2017 Master Catalogue

WIDIA™

For more than 90 years, WIDIA™ brand products and services have defined excellence in innovation, technology, and customer service.

From turning, indexable milling, solid end milling, holemaking, tapping, and tooling systems — WIDIA offers a broad range of solutions, all delivered from a single source. Match the most expansive portfolio of precision-engineered products and engineered solution services available today with a global, specialised network of Authorised Distributor partners, and you have the tools you need — and the power that only comes from WIDIA.

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Table of Contents

1926
Tungsten carbide production begins

1937
WIDIA™ wins the Grand Prix at the world exposition in Paris

1962
First patent granted for coated carbide inserts

1967
WIDIA (India) begins producing carbide and tools

1968
Launch of first global coated grade

A **Powerful History** of **High Performance**

For more than 90 years, WIDIA™ brand products and services have defined excellence in innovation, technology, and customer service. From the world's first patent for carbide indexable inserts to the development of the world's first coated grades, WIDIA delivers extreme results, no matter what the challenge.

From turning, indexable milling, solid end milling, holemaking, tapping, and tooling systems — WIDIA offers a broad range of solutions. Match the most expansive portfolio of precision-engineered products and engineered solution services available today with a global, specialized network of Authorised Distributor partners, and you have the tools you need — and the power that only comes from WIDIA.

WIDIA™

1982
Launch of first PVD TiN coated taps (VTD)

1987
Launch of the Widaflex™ tooling system for turning, holemaking, and milling

2000
QS 9000 TES and VDA 6.4 certification for the WIDIA operations in Germany

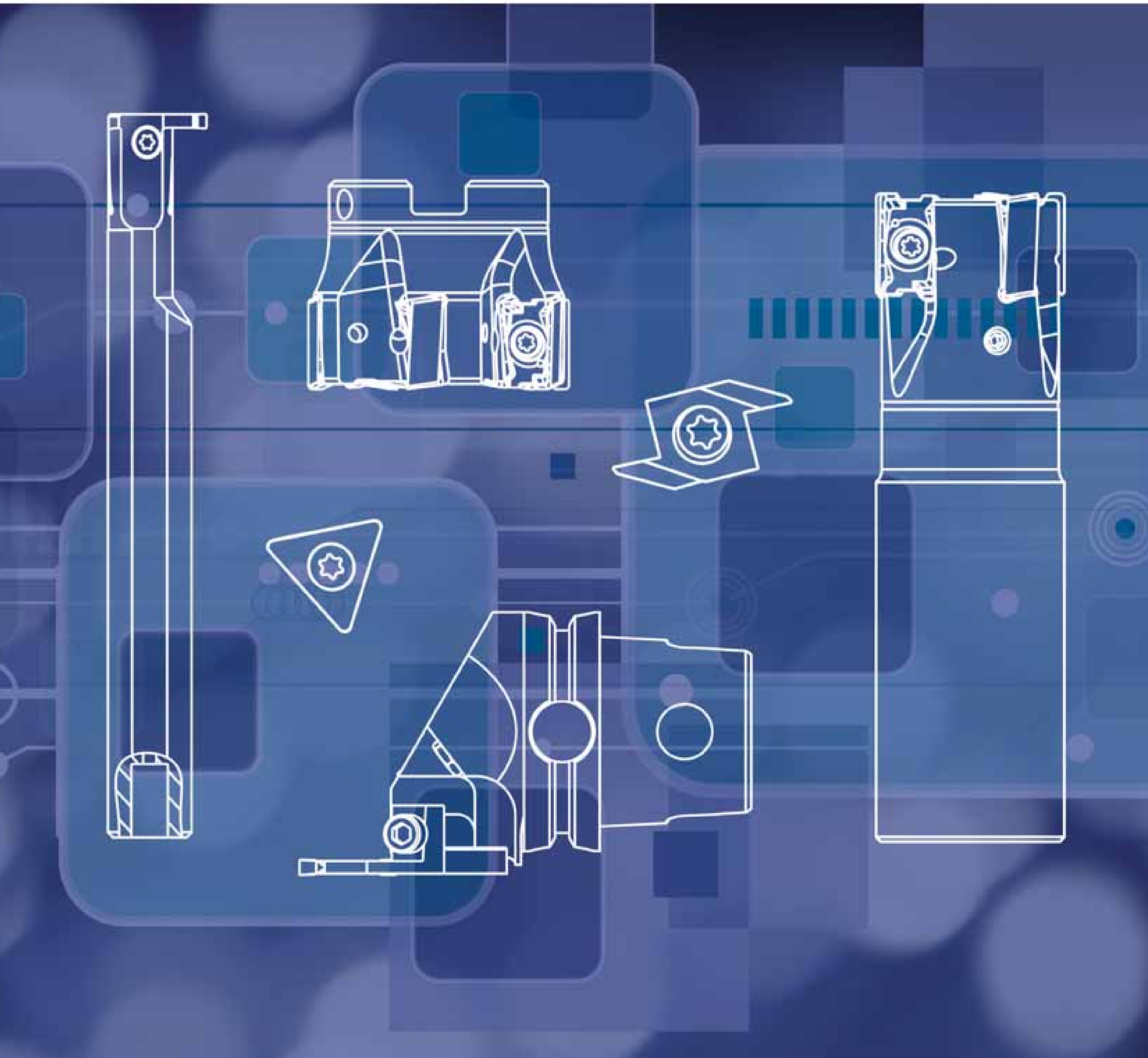
2009
The WIDIA, Hanita, Greenfield Tap & Die, Circle, ClappDiCo, Manchester, Metal Removal, Metcut, and Rübig brands combine to create the WIDIA Products Group

2011
Launch KM™ and ERICKSON™ Portfolio

2013
Launch of new VariTap™ series

2016
WIDIA celebrates 90 years

WIDIA™



01

THE DIGITAL SOURCE FOR DELIVERING
SMART MACHINING SOLUTIONS

widia.com/novo

NOVO™

WIDIA™ Metalworking Services

WIDIA™ provides an array of products and support services from onsite tool management and engineering personnel, to inventory control systems, to tool manufacturing, reconditioning, and recycling to support tools and their processes throughout their entire lifecycle. Our metalworking services are designed to save your business time, money, and inventory, and protect your cutting tool investment for the long term.

Let WIDIA help you extend the life of your tools and maintain their performance in delivering productivity. Contact your local authorised WIDIA distributor or visit widia.com/services to learn more.

NOVO™

NOVO™ possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

See pages D92–D93, H61, S9, and Y57 to learn more.

ToolBOSS™ Vending Solution

ToolBOSS vending solutions help to reduce costs and improve efficiencies to give you a competitive edge.

See pages M131 and U9 to learn more.

CAS

Customer Application Support

WIDIA™ Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of WIDIA tooling.

See pages D75, L15, and W67 to learn more.

Toolholder Service and Repair

When your WIDIA™ advanced tooling products need to be serviced, the WIDIA Service and Repair Department has the highly trained staff to provide expert assistance.

See page M71 to learn more.

Carbide Recycling

The WIDIA™ Carbide Recycling Programme can turn accumulated scrap carbide tooling in your shop into cash.

See pages R19 and T97 to learn more.

KNOWLEDGE
CENTER

Knowledge Center

The Knowledge Center offers several ways to get trained. In-person classes include lecture, lab, and machining demonstrations.

See pages L31 and U39 to learn more.

WIDIA and the Machine Tool Industry (MTI)

We have Machine Tool Industry (MTI) specialists in more than 60 countries around the world, so there's always someone near you: W-MTI.Solutions@WIDIA.com.

See page O216–O217 to learn more.

Tool Reconditioning

WIDIA Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

See pages I11, N22–N23, T140–T141, V42–V43, and Y87 to learn more.

Get fast and reliable answers to your toughest metalcutting problems.

Our Customer Application Support (CAS) Team is the metalworking industry's leading help desk resource for tooling application solutions and problem resolution.

Customer Application Support (CAS)

• Easy access to proven metalworking expertise.
• Service level excellence.
• Best-in-class application support tools and technology.

Easy access to proven metalworking expertise!

WIDIA™ Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of WIDIA tooling.

Service Level Excellence:

• Fast telephone response.
• Quick technical solutions.
• Efficient case management.

Services Provided:

• Tooling selection.
• Operating parameters.
• Troubleshooting.
• Process optimisation.
• Hardware support.

Best-in-Class Support Tools and Technology:

• Tooling performance experts.
• Materials database.
• Application calculators.

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Malaysia	English	+60 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
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Thailand	English	+66 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
United Kingdom	English	+44 0800 028 2996	001 724 539 6830 *	na.techsupport@widia.com
Ukraine	Russian	+380 0800502665	0048 6166 56504*	eu.techsupport@widia.com
USA	English	888 539 5145	001 724 539 6830 *	na.techsupport@widia.com

*Noted phone and fax numbers are not toll free.

On the Web

We are here to serve you.

Visit our homepage at widia.com to:

- Find a local WIDIA™ Authorised Distributor near you.
- Contact our Customer Application Support team for technical support and product recommendations.
- Log in to NOVO™ for instant access to inventory availability, application recommendations, CAD drawings, and 3D models.
- Purchase WIDIA-branded merchandise.
- Get social with us on Facebook, Twitter, Instagram, YouTube, and more!

NOVO™

You can also use our NOVO app to guide you to the correct choice!

For more information, please visit widia.com/novo.

NOVO: The Digital Source for Delivering Smart Machining Solutions

For more information, contact your local WIDIA Authorized Distributor or visit **widia.com/services**.

WIDIA™

Turning

Turning Product Highlights

WIDIA™ Victory™ High-Temp Turning

With three geometries and three grades, WIDIA Victory has a complete portfolio for high-temp turning applications in nickel-based (INCONEL®, Udimet®, Rene), cobalt-based (Haynes®), and Fe-based (Airmet 100) materials, as well as difficult-to-machine stainless (460SS, duplex, high-alloy stainless), cobalt-chrome, and stainless-based powdered metals. These materials are commonly found in rings, housings, hubs, compressors, fans, rotors, and medical devices.

-FS Geometry

The -FS Geometry is a ground, highly-positive design best used in finishing cuts where size control, finish, and minimisation of part deflection are considerations.

- Excellent chip control versus similar competitive geometries. This chip control adds process stability and reduces machine stoppages to remove stringers.
- Increased cutting speed and/or feed rate for better chip control to reduce cycle time, gain productivity, and reduce machining cost.
- Reduced cutting forces provide longer tool life and/or better surface finish.
- Improved depth-of-cut (DOC) notching resistance for longer tool life.
- Advanced PVD grades provide more wear resistance and longer tool life.

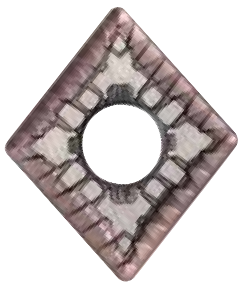
-MS Geometry

-MS geometry is a moulded geometry with increased edge toughness that is best used in medium machining.

- The -MS geometry offers excellent chip control versus similar competitive geometries. This chip control adds process stability and reduces machine stoppages to remove stringers.
- Available in two PVD grades, -MS is a high-performance geometry. Compete with confidence against any competitor. The -MS is also available in an uncoated grade.
- The WIDIA™ Victory™ grades offer better depth-of-cut (DOC) notching resistance and improved edge toughness. This offers customers an improved solution from other competitors.

-UR Geometry

- -UR geometry offers a roughing solution for high-temp materials. Available in WS10PT™ and WS25PT™, the -UR geometry provides smooth chip forming and improved coolant flow for increased tool life. This positive geometry, with its unique chipbreaker without inflection points, reduces cutting forces and improves depth-of-cut (DOC) notching resistance.



Turning Product Highlights

WIDIA™ VariTurn™

Formerly known as WIDIA Value, the WIDIA VariTurn platform offers high-performance inserts with versatility. With eight grades and eight geometries, VariTurn covers 80% of all turning applications.

Every insert is gold, which exposes wear as the tool continues to be used. This makes it easy to detect when an insert is ready to be changed, maximising the product's value and protecting the workpiece. Also, because WIDIA VariTurn inserts can be used in most applications, a single insert can take on any number of tasks, thus reducing inventory. WIDIA VariTurn products are reliable enough to cut steel, stainless steel, cast iron, and high-temperature alloys, enabling quick changes in workpiece materials without the need to swap inserts, saving time and money.

WMT™ System

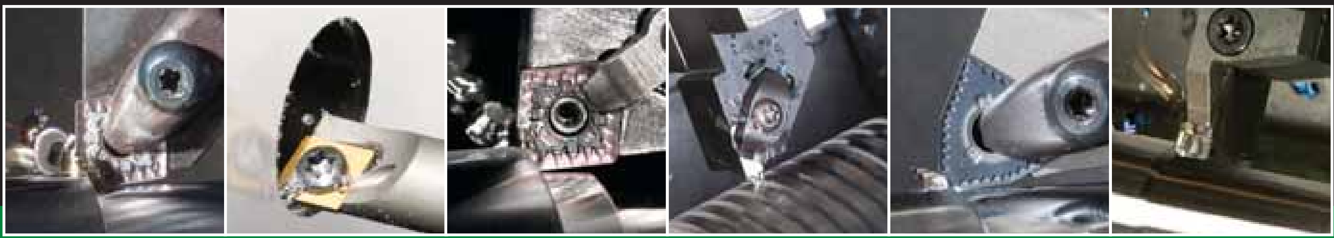
The WMT platform is the economical and reliable option for all grooving, face grooving, cut-off, turning, and profiling applications. The WMT system ensures precise insert positioning and provides only the most accurate machining, with exceptionally fast cycle times and superior performance.

The WMT portfolio offers:

- Proven higher stability.
  - WMT insert design has the best clamping system for stability.
- Platform flexibility, with multiple geometries in single holder for multiple application types.
- Victory™ grades:
  - WU10HT™ — Uncoated
  - WU10PT, WU25PT — PVD
  - WP10CT, WP10CT — CVD
- Greater depth-of-cut (DOC) capability.

Versatile and Well Constructed

- Specifically designed to increase speeds and feeds.
- Excellent geometry for even the most demanding deep grooving applications.
- The WMT system enables heavy stock removal in turning applications.
- Ensures finer surface finishes and a long, reliable tool life.



WIDIA™ Tools for Small Hole Boring

When the application calls for boring at a D min of less than 35mm, WIDIA offers comprehensive and easy solutions to choose from. Our portfolio of tools for small hole boring offer solutions in either indexable inserts or solid carbide inserts, and inserts are available for boring, profiling, threading, and grooving.

I.D. Indexable Tooling

- Steel and solid carbide shanks with through coolant in inch and metric sizes.
- Ground-in and pressed-type chipbreaker inserts.
- Coated and uncoated carbide grades and cubic boron nitride/polycrystalline diamond-tipped inserts to support all machining applications.

Quadralock™ System

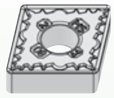
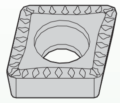
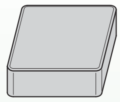
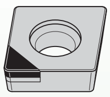
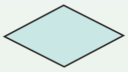
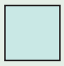
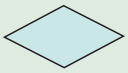
- Versatile and engineered to give exceptional performance for I.D. machining applications. Quick, accurate insert indexing.
- Internal coolant can be used with all tool bodies. Cutting inserts have special slots that direct coolant to the cutting edge.
- Carbide grades for steels, stainless steels, non-ferrous materials, super alloys, titanium, and hard materials.

A/B Series Tooling

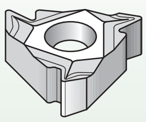
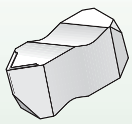
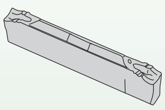
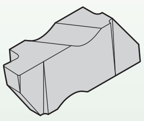
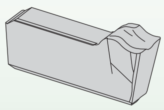
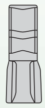
- Inserts repeat within ±0,013mm, allowing quick and accurate setups.
- Elliptical, ground insert shanks allow for maximum strength and rigidity.
- Available in boring, grooving, threading, and profiling insert styles.
- Coated and uncoated carbide grades and cubic boron nitride/polycrystalline diamond-tipped inserts to support all machining applications.

ISO Turning Inserts

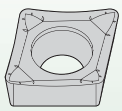
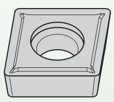
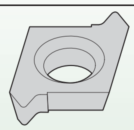
Step 1 • Select Insert Style

						
			Carbide Inserts, Negative	**Carbide Inserts, Positive**	**Ceramic Inserts**	**PcBN/PCD Inserts**
C	Rhomboid 80°		B35–B45	B30–B34 B45–B46	B179–B181	B197–B203
D	Rhomboid 55°		B51–B63	B47–B50 B63–B64	B182–B183	B206–B210
R	Round		B67	B65–B66	B184–B186	B210
S	Square 90°		B70–B77	B68–B70 B78–B80	B187–B192	B210–B212
T	Triangular 60°		B83–B91	B91–B93	B193–B195	B212–B215
V	Rhomboid 35°		B95–B99	B94–B95	B196	B216–B218
W	Trigon 80° with enlarged corner angles		B99–B105	B105	B196	B218

Threading, Grooving, and Cut-Off

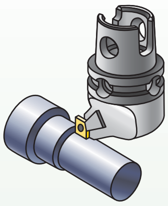
						
	LT	**TopThread™**	**WMT™**	**TopGroove™**	**Separator™**	**ProGroove™**
inserts	F42–F68	F8–F22	E12–E26	E48–E72	E112–E121	E94–E101
toolholders	F69–F77	F23–F35	E28–E39	E73–E79	E122–E128	E102–E104

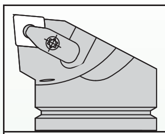
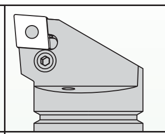
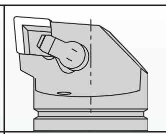
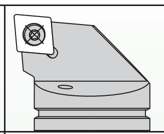
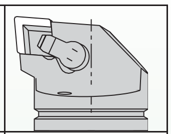
WIDIA™ Turning Solutions

			
	Inserts to Machine Aluminium	**VariTurn™**	**Tools for Small Hole Boring**
inserts	B150–B157	B106–B149	D2–D91

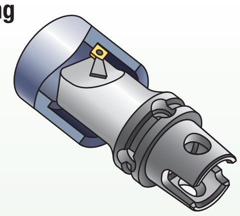
Step 2 • Select Application and Clamping System

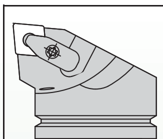
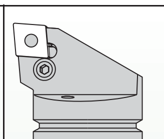
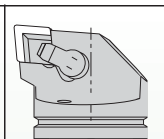
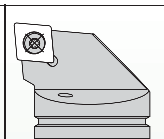
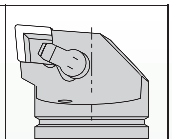
External Machining



				 D-Style Clamping	 P-Style Clamping	 Negative C-Style Clamping	 S-Style Clamping	 Positive C-Style Clamping
C	Rhomboid 80°		conventional	C8–C10	C20–C22	C31–C32	C42–C43	–
D	Rhomboid 55°			C11	C23–C24	C32–C33	C43–C42	–
R	Round		conventional	C12	–	C35	–	C40–C41
S	Square 90°		conventional	C12–C14	C25–C27	C36–C37	C45	–
T	Triangular 60°		conventional	C15	C28–C29	C37–C39	C46–C47	–
V	Rhomboid 35°		conventional	C16–C17	–	–	C48	–
W	Trigon 80° with enlarged corner angles		conventional	C19	C30	–	C48–C49	–

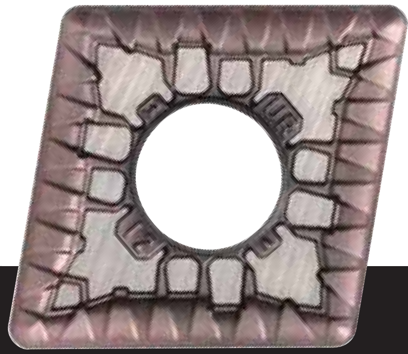
Internal Machining



				 D-Style Clamping	 P-Style Clamping	 Negative C-Style Clamping	 S-Style Clamping	 Positive C-Style Clamping
C	Rhomboid 80°		conventional	C56	C60	C62	C66–C70	–
D	Rhomboid 55°			C56–C57	–	C63	C71–C76	–
R	Round		conventional	–	–	–	–	–
S	Square 90°		conventional	–	–	C63–C64	–	–
T	Triangular 60°		conventional	C58	C60	–	C77–C80	C65
V	Rhomboid 35°		conventional	C58	–	–	C80–C81	–
W	Trigon 80° with enlarged corner angles		conventional	C59	C61	C64	–	–

Turning • ISO Inserts

Specifically engineered multilayer coating provides high-speed capability for finishing to roughing operations. New geometries enhance chip control for better tool life and superior surface finshes.



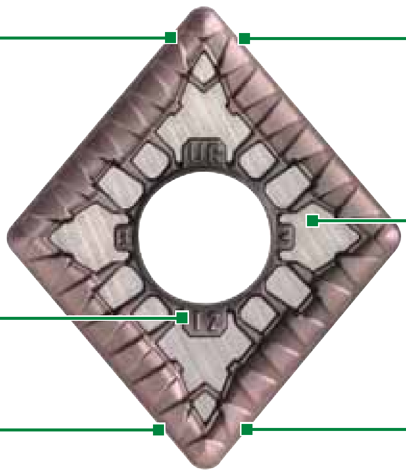
Victory

- Market-leading technology.
- Longer tool life.
- Higher productivity through increased speed capability.

Steel and Stainless Steel Grades

- Reduced cycle times — high speed and feed capability.
- Long tool life — new multilayer coating provides better wear resistance.
- Proven seating — smooth and secure seating surface.
- Outer layer is bronze-colored for easier wear detection.

Post-coat treatment
- Improves edge toughness.
- Long, predictable tool life.
- Reduces depth-of-cut notching.
- Wide range of applications.

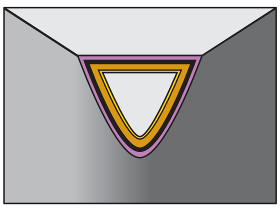


Improved edge toughness
- Provides smooth outer surface to reduce forces, friction, and workpiece sticking.

Post-coat grinding
- Provides secure seating surface.

New geometry identification system.

MT-CVD/CVD–TiN-TiCN-Al_2O_3-ZrCN

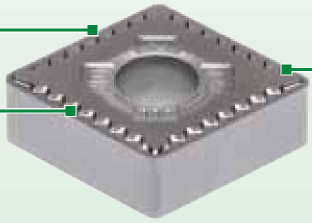


Alpha aluminia layer
- Provides coating integrity at elevated speeds.
- Higher productivity and dependability at high cutting temperatures.

New WIDIA™ Victory™ grades and geometries are designed to offer better tool life and surface finishes.

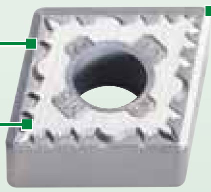
..GG-FS Geometry

- All ..GG-FS inserts are G tolerance inserts. This is a critical feature in some applications, especially the aerospace industry.
- Reduced cycle times — high speed and feed capability.
- Reduced cutting forces — improved dimensional control and reduced deflections.
- New chip forming elements — better chip control.
- Long tool life — new multilayer coating provides better wear resistance.
- Proven seating — smooth and secure seating surface.



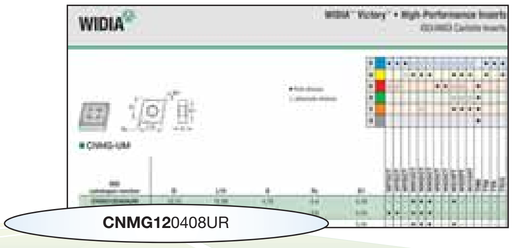
..MG-MS Geometry

- High positive rake angle delivers improved tool life by reducing cutting forces and built-up edge when machining high-temp alloys.
- Improved chip control and reduced crater wear due to proprietary chipbreakers with varying shapes and distances.
- Reduced thermal wear and cracking due to near sharp cutting edge with optimised edge treatment.
- Improved chipbreaking at various depths of cut due to variable land width, which improves impact strength.
- All MG-MS inserts are moulded, which supports increased tool life due to the elimination of grinding stress.

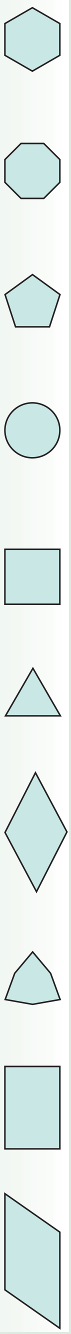


How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.

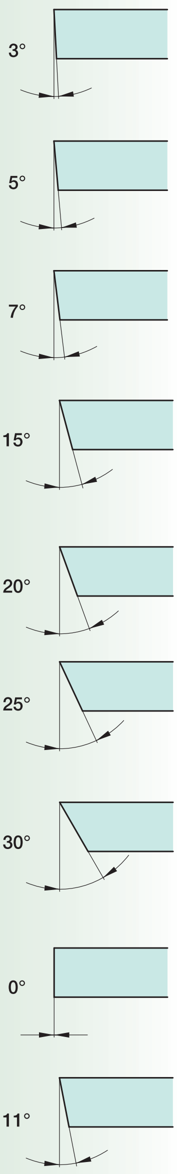


C — Insert Shape



- **H** Hexagon 120°
- **O** Octagon 135°
- **P** Pentagon 108°
- **R** Round —
- **S** Square 90°
- **T** Triangular 60°
- **C D E M V** Rhomboid 80° 55° 75° 86° 35°
- **W** Trigon 80° with enlarged corner angles
- **L** Rectangular 90°
- **A B N/K** Parallelogram 85° 82° 55°

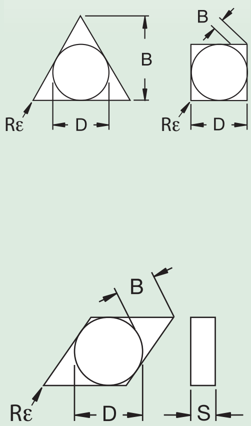
N — Insert Clearance Angle



- **A** 3°
- **B** 5°
- **C** 7°
- **D** 15°
- **E** 20°
- **F** 25°
- **G** 30°
- **N** 0°
- **P** 11°
- **O** Indicated for other clearance angles requiring descriptions.

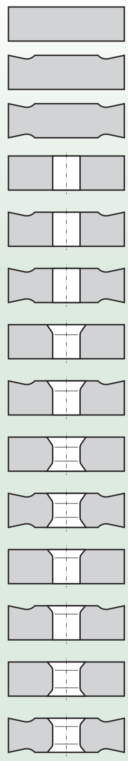
M — Tolerance Class

Tolerances apply prior to edge prep and coating



D = Theoretical diameter of the insert inscribed circle
S = Thickness
B = See figures below

G — Insert Features



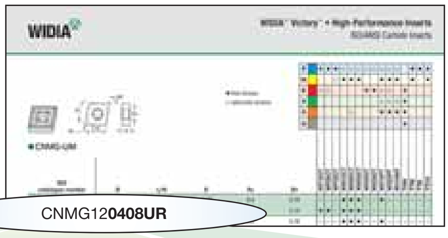
- N
- R
- F
- A
- M
- G
- W
- T
- Q
- U
- B
- H
- C
- J
- **X V** Special Design

12 — Size

"D" mm	C	D	R	S	T	V	W
	Code for mm cutting edge length "L10"						
3,97	S4	04	03	03	06	—	—
4,76	04	05	04	04	08	08	S3
5,56	05	06	05	05	09	09	03
6,00	—	—	06	—	—	—	—
6,35	06	07	06	06	11	11	04
7,94	08	09	07	07	13	13	05
8,00	—	—	08	—	—	—	—
9,52	09	11	09	09	16	16	06
10,00	—	—	10	—	—	—	—
11,11	11	13	11	11	19	19	07
12,00	—	—	12	—	—	—	—
12,70	12	15	12	12	22	22	08
14,29	14	17	14	14	24	24	09
15,88	16	19	15	15	27	27	10
16,00	—	—	16	—	—	—	—
17,46	17	21	17	17	30	30	11
19,05	19	23	19	19	33	33	13
20,00	—	—	20	—	—	—	—
22,22	22	27	22	22	38	38	15
25,00	—	—	25	—	—	—	—
25,40	25	31	25	25	44	44	17
31,75	32	38	31	31	54	54	21
32,00	—	—	32	—	—	—	—

tolerance class	tolerance on "D"	tolerance on "B"	tolerance on "S"
C	±0,025	±0,013	±0,025
H	±0,013	±0,013	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,025	±0,013
M	See tables on next page		±0,013
U	See tables on next page		±0,013

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



04 – Thickness S

symbol mm	thickness mm
–	0,79
T0	1,00
01	1,59
T1	1,98
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94
9	9,52
11	11,11
12	12,70

08 – Corner Radius “Rε”

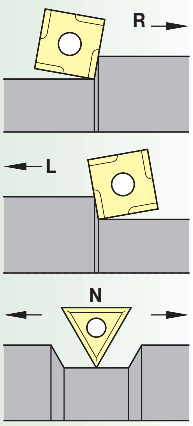
symbol mm	corner radius mm
X0	0,04
01	0,1
02	0,2
04	0,4
08	0,8
12	1,2
16	1,6
20	2,0
24	2,4
28	2,8
32	3,2
00	round insert
M0	round insert
–	

Hand of Insert (optional)

R = Right hand

L = Left hand

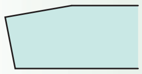
N = Neutral

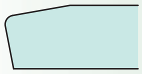


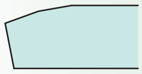
Cutting Edge (optional)

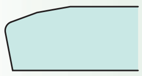
F  Sharp

E  Rounded

T  Chamfered

S  Chamfered and Rounded

K  Double-Chamfered

P  Double-Chamfered and Rounded

UR – Chipbreaker (optional)

13 = Railroad Light
CT = Copy Turning
FF = Fine Finishing
FP = Finish Positive
FW = Finish Wiper
ML = Medium Light
MR = Medium Roughing
MW = Medium Wiper
RH = Roughing Heavy
T = Negative Land
UF = Universal Finishing
UM = Universal Medium
UR = Universal Roughing
.NMP = Sharp Medium
MP = Medium Positive
FS = Finishing High-Temp(S)
MS = Medium High-Temp(S)
MU = Medium Universal
SR = Super Roughing
65 = Heavy Roughing

± Tolerance on “D”

	Class M Tolerance			Class U Tolerance
“D” mm	Shapes S, T, C, R, & W mm	Shape D mm	Shape V mm	Shapes S, T, & C mm
3,97	0,05	–	–	–
4,76	0,05	–	–	0,08
5,56	0,05	0,05	0,05	0,08
6,35	0,05	0,05	0,05	0,08
7,94	0,05	0,05	0,05	0,08
9,52	0,05	0,05	0,05	0,08
11,11	0,08	0,08	0,08	0,13
12,70	0,08	0,08	0,08	0,13
14,29	0,08	0,08	0,08	0,13
15,88	0,10	0,10	0,10	0,18
17,46	0,10	0,10	0,10	0,18
19,05	0,10	0,10	0,10	0,18
22,22	0,13	–	–	0,25
25,40	0,13	–	–	0,25
31,75	0,15	–	–	0,25

± Tolerance on “B”

	Class M Tolerance			Class U Tolerance
“D” mm	Shapes S, T, C, R, & W mm	Shape D mm	Shape V mm	Shapes S, T, & C mm
3,97	0,08	–	–	–
4,76	0,08	–	–	0,13
5,56	0,08	0,11	–	0,13
6,35	0,08	0,11	–	0,13
7,94	0,08	0,11	–	0,13
9,52	0,08	0,11	0,18	0,13
11,11	0,13	0,15	–	–
12,70	0,13	0,15	0,25	0,20
14,29	0,13	0,15	–	–
15,88	0,15	0,18	–	0,27
17,46	0,15	0,18	–	0,27
19,05	0,15	0,18	–	0,27
22,22	0,15	–	–	0,38
25,40	0,18	–	–	0,38
31,75	0,20	–	–	0,38

A system of grades, geometries, and application guidelines to provide optimal solutions for your metalcutting needs. It's easy to determine which WIDIA™ chip-control cutting tool will work best in your specific workpiece materials and applications!

W	P	15	C	T
Brand	Primary Workpiece Material	Application Range*	Insert Material	Application

Primary Workpiece Material

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials
U	Universal Machining

Application Range*

05	=	fine finishing
10	=	finishing
15	=	medium to roughing
20	=	medium to roughing
25	=	medium to roughing
30	=	roughing
35	=	roughing
40	=	heaviest roughing
45	=	heaviest roughing
50	=	heaviest roughing

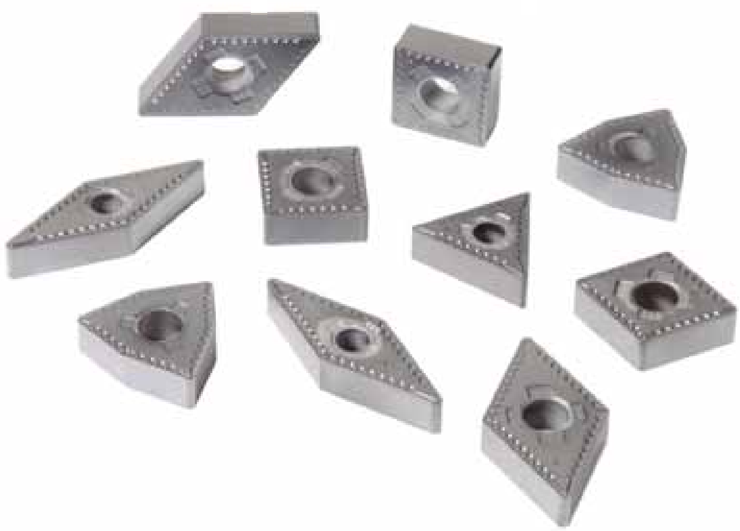
*Samples shown are based on turning and will differ within applications

Insert Material

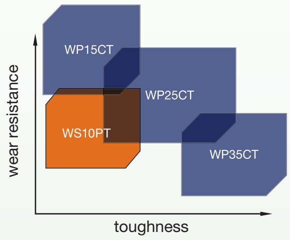
H	=	Uncoated Carbide
C	=	Carbide + CVD
P	=	Carbide + PVD
T	=	Cermet
Y	=	Ceramics
D	=	Diamond
B	=	PcBN
S	=	HSS
E	=	HSS-E
M	=	HSS-E-PM

Application

T	=	Turning
M	=	Milling
H	=	Holemaking
D	=	Solid Drills
E	=	Solid End Mills
G	=	Taps
R	=	Reamer
V	=	Thread Mills

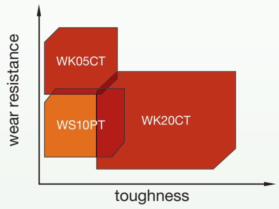


Victory Toughness/Wear Resistance



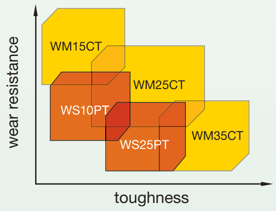
WP Grades for Steel

- Three grades and seven primary geometries for use in roughing to finishing operations.
- Increase cutting speed and/or feed rate to gain productivity.



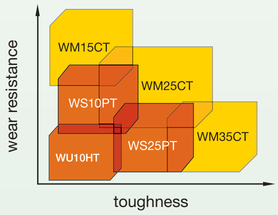
WK Grades for Cast Iron

- Three grades across 12 geometries for use in roughing to finishing operations.
- Very good balance of wear resistance and toughness for long predictable tool life. Flat top geometry for machining cast iron. For finishing to roughing applications.



WM Grades for Stainless Steel

- Two grades to cover all of your cast iron turning operations.
- Increase cutting speed and/or feed rate by up to 30% over similar competitive grades.



WS Grades for High-Temp Alloys

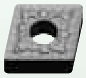
- Two grades for use in roughing to finishing operations.
- Very good wear resistance for longer tool life.
- One uncoated grade for use in titanium.

Positive and Negative Inserts

Positive Inserts

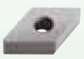
- Screw-on inserts are the first choice for I.D. turning of all materials and O.D. turning on small to medium lathes.
- Suitable for all workpiece materials.

Negative Inserts



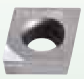
- Negative style inserts are your first choice for general machining of all materials on medium to large lathes.
- Negative style inserts offer the best economy for high metal removal rates.
- Available in flat-top and chip-control geometries with both moulded and ground peripheries.
- Suitable for all workpiece materials.

Ceramic Inserts



- Ceramic inserts are a great choice for productive machining of high-temp alloys.
- Negative rake inserts are also recommended for the machining of hardened materials and cast irons.
- Available in flat-top geometries with moulded and ground peripheries.

PcBN and PCD Inserts



- PcBN can be used for machining steels with a hardness higher than 48 HRC.
- PcBN inserts can also be used for productivity improvements in machining cast irons and high-temp alloys.
- PCD inserts are used for machining non-ferrous materials.

Insert Selection System

How to Use

The WIDIA three-step insert selection system makes choosing and applying the most productive tool as easy as 1, 2, 3.
Tool recommendations are based on six workpiece material groups, optimising selection accuracy.

Example:
Six workpiece material groups

Step 1 • Select the insert geometry

Given: depths of cut = 1mm (.040")
feed = 4mm (.016 IPR)
Unknown: insert geometry
Solution: -RH

Step 2 • Select the grade

Given: cutting conditions:
lightly interrupted cut
Geometry: -RH
Unknown: grade
Solution: WP25CT™

Step 3 • Select the cutting speed

Given: grade WP35CT™
cutting conditions
material CK15
Unknown: cutting speed
Solution: 210 m/min

Need help in selecting a product?
Additional information can be obtained by contacting
the WIDIA Customer Application Support Team.
Go to widia.com for your country's phone number.

Step 1 • Select the insert geometry

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

Negative Inserts


-RH

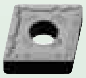

-UR

Roughing

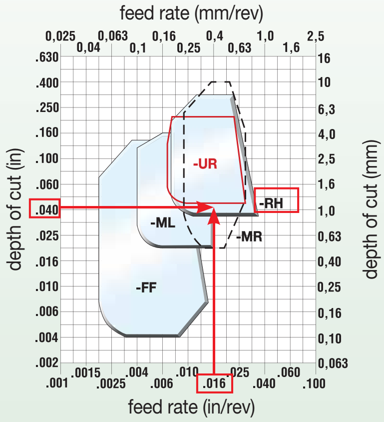

-ML


-MR

Medium Machining


-FF

Finishing



Step 2 • Select the grade

cutting condition	Negative Insert Geometry -FF	-ML	-MR	-UR	-RH	Positive Insert Geometry -FP	-MU	-MP
heavily interrupted cut	WP15CT	WP25CT	WP35CT/ WP25CT	WP35CT	WP35CT	WP25CT/ WS25PT	WP35CT	WM35CT
lightly interrupted cut	WP15CT	WP25CT	WP25CT	WP35CT	WP35CT	WP25CT	WP25CT	WP25CT
varying depth of cut, casting, or forging skin	WP15CT	WP15CT	WP15CT	WP25CT	WP25CT	WP15CT	WP15CT	WP15CT
smooth cut, pre-turned surface	WP15CT	WP15CT	WP15CT	WP25CT	WP25CT	WP15CT	WP15CT	WP15CT

Step 3 • Selecting the cutting speed

Low-Carbon (<0.3% C) and Free-Machining Steel speed — m/min Starting Conditions

material group	grade	135	180	225	275	320	360	410	455	495	m/min
P0/P1	WP15CT										395
	WP25CT										275
	WP35CT										210
	WS10PT										280

WIDIA Material Group Selection Guide:

To optimise speed recommendations, material subgroups have been added to each of the six workpiece material groups.

material	material group ISO code	number of material subgroups
steel	P	1–6
stainless steel	M	1–3
cast iron	K	1–3
non-ferrous materials	N	1–8
high-temp alloys	S	1–4
hardened materials	H	1

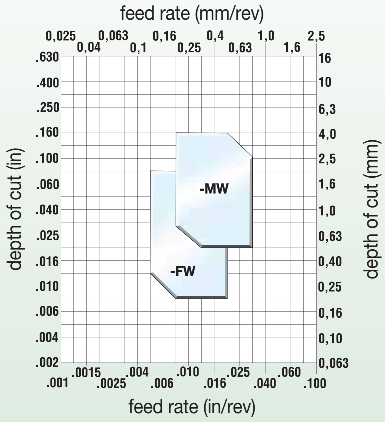
Step 1 • Select the insert geometry

WIDIA VICTORY

Negative Wiper Inserts

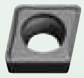

-MW
Medium Wiper

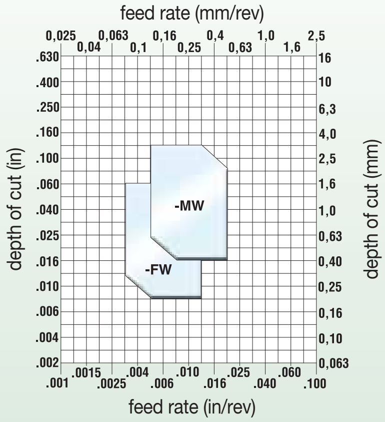

-FW
Finishing Wiper



Positive Wiper Inserts


-MW
Medium Wiper


-FW
Finishing Wiper



Step 2 • Select the grade

cutting condition	Negative Insert Geometry -FW	Negative Insert Geometry -MW	Positive Insert Geometry -FW	Positive Insert Geometry -MW
heavily interrupted cut	WP15CT	WP25CT	–	WP25CT
lightly interrupted cut	WP15CT	WP25CT	WP15CT	WP25CT
varying depth of cut, casting, or forging skin	WP15CT	WP15CT	WP15CT	WP15CT
smooth cut, pre-turned surface	WP15CT	WP15CT	WP15CT	WP15CT

Step 1 • Select the insert geometry

Negative Inserts


-RH

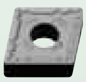

-UR

Roughing

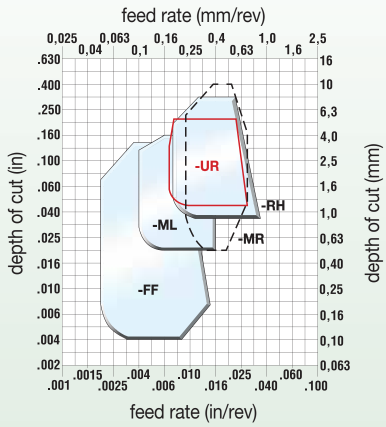

-ML


-MR

Medium Machining


-FF

Finishing



Positive Inserts

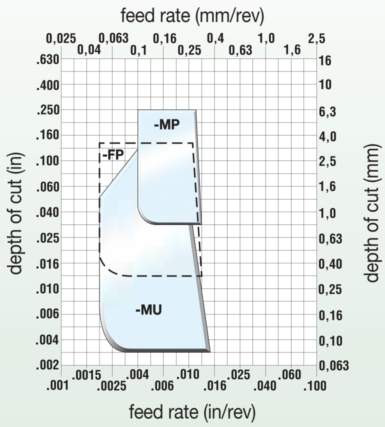

-MP


-MU

Medium Machining


-FP

Finishing



Step 2 • Select the grade

cutting condition	Negative Insert Geometry -FF	-ML	-MR	-UR	-RH	Positive Insert Geometry -FP	-MU	-MP
heavily interrupted cut	WP15CT	WP25CT	WP35CT/ WP25CT	WP35CT	WP35CT	WP25CT/ WS25PT	WP35CT	WM35CT
lightly interrupted cut	WP15CT	WP25CT	WP25CT	WP35CT	WP35CT	WP25CT	WP25CT	WP25CT
varying depth of cut, casting, or forging skin	WP15CT	WP15CT	WP15CT	WP25CT/ WP10CT	WP25CT	WP15CT	WP25CT/ WP10CT	WP15CT
smooth cut, pre-turned surface	WP15CT	WP15CT	WP15CT	WP25CT/ WP10CT	WP25CT	WP15CT	WP25CT/ WP10CT	WP15CT

(continued)

Step 3 • Select the cutting speed *(continued)*

Low-Carbon (<0.3% C) and Free-Machining Steel — speed – m/min — Starting Conditions

material group	grade	135	180	225	275	320	360	410	455	495	m/min
P0/P1	WP15CT										395
	WP25CT										275
	WP35CT										210
	WS10PT										280
	WM35CT										280

Medium- and High-Carbon Steels (<0.3% C) — speed – m/min — Starting Conditions

material group	grade	135	180	225	275	320	360	410	455	495	m/min
P2	WP15CT										265
	WP25CT										195
	WP35CT										150
	WS10PT										200
	WM35CT										200

Alloy Steels and Tool Steels (≤330 HB) (≤35 HRC) — speed – m/min — Starting Conditions

material group	grade	135	180	225	275	320	360	410	455	495	m/min
P3	WP15CT										190
	WP25CT										155
	WP35CT										120
	WS10PT										155
	WM35CT										155

Alloy steels and Tool Steels (340–450 HB) (36–48 HRC) — speed – m/min — Starting Conditions

material group	grade	60	90	120	150	180	210	240	270	300	m/min
P4	WP15CT										145
	WP25CT										105
	WP35CT										95
	WS10PT										110
	WM35CT										110

Ferritic, Martensitic, and PH Stainless Steels (≤330 HB) (≤35 HRC) — speed – m/min — Starting Conditions

material group	grade	120	150	180	210	240	270	300	330	360	m/min
P5	WP15CT										215
	WP25CT										195
	WP35CT										135
	WS10PT										200

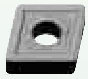
Ferritic, Martensitic, and PH Stainless Steels (340–450 HB) (36–48 HRC) — speed – m/min — Starting Conditions

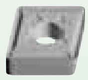
material group	grade	105	135	165	195	225	255	285	315	345	m/min
P6	WP15CT										180
	WP25CT										150
	WP35CT										105
	WS10PT										150

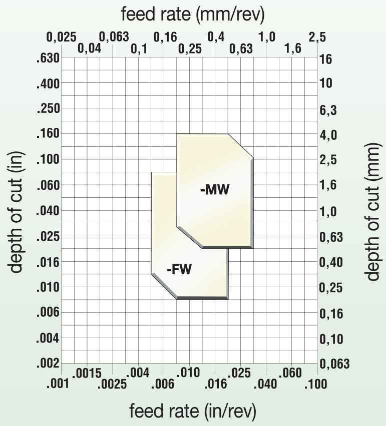
Step 1 • Select the insert geometry

WIDIA VICTORY

Negative Wiper Inserts

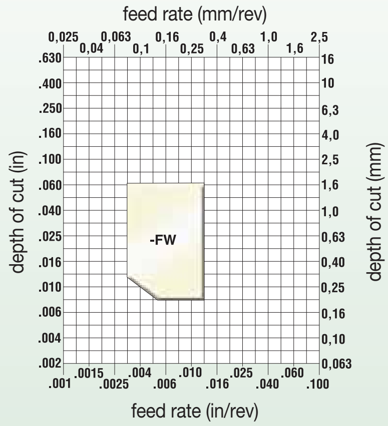

-MW
Medium Wiper


-FW
Finishing Wiper



Positive Wiper Inserts


-FW
Finishing Wiper

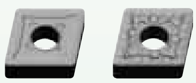


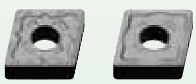
Step 2 • Select the grade

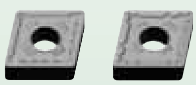
cutting condition	Negative Insert Geometry -FW	Negative Insert Geometry -MW	Positive Insert Geometry -FW
heavily interrupted cut	WM15CT	WM15CT	WM15CT
lightly interrupted cut	WM15CT	WM25CT	WM15CT
varying depth of cut, casting, or forging skin	WM15CT	WM25CT	WM15CT
smooth cut, pre-turned surface	WM15CT	WM25CT	WM15CT

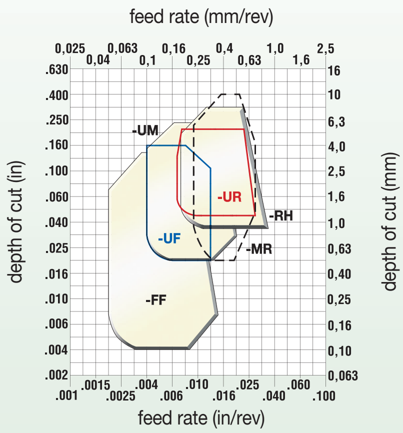
Step 1 • Select the insert geometry

Negative Inserts


-RH -UR
Roughing


-MR -UM
Medium Machining

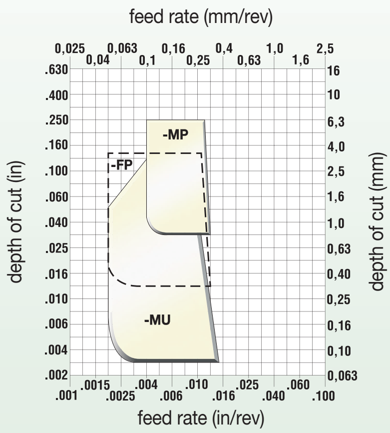

-UF -FF
Finishing



Positive Inserts


-MP -MU
Medium Machining


-FP
Finishing



(continued)

Step 2 • Select the grade *(continued)*

cutting condition	-FF	-UF	-MR	-UM	-RH	-UR
	Negative Insert Geometry					
heavily interrupted cut	WS10PT	WM15CT	WM35CT	WM35CT	–	WM35CT
lightly interrupted cut	WS10PT	WM15CT	WM25CT	WM25CT	WM35CT	WM35CT/ WM25CT
varying depth of cut, casting, or forging skin	WM15CT	WM15CT/ WS10PT	WM15CT	WM15CT	WM35CT	WM25CT
smooth cut, pre-turned surface	WM15CT	WM15CT	WM15CT	WM15CT	–	WM15CT

cutting condition	-FP	-MU	-MP
	Positive Insert Geometry		
heavily interrupted cut	WM25CT	WM35CT/ WS25PT	WM25CT
lightly interrupted cut	WM25CT	WM25CT/ WS10PT	WM25CT
varying depth of cut, casting, or forging skin	WM25CT/ WM15CT	WM25CT	WM25CT/ WM15CT
smooth cut, pre-turned surface	WM15CT	WM25CT	WM15CT

Step 3 • Select the cutting speed

Austenitic Stainless Steel — speed — m/min — Starting Conditions

material group	grade	90	135	180	225	270	315	200	360	405	450	m/min
M1	WM15CT											180
	WM25CT											150
	WM35CT											120
	WS10PT											215
	WS25PT											180

Austenitic Stainless Steel — speed — m/min — Starting Conditions

material group	grade	90	135	180	225	270	315	200	360	405	450	m/min
M2	WM15CT											165
	WM25CT											140
	WM35CT											105
	WS10PT											200
	WS25PT											165

Austenitic Stainless Steel: Duplex (Ferritic and Austenitic Mixture) — speed — m/min — Starting Conditions

material group	grade	90	135	180	225	270	315	200	360	405	450	m/min
M3	WM15CT											150
	WM25CT											120
	WM35CT											90
	WS10PT											185
	WS25PT											150

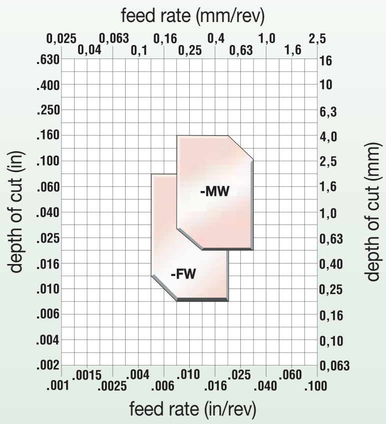
Step 1 • Select the insert geometry

WIDIA VICTORY

Negative Wiper Inserts

-MW
Medium Wiper

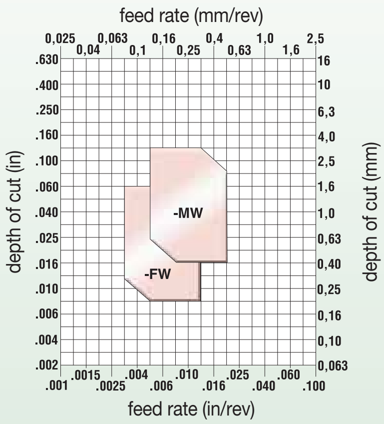
-FW
Finishing Wiper



Positive Wiper Inserts

-MW
Medium Wiper

-FW
Finishing Wiper



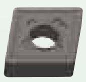
Step 2 • Select the grade

cutting condition	Negative Insert Geometry -FW	Negative Insert Geometry -MW	Positive Insert Geometry -FW	Positive Insert Geometry -MW
heavily interrupted cut	–	–	–	–
lightly interrupted cut	WK05CT	WK05CT	WK05CT	WK05CT
varying depth of cut, casting, or forging skin	WK05CT	WK05CT	WK05CT	WK05CT
smooth cut, pre-turned surface	WK05CT	WK05CT	WK05CT	WK05CT

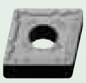
Step 1 • Select the insert geometry

Negative Inserts

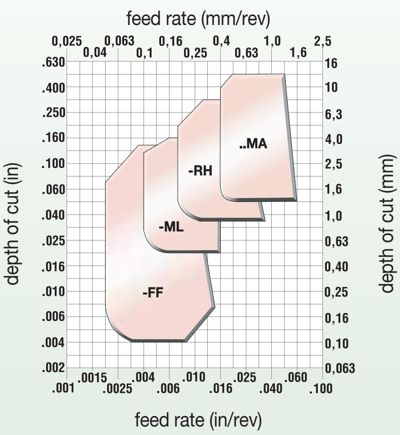
-RH ..MA
Roughing



-ML
Medium Machining

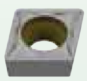


-FF
Finishing

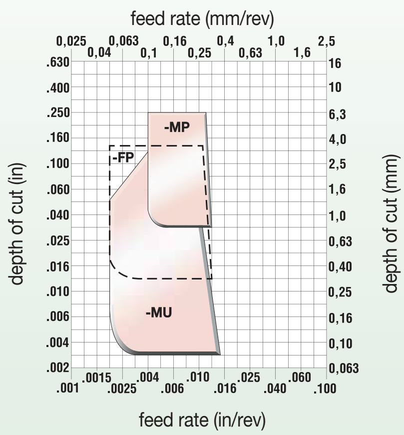


Positive Inserts

-MP -MU
Medium Machining



-FP
Finishing



(continued)

Step 2 • Select the grade *(continued)*

cutting condition	Negative Insert Geometry -FF	-ML	-UR	..MA	Positive Insert Geometry -FP	-MU	-MP
heavily interrupted cut	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT
lightly interrupted cut	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT
varying depth of cut, casting, or forging skin	WK20CT	WK05CT	WK20CT	WK05CT	WK20CT	WK20CT	WK20CT
smooth cut, pre-turned surface	WK20CT	WK05CT	WS10PT	WK05CT	WK20CT	WK20CT/ WK05CT/ WS10PT	WK20CT

Step 3 • Select the cutting speed

Grey Cast Iron — speed — m/min — Starting Conditions

material group	grade	60	180	305	430	550	675	800	920	1040	1160	m/min
K1	WK05CT											450
	WK20CT											300

Ductile, Compacted Graphite, and Malleable Cast Irons (<600 MPa tensile strength) — speed — m/min — Starting Conditions

material group	grade	90	135	180	225	275	320	360	410	460	500	m/min
K2	WS10PT											200
	WK05CT											360
	WK20CT											240

Ductile, Malleable, and Austempered Cast Irons (>600 MPa tensile strength) — speed — m/min — Starting Conditions

material group	grade	90	135	180	225	275	320	360	410	460	500	m/min
K3	WS10PT											150
	WK05CT											240
	WK20CT											210

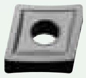
Step 1 • Select the insert geometry

WIDIA VICTORY

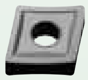
Negative Inserts

-UR
Roughing

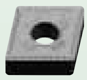
-MS



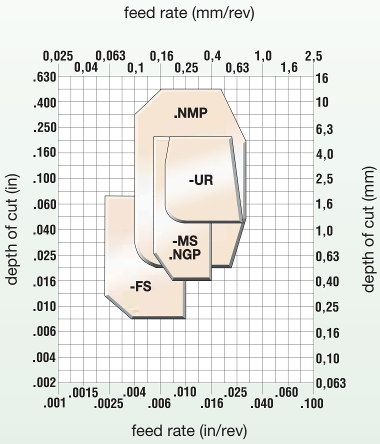
.NMP



.NGP
Medium Machining



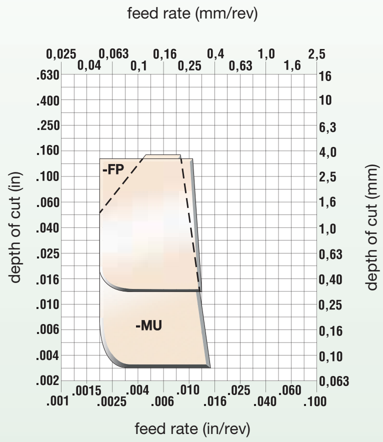
-FS
Finishing



Positive Inserts

-MU
Medium Machining

-FP
Finishing



Step 2 • Select the grade

	Negative Insert Geometry				Positive Insert Geometry	
cutting condition	**-FS**	**-NGP/-NMP**	**-MS**	**-UR**	**-FP**	**-MU**
heavily interrupted cut	**WS25PT**	**WS25PT**	**WS25PT**	**WS25PT/ WM35CT**	**WS25PT/ WM15CT**	**WS25PT**
lightly interrupted cut	**WS10PT**	**WS10PT**	**WS25PT**	**WS25PT/ WM25CT**	**WS25PT**	**WS25PT**
varying depth of cut, casting, or forging skin	**WS10PT**	**WS10PT**	**WS10PT**	**WS25PT**	**WS10PT**	**WS10PT**
smooth cut, pre-turned surface	**WS10PT/ WU10HT**	**WS10PT/ WU10HT**	**WS10PT**	**WS10PT**	**WS10PT**	**WS10PT**

(continued)

Step 3 • Select the cutting speed *(continued)*

Iron-Based, Heat-Resistant Alloys (135–320 HB) (≤34 HRC)

material group	grade	15	45	75	105	140	170	200	230	290	310	Starting Conditions m/min
S1	WU10HT											30
	WS10PT											55
	WS25PT											40
	WM15CT											55
	WM25CT/WM35CT											40

Cobalt-Based, Heat-Resistant Alloys (150–425 HB) (≤45 HRC)

material group	grade	15	45	75	105	140	170	200	230	290	310	Starting Conditions m/min
S2	WU10HT											35
	WS10PT											60
	WS25PT											30
	WM15CT											60
	WM25CT/WM35CT											30

Nickel-Based, Heat-Resistant Alloys (140–475 HB) (≤48 HRC)

material group	grade	15	45	75	105	140	170	200	230	290	310	Starting Conditions m/min
S3	WU10HT											40
	WS10PT											70
	WS25PT											40
	WM15CT											70
	WM25CT/WM35CT											40

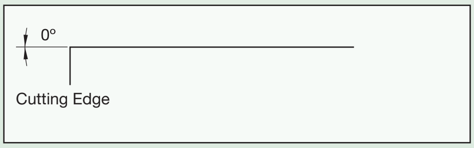
Titanium and Titanium Alloys (110–450 HB) (≤48 HRC)

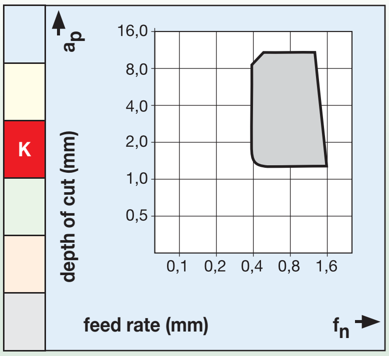
material group	grade	15	45	75	105	140	170	200	230	290	310	Starting Conditions m/min
S4	WU10HT											45
	WM15CT											70
	WM25CT/WM35CT											55

Negative Inserts

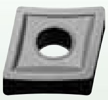
..MA

Flat top geometry for machining cast iron. For finishing to roughing applications.

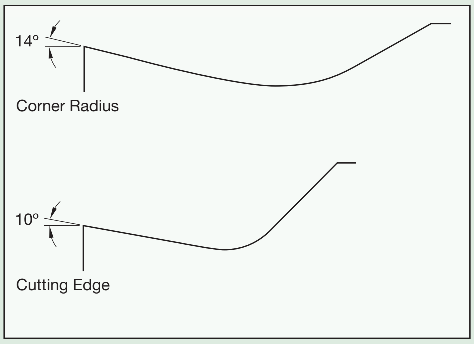


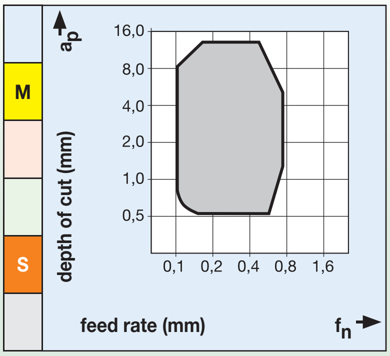


.NMP



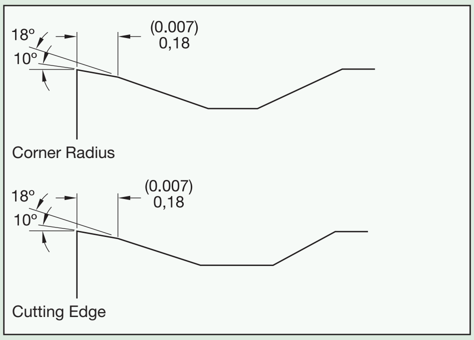
For medium-duty machining of tough work materials, such as chrome- and nickel-based alloys. Minimises tendency for materials to adhere to insert.

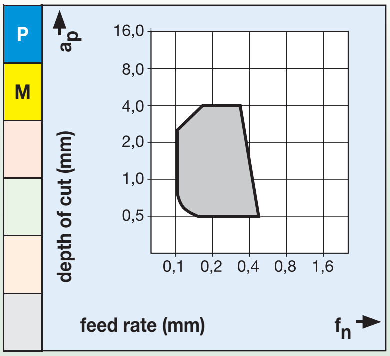




4

Semi-finishing geometry for light- to medium-duty steel machining. Reduced back forces result from adjusted inclination angle. Well-suited for positive, vibration-prone parts.



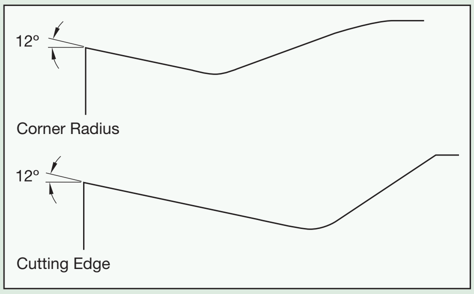


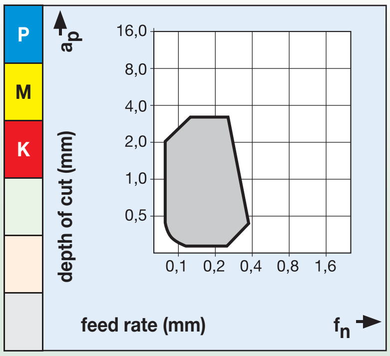
(continued)

Negative Inserts *(continued)*

22

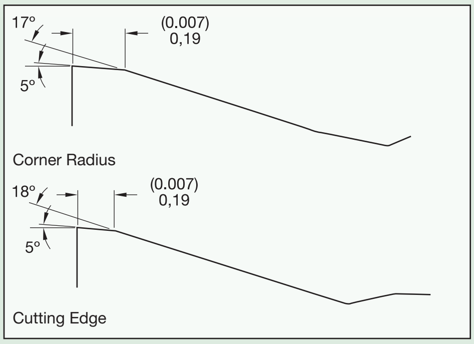
For finish turning, producing smooth, accurate surfaces. Very good chip control, especially at low depths of cut.

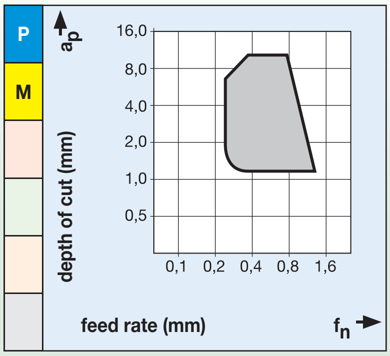




65

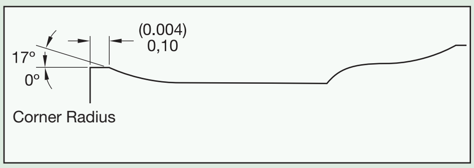
Rough-turning geometry with chip control extending to the medium-duty range.
Positive rake angle lowers cutting forces, reducing power requirements.
Used on low-tensile and stainless steels.

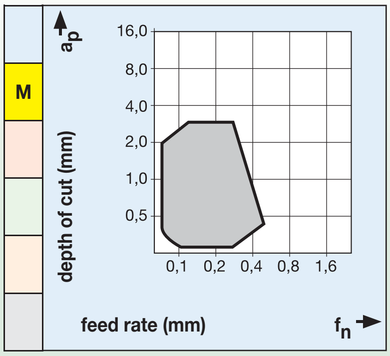




CT

Designed for outward copy turning. Where other geometries produce long chips, the unique distribution of the cut results in good chip control.

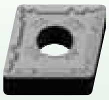




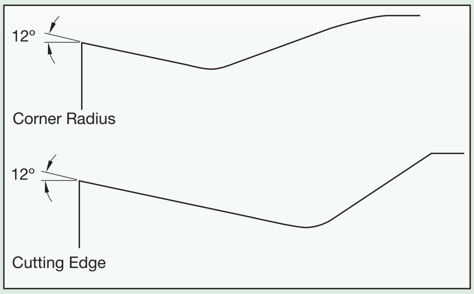
(continued)

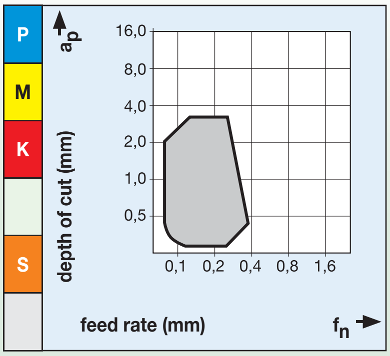
Negative Inserts *(continued)*

FF



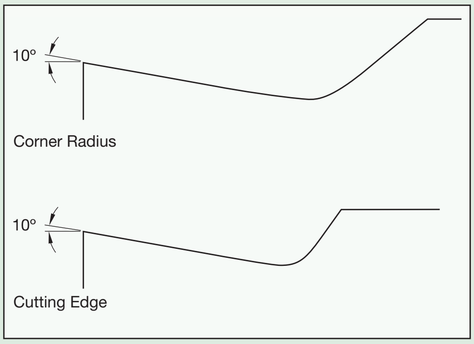
For finish turning, producing smooth, accurate surfaces.
Very good chip control, especially at low depths of cut.

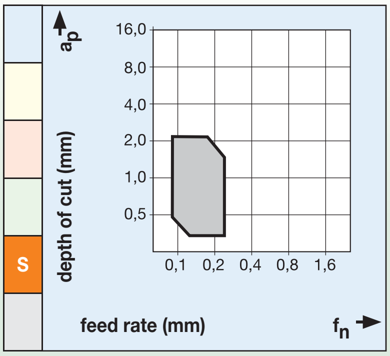




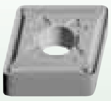
FS

For finishing applications. Ground periphery with positive cutting edge ideally suited for high-temp alloys. Micro finished edge on the ground periphery adds just a slight hone for improved edge integrity and reliability.

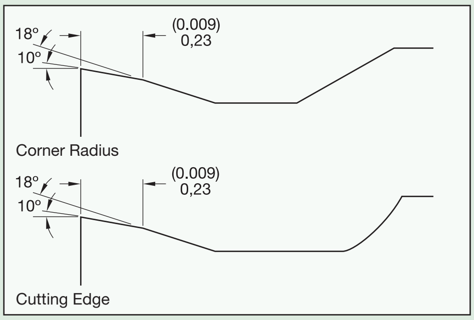


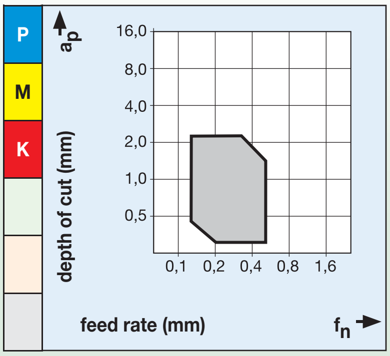


FW



Wiper geometry for finishing when good surface finish is needed using high feed rates.
First choice for high-performance finishing.

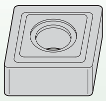




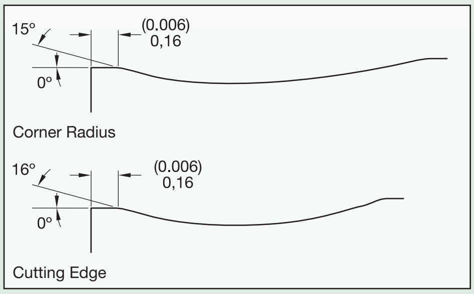
(continued)

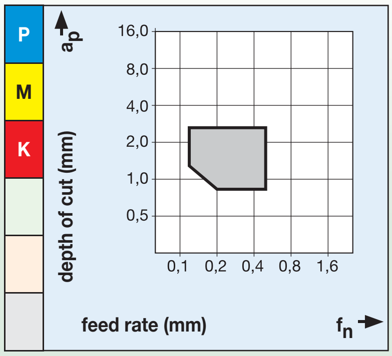
Negative Inserts *(continued)*

MG

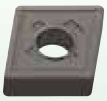


For light machining to light roughing.

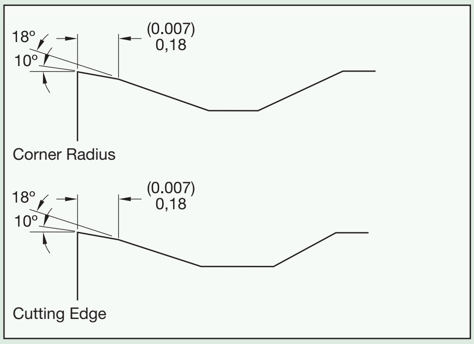


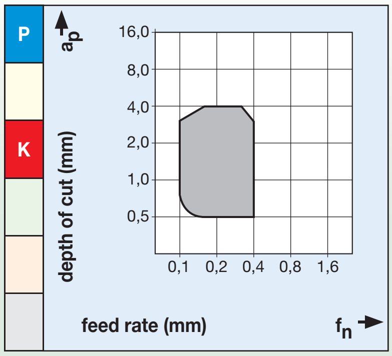


ML



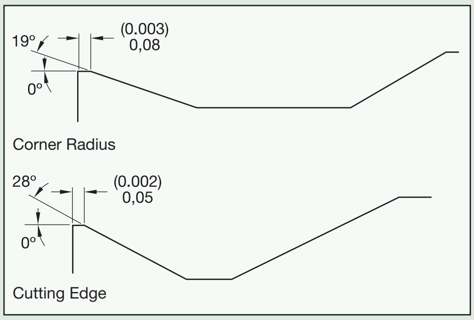
For finishing to medium machining with a negative, stable cutting edge.

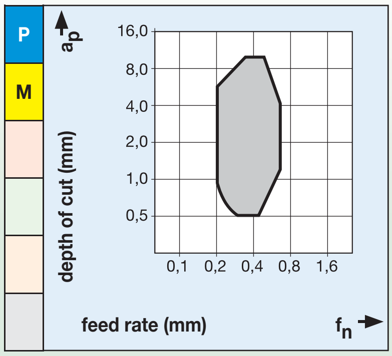




MR

For medium to light roughing of steels, difficult-to-machine high-alloy titanium, and aluminium materials. High strength to deal with heavy chip deformation.

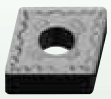




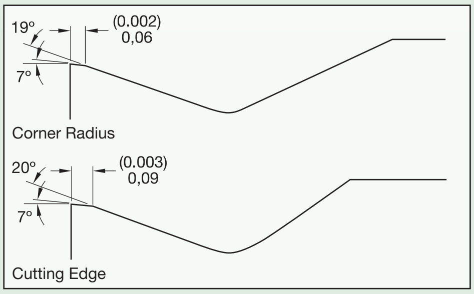
(continued)

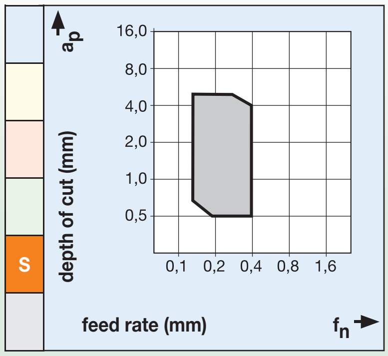
Negative Inserts *(continued)*

MS



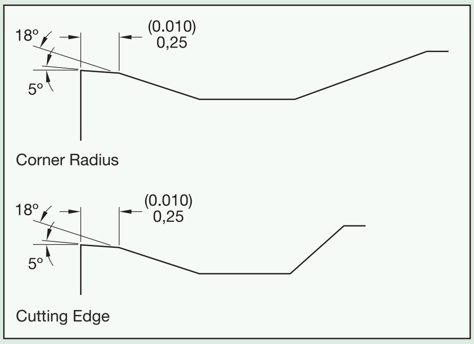
For medium machining in high-temp materials. Utilises a micro-finished edge preparation to increase edge toughness.

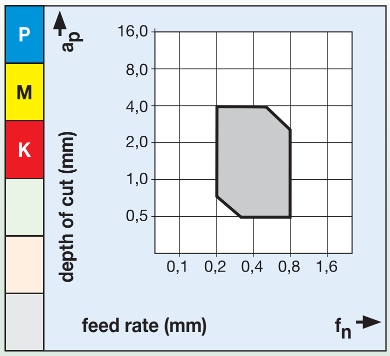




MW

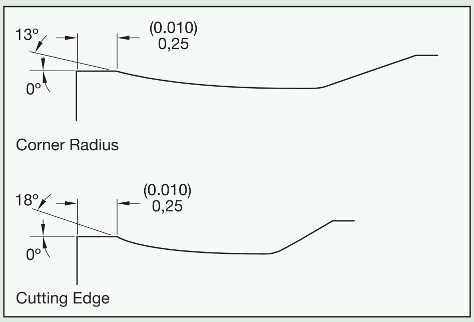
Wiper geometry for light to medium turning with high feed rates. Feed twice as high as with edges with full corner radii to produce same surface finish.

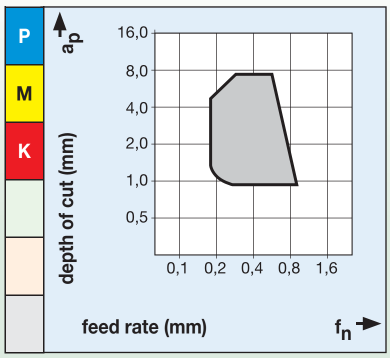




RH

For medium-duty to roughing. Outstanding chip control. High edge strength for interrupted cuts, forging skin, or scale. Preferred for all cast iron, such as grey, malleable, and nodular.



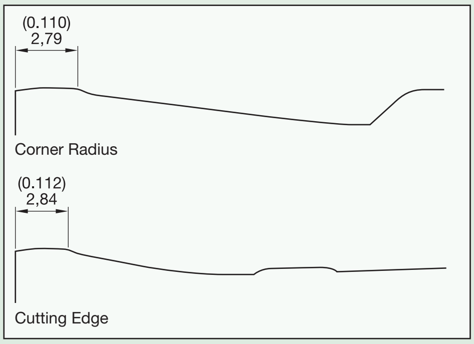


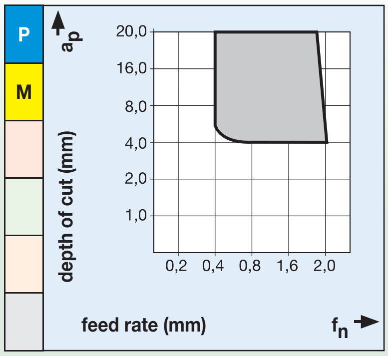
(continued)

Negative Inserts *(continued)*

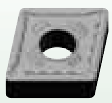
SR

A super roughing geometry. The SR has a strong cutting edge to support high cutting loads in roughing applications. Can produce high metal removal rates.

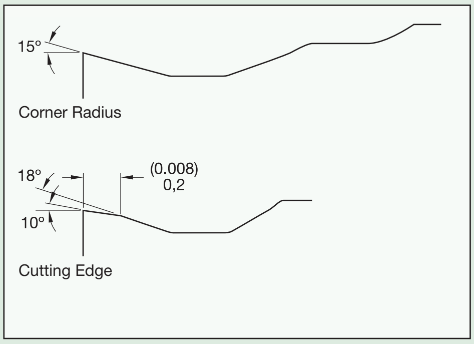


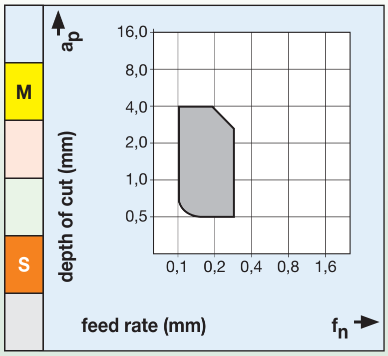


UF

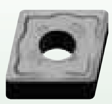


For finishing with a positive cutting edge for reduced cutting forces and superior surface quality.

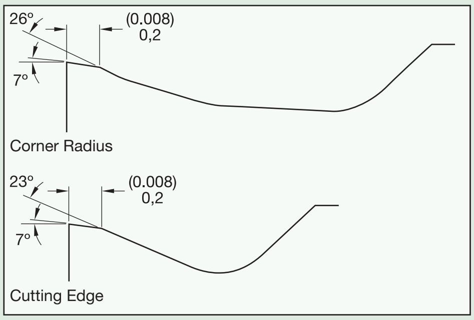


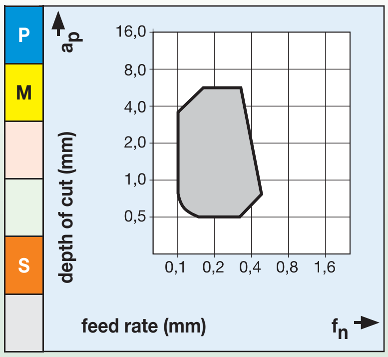


UM



For medium-duty turning operations. Soft-cutting chipbreaker. Used in applications producing varying chip sections, such as profile or copy turning. Good dimensional accuracy. For soft steel materials and stainless steels.

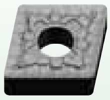




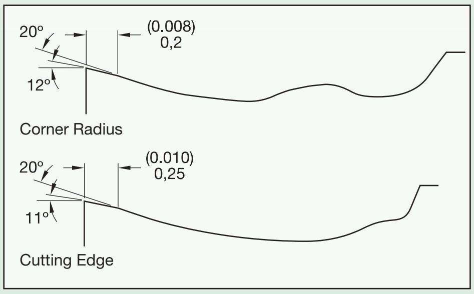
(continued)

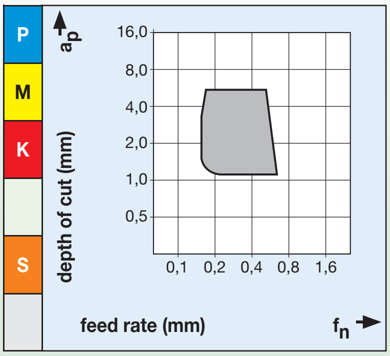
Negative Inserts *(continued)*

UR



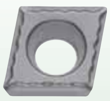
Roughing geometry with smooth chip forming and improved coolant flow for increased tool life. Positive geometry reduces cutting forces and improves depth-of-cut notching resistance. Ideally suitable for stainless steel applications and for smooth machining of steel.



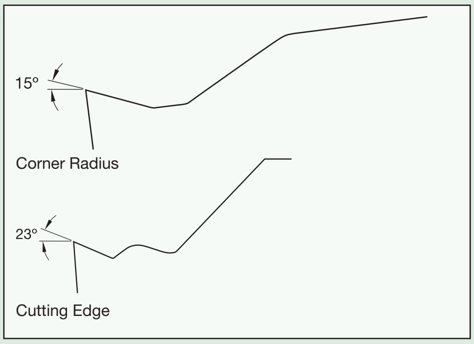


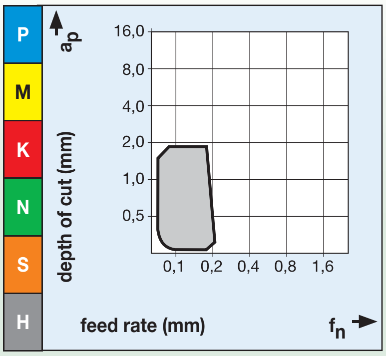
Positive Inserts

2

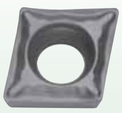


Sharp edge for finish machining. Good chip control with very small chip sections. High dimensional accuracy and smooth surface finishes. Inserts with .008" corner radius precision-ground on all sides.

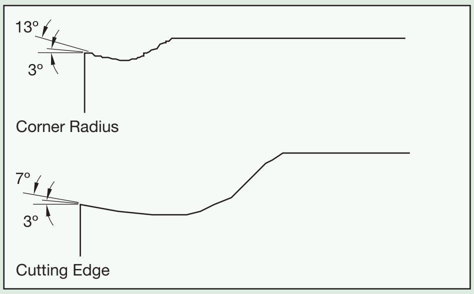


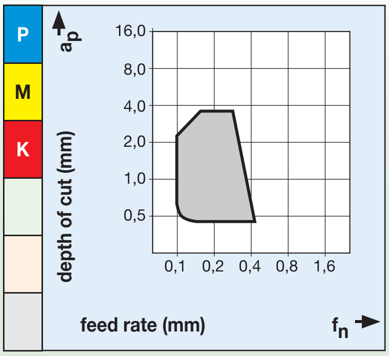


41



Preferred for light- to medium-duty machining. Low cutting forces and reduced power requirements due to positive rake angle. Good chip control over a wide range. Also used on short-chipping cast iron.



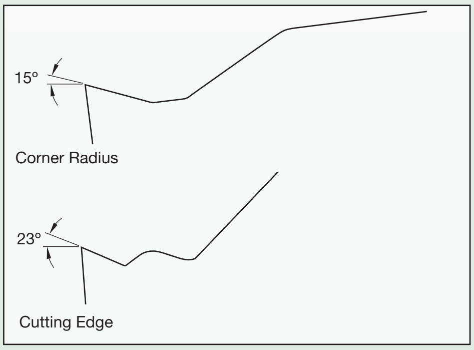


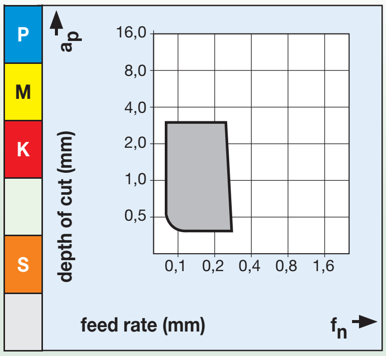
(continued)

Positive Inserts *(continued)*

FP

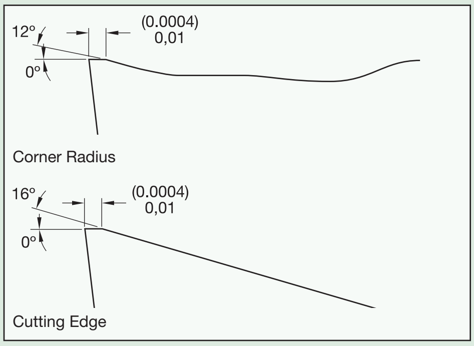
For finishing to medium turning operations with optimal chip control over a wide range of cutting conditions and workpiece materials.

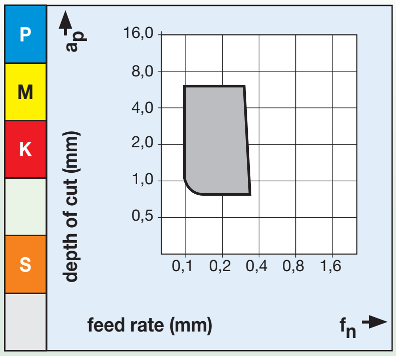




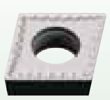
MP

For medium to rough turning with reduced cutting forces and improved chip control for high feed rates. Suitable for high metal removal rates and spindling applications.

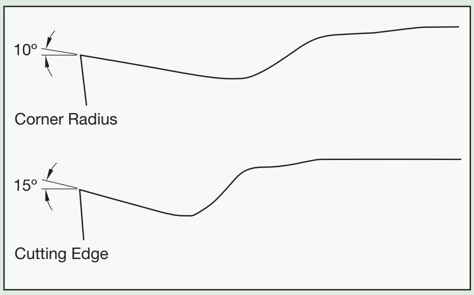


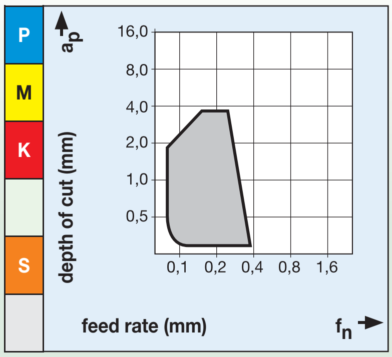


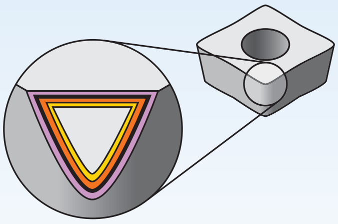
MU



A medium universal geometry with a soft cutting action due to its positive geometry. Has a versatile application range and is suited for turning unstable components and for boring applications.





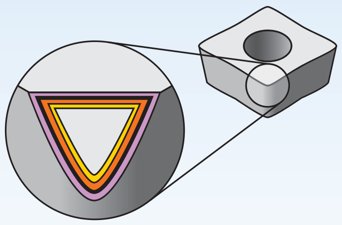


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ←→ toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WP15CT	HC-P15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. Good balance of wear resistance and toughness properties. High productivity machining on smooth to lightly interrupted cuts. For steels.	P		■	■	■					
			K				■	■				
WP25CT	HC-P25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. Good toughness properties. Excellent first choice for steel machining, high productivity metal removal for all but the harshest interrupted cuts.	P				■	■	■			
			K						■	■		
WP35CT	HC-P35	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. Proven on all roughing and heavy roughing operations, wet or dry, on interrupted and uninterrupted cuts.	P						■	■	■	
			M					■	■			
WM15CT	HC-M15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. High degree of wear resistance and good resistance to depth-of-cut notching for long tool life in finishing to medium turning applications.	P				■	■				
			M		■	■	■					
			S		■	■	■					
WM25CT	HC-M25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. Good balance of wear resistance and toughness properties. Light and medium machining. For austenitic stainless steel AISI series.	P							■	■	
			M				■	■	■			
			S				■	■	■			
WM35CT	HC-M35	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. Good toughness and wear resistance balance. For medium to roughing operations with light and heavily interrupted cuts.	P								■	■
			M						■	■	■	
			S						■	■	■	

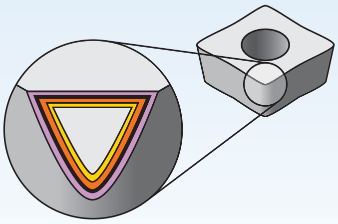


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WK05CT	HC-K05	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3. Increased wear resistance for long tool life at high cutting speeds. Enhanced edge strength against depth-of-cut notching in interrupted cuts. Maximum wear resistance for long tool life at high cutting speeds in finish to medium machining.	P	■								
			K	■	■	■	■					
WK20CT	HC-K20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3. First choice for a wide range of machining on all grey and ductile irons, light to heavy machining, smooth or interrupted cuts, and wet or dry.	P		■	■						
			K			■	■	■				
WS10PT	HC-S10	An advanced multilayer PVD coating over a very deformation-resistant unalloyed carbide substrate. The new and improved coating improves edge stability with wide range speed and feed capabilities. WS10PT™ is ideal for finishing to general machining of most workpiece materials at a wide range of speed and feed capabilities. Excellent for machining most steels, stainless steels, cast irons, non-ferrous materials, and super alloys with improved edge toughness and higher cutting speed and feed capabilities.	P	■	■	■	■					
			M		■	■	■					
			K		■	■	■					
			N		■	■	■					
			S		■	■	■					
			H		■							
WS25PT	HC-S25	An advanced PVD grade with hard AlTiN coating and fine-grain unalloyed substrate. The new and improved coating improves edge stability with wide range speed and feed capabilities. WS25PT™ is ideal for general machining of most steels, stainless steels, high-temp alloys, titanium, irons, and non-ferrous materials at moderate speeds and over a wide range of feeds, with improved edge toughness for interrupted cut and high feed rates.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
WU10HT	C3-C4	An uncoated, hard, low-binder content, unalloyed WC/Co fine-grain grade. WU10HT™ offers exceptional edge wear and superior thermal deformation and depth-of-cut notch resistance. The grain structure is well controlled for minimal pits and flaws, which contributes to long, reliable service.	M		■	■	■					
			N		■	■	■					
			S		■	■	■					



Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
THM	HW-K15	Uncoated carbide. Extraordinarily good balance of hardness, wear resistance, edge stability, and toughness. Light and medium machining. For cast iron, all non-ferrous metals, and non-metals. Useful in unfavourable conditions.	K		■	■	■					
			N		■	■	■					
			S		■	■	■					
			H		■	■	■					
TTM	HW-P25	Uncoated carbide. Medium machining. For steel.	P				■	■	■			
			M				■	■	■			
TTR	HW-P35	Uncoated carbide. Light and medium machining. For steel. To be used at low cutting speeds. Effective in unfavourable conditions.	P						■	■	■	
TTI15	HT-P15	Cermet. Light machining. Extremely good wear resistance at higher cutting speeds. For steels and nodular cast iron. Recommended for high cutting speeds under favourable conditions.	P	■	■	■						
			M	■	■	■						
			K	■	■	■						

NOVO KNOWS CAD/CAM

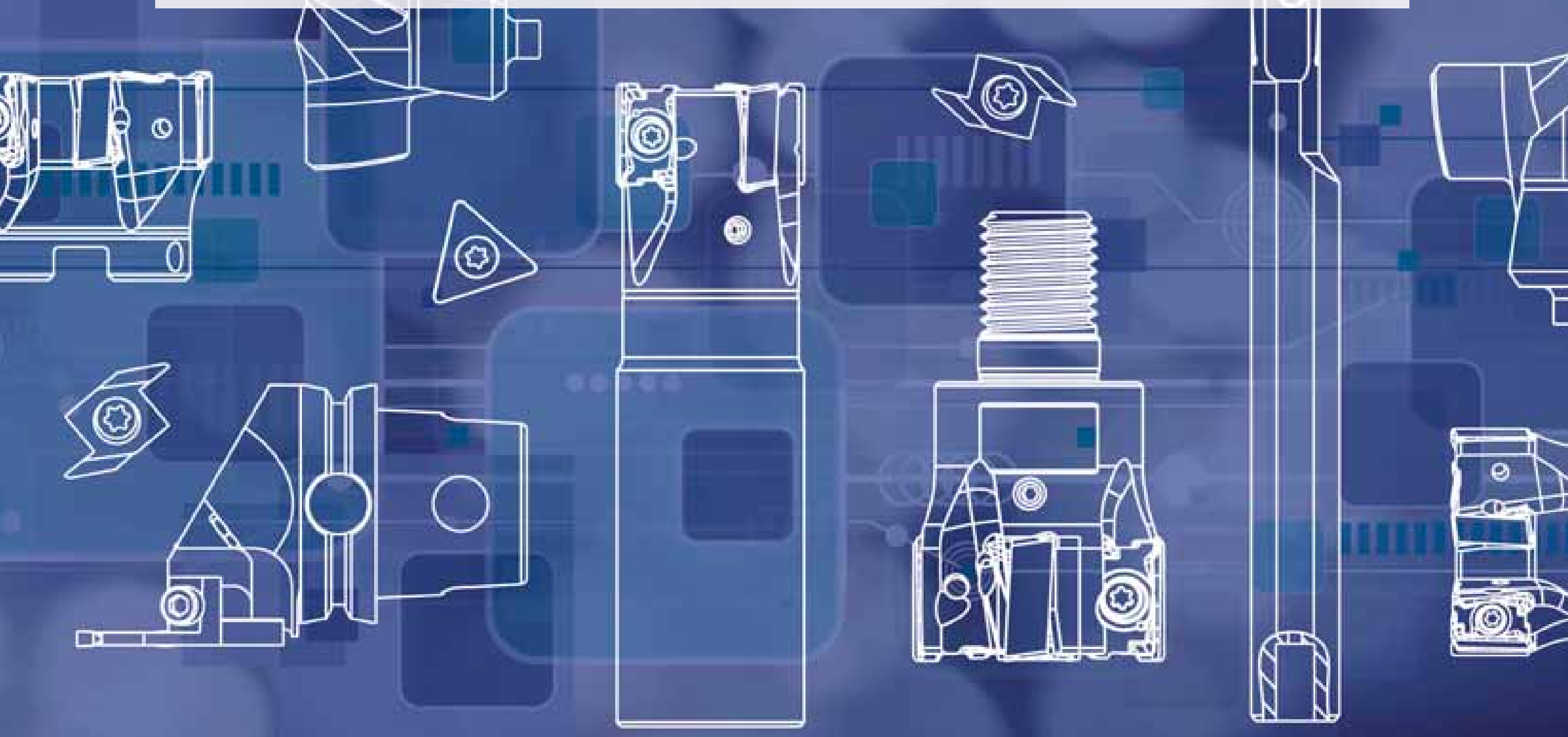
With the addition of NOVO™ to your team, your CAD/CAM capabilities become much more accurate, streamlined, and productive.

Before NOVO: The programmer would be in their CAD/CAM software, programming a part. Using the outdated method of finding a tool in a catalogue, and then manually inputting the tooling information from the catalogue into the CAD/CAM software.

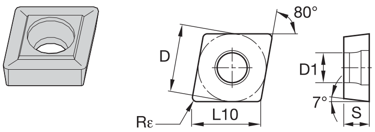
The concern is that assumptions are made, and only partial tooling information is entered.

With NOVO: The powerful digital intelligence of NOVO not only helps the programmer find the right tool for the metalcutting job, but also automatically integrates all the tooling data into a complete CAD/CAM solution. The integration of all the tooling data increases the viability of the part being programmed, and is delivered quickly — saving you time.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. **widia.com/novo**



Inserts

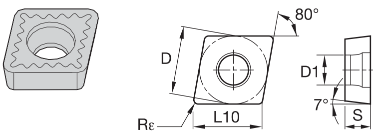


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

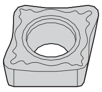
■ CCMT

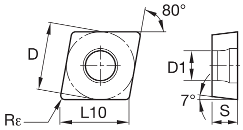
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT060202	6,35	6,45	2,38	0,2	2,80	–	–	–	–	–	–	–	–	–	–	–	2031658	–	–	–
CCMT060204	6,35	6,45	2,38	0,4	2,80	–	–	–	–	–	–	–	–	–	–	–	2031666	–	2031668	2031665
CCMT090304	9,53	9,67	3,18	0,4	4,40	–	–	–	–	–	–	–	–	–	–	–	2031693	–	2031695	–
CCMT090308	9,53	9,67	3,18	0,8	4,40	–	–	–	–	–	–	–	–	–	–	–	2031706	–	2027339	–
CCMT09T304	9,53	9,67	3,97	0,4	4,40	–	–	–	–	–	–	–	–	–	–	–	2031723	–	–	–
CCMT09T308	9,53	9,67	3,97	0,8	4,40	–	–	–	–	–	–	–	–	–	–	–	2027432	–	–	–
CCMT09T312	9,53	9,67	3,97	1,2	4,40	–	–	–	–	–	–	–	–	–	–	–	–	–	2027465	–
CCMT120408	12,70	12,90	4,76	0,8	5,50	–	–	–	–	–	–	–	–	–	–	–	2027472	–	2027484	–



■ CCMT-2

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT0602042	6,35	6,45	2,38	0,4	2,80	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2021947



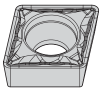


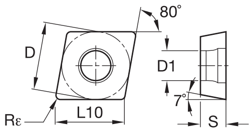
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

CCMT-41

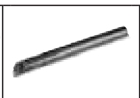
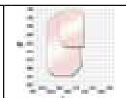
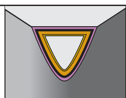
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT12040441	12,70	12,90	4,76	0,4	5,50	-	-	-	-	-	-	-	-	-	-	-	2010027	-	-	-
CCMT12040841	12,70	12,90	4,76	0,8	5,50	-	-	-	-	-	-	-	-	-	-	-	2010061	-	-	-



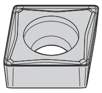
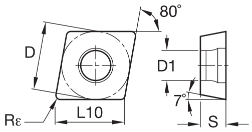


CCMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT060202FP	6,35	6,45	2,38	0,2	2,80	4169857	4170140	-	-	4168778	-	-	-	-	-	-	-	-	-	-
CCMT060204FP	6,35	6,45	2,38	0,4	2,80	4169858	4170141	-	4168738	4168779	-	-	4170032	5684337	5684340	-	-	-	-	-
CCMT060208FP	6,35	6,45	2,38	0,8	2,80	4169859	4170142	-	4168739	4168780	-	-	4170083	5684342	5684344	-	-	-	-	-
CCMT09T302FP	9,53	9,67	3,97	0,2	4,40	-	4170293	-	-	4168781	-	-	-	-	-	-	-	-	-	-
CCMT09T304FP	9,53	9,67	3,97	0,4	4,40	4169860	4170294	-	4168740	4168782	-	-	4170084	5684341	5684343	-	-	-	-	-
CCMT09T308FP	9,53	9,67	3,97	0,8	4,40	4169861	4170295	-	4168741	4168783	-	-	4170085	-	5684338	-	-	-	-	-
CCMT120404FP	12,70	12,90	4,76	0,4	5,50	4169862	4170296	-	4168742	4168784	-	-	4170086	-	-	-	-	-	-	-
CCMT120408FP	12,70	12,90	4,76	0,8	5,50	4169993	4170297	-	4168763	4168785	-	-	4170087	-	-	-	-	-	-	-
CCMT120412FP	12,70	12,90	4,76	1,2	5,50	4169994	4170298	-	-	4168786	-	-	4170088	-	-	-	-	-	-	-

					
C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts

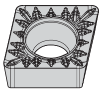
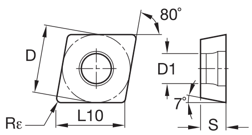



● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

CCMT-FW

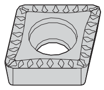
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT060202FW	6,35	6,45	2,38	0,2	2,80	5623344	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCMT060204FW	6,35	6,45	2,38	0,4	2,80	5623345	-	-	5623346	-	-	-	-	-	-	-	-	-	-	-
CCMT060208FW	6,35	6,45	2,38	0,8	2,80	5623347	-	-	5623348	-	-	-	-	-	-	-	-	-	-	-
CCMT09T304FW	9,53	9,67	3,97	0,4	4,40	5623349	-	-	5623470	-	-	-	-	-	-	-	-	-	-	-
CCMT09T308FW	9,53	9,67	3,97	0,8	4,40	5623473	-	-	-	-	-	-	-	-	-	-	-	-	-	-

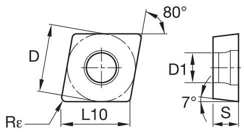



CCMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT060204MP	6,35	6,45	2,38	0,4	2,80	4170197	4170217	-	4168893	4168906	-	-	4170237	5684351	-	-	-	-	-	-
CCMT09T304MP	9,53	9,67	3,97	0,4	4,40	4170198	4170218	-	4168894	4168907	-	-	4170238	5684352	-	-	-	-	-	-
CCMT09T308MP	9,53	9,67	3,97	0,8	4,40	4170199	4170219	-	4168895	4168908	-	-	4170239	5684350	-	-	-	-	-	-
CCMT09T312MP	9,53	9,67	3,97	1,2	4,40	-	4170220	-	-	4168909	-	-	-	-	-	-	-	-	-	-
CCMT120408MP	12,70	12,90	4,76	0,8	5,50	4170200	4170221	-	4168896	4168910	-	-	4170240	5684349	-	-	-	-	-	-
CCMT120412MP	12,70	12,90	4,76	1,2	5,50	-	4170222	-	4168897	4168911	-	-	4170241	-	-	-	-	-	-	-

Inserts



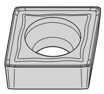


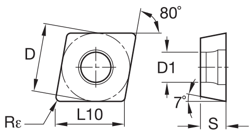
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CCMT-MU

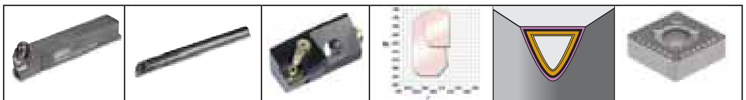
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT060208MU	6,35	6,45	2,38	0,8	2,80	–	–	–	–	5623159	–	–	5623158	–	–	–	–	–	–	–
CCMT090304MU	9,53	9,67	3,18	0,4	4,40	–	5623420	–	–	5623421	–	–	–	–	–	–	–	–	–	–
CCMT090308MU	9,53	9,67	3,18	0,8	4,40	5623425	5623424	–	–	5623423	–	–	–	–	–	–	–	–	–	–
CCMT09T304MU	9,53	9,67	3,97	0,4	4,40	5623431	5623430	–	–	5623427	–	5623429	5623432	5623428	5623426	–	–	–	–	–
CCMT09T308MU	9,53	9,67	3,97	0,8	4,40	5623434	5623436	5623439	–	5623435	–	–	5623433	5623438	5623437	–	–	–	–	–
CCMT120408MU	12,70	12,90	4,76	0,8	5,50	5623440	5623443	–	–	5623442	–	–	5623441	–	5623444	–	–	–	–	–





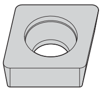
■ CCMT-MW

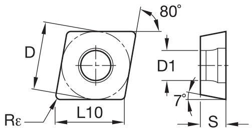
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT09T304MW	9,53	9,67	3,97	0,4	4,40	5623471	5623472	–	–	–	–	–	–	–	–	–	–	–	–	–
CCMT09T308MW	9,53	9,67	3,97	0,8	4,40	5623474	5623475	–	–	–	–	–	–	–	–	–	–	–	–	–
CCMT120404MW	12,70	12,90	4,76	0,4	5,50	5623476	5623477	–	–	–	–	–	–	–	–	–	–	–	–	–
CCMT120408MW	12,70	12,90	4,76	0,8	5,50	5623478	5623479	–	–	–	–	–	–	–	–	–	–	–	–	–



C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts





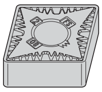
● first choice
○ alternate choice

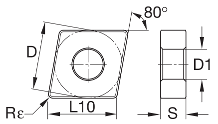
	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

■ CCMW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMW060202	6,35	6,45	2,38	0,2	2,80	-	-	-	-	-	-	-	-	-	-	-	2031733	-	-	-
CCMW060204	6,35	6,45	2,38	0,4	2,80	-	-	-	-	-	-	4170464	4170368	-	-	-	2027507	-	-	-
CCMW090302	9,53	9,67	3,18	0,2	4,40	-	-	-	-	-	-	-	-	-	-	-	2031734	-	-	-
CCMW090304	9,53	9,67	3,18	0,4	4,40	-	-	-	-	-	-	4170465	4170369	-	-	-	2027509	-	-	-
CCMW090308	9,53	9,67	3,18	0,8	4,40	-	-	-	-	-	-	4170466	4170370	-	-	-	-	-	-	-
CCMW09T304	9,53	9,67	3,97	0,4	4,40	-	-	-	-	-	-	4170467	4170371	-	-	-	2027511	-	-	-
CCMW09T308	9,53	9,67	3,97	0,8	4,40	-	-	-	-	-	-	4170468	4170372	-	-	-	2027512	-	-	-
CCMW120404	12,70	12,90	4,76	0,4	5,50	-	-	-	-	-	-	4170469	4170373	-	-	-	2027524	-	-	-
CCMW120408	12,70	12,90	4,76	0,8	5,50	-	-	-	-	-	-	4170470	4170374	-	-	-	2027525	-	-	-

WIDIA



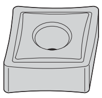


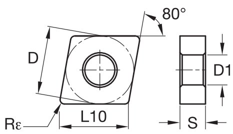
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

CNGG-FS

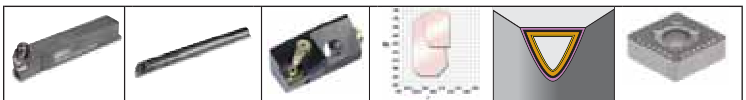
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNGG120401FS	12,70	12,90	4,76	0,1	5,16	–	–	–	–	–	–	–	–	5548576	–	–	–	–	–	–
CNGG120402FS	12,70	12,90	4,76	0,2	5,16	–	–	–	–	–	–	–	–	5548575	–	–	–	–	–	–
CNGG120404FS	12,70	12,90	4,76	0,4	5,16	–	–	–	–	–	–	–	–	5548577	5538204	5549945	–	–	–	–
CNGG120408FS	12,70	12,90	4,76	0,8	5,16	–	–	–	–	–	–	–	–	5548578	5538205	5549946	–	–	–	–
CNGG120412FS	12,70	12,90	4,76	1,2	5,16	–	–	–	–	–	–	–	–	5548579	–	–	–	–	–	–





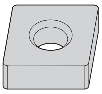
CNGP

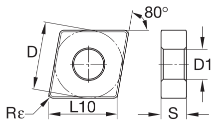
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNGP120401	12,70	12,90	4,76	0,1	5,16	–	–	–	–	–	–	–	–	5549137	–	–	–	–	–	–
CNGP120402	12,70	12,90	4,76	0,2	5,16	–	–	–	–	–	–	–	–	5549138	–	5549206	–	–	–	–
CNGP120404	12,70	12,90	4,76	0,4	5,16	–	–	–	–	–	–	–	–	5549139	–	5549207	–	–	–	–
CNGP120408	12,70	12,90	4,76	0,8	5,16	–	–	–	–	–	–	–	–	5549190	–	5549208	–	–	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts





● first choice
○ alternate choice

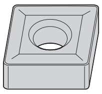
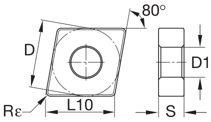
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

CNMA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMA120404	12,70	12,90	4,76	0,4	5,16	-	-	-	-	-	-	4171595	4171863	-	-	-	-	-	-	-
CNMA120408	12,70	12,90	4,76	0,8	5,16	-	-	-	-	-	-	4171596	4171864	-	-	-	-	-	-	-
CNMA120412	12,70	12,90	4,76	1,2	5,16	-	-	-	-	-	-	4171597	4171865	-	-	-	-	-	-	-
CNMA120416	12,70	12,90	4,76	1,6	5,16	-	-	-	-	-	-	4171598	4171866	-	-	-	-	-	-	-
CNMA160608	15,88	16,12	6,35	0,8	6,35	-	-	-	-	-	-	-	4171867	-	-	-	-	-	-	-
CNMA160612	15,88	16,12	6,35	1,2	6,35	-	-	-	-	-	-	4171599	4171868	-	-	-	-	-	-	-
CNMA160616	15,88	16,12	6,35	1,6	6,35	-	-	-	-	-	-	4171600	4171869	-	-	-	-	-	-	-
CNMA190608	19,05	19,34	6,35	0,8	7,93	-	-	-	-	-	-	4171601	4171870	-	-	-	-	-	-	-
CNMA190612	19,05	19,34	6,35	1,2	7,93	-	-	-	-	-	-	4171602	4171871	-	-	-	-	-	-	-
CNMA190616	19,05	19,34	6,35	1,6	7,93	-	-	-	-	-	-	4171633	4171872	-	-	-	-	-	-	-

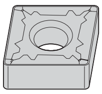
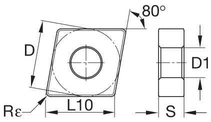
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

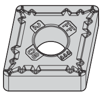
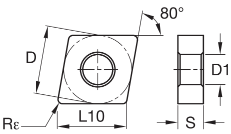
■ CNMG

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404	12,70	12,90	4,76	0,4	5,16	-	-	-	-	-	-	-	-	-	-	-	2559561	-	-	-
CNMG120408	12,70	12,90	4,76	0,8	5,16	-	-	-	-	-	-	-	-	-	-	-	2027567	-	-	-
CNMG190612	19,05	19,34	6,35	1,2	7,93	-	-	-	-	-	-	-	-	-	-	-	2559382	-	-	-
CNMG190616	19,05	19,34	6,35	1,6	7,93	-	-	-	-	-	-	-	-	-	-	-	2559317	-	-	-

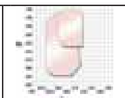
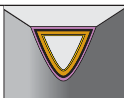
■ CNMG-22

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG12040422	12,70	12,90	4,76	0,4	5,16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2010175

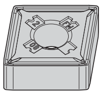



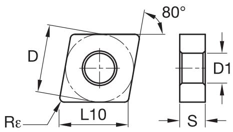
■ CNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404FF	12,70	12,90	4,76	0,4	5,16	4171025	-	-	-	4172345	-	-	4171318	5684271	-	-	-	-	-	-
CNMG120408FF	12,70	12,90	4,76	0,8	5,16	4171026	-	-	-	4172346	-	-	4171319	5684272	-	-	-	-	-	-
CNMG120412FF	12,70	12,90	4,76	1,2	5,16	4171027	-	-	-	4172347	-	-	4171320	-	-	-	-	-	-	-

					
C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts



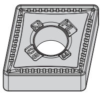


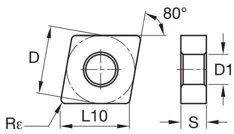
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

CNMG-FW

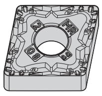
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404FW	12,70	12,90	4,76	0,4	5,16	-	-	-	4171755	4172702	-	4171680	-	-	-	-	-	-	-	-
CNMG120408FW	12,70	12,90	4,76	0,8	5,16	5623480	-	-	4171756	4173103	-	4171681	-	-	-	-	-	-	-	-
CNMG120412FW	12,70	12,90	4,76	1,2	5,16	5623481	-	-	4171757	4173104	-	4171683	-	-	-	-	-	-	-	-

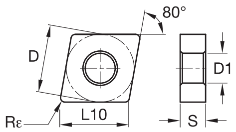




CNMG-ML

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404ML	12,70	12,90	4,76	0,4	5,16	4171059	4170458	-	-	-	-	4171657	4171390	-	-	-	-	-	-	-
CNMG120408ML	12,70	12,90	4,76	0,8	5,16	4171060	4170459	-	-	-	-	4171658	4171391	-	-	-	-	-	-	-
CNMG120412ML	12,70	12,90	4,76	1,2	5,16	4171348	4170460	-	-	-	-	4171659	4171392	-	-	-	-	-	-	-
CNMG120416ML	12,70	12,90	4,76	1,6	5,16	-	5684346	-	-	-	-	-	4171393	-	-	-	-	-	-	-



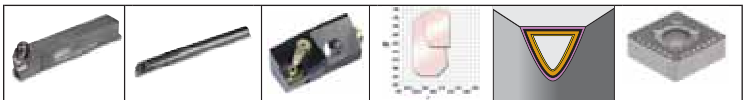


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

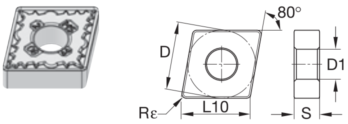
CNMG-MR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404MR	12,70	12,90	4,76	0,4	5,16	4171130	4170546	4170043	-	-	-	-	-	-	-	-	-	-	-	-
CNMG120408MR	12,70	12,90	4,76	0,8	5,16	4171131	4170547	4170044	-	4172955	4173120	-	-	-	-	-	-	-	-	-
CNMG120412MR	12,70	12,90	4,76	1,2	5,16	4171132	4170548	4170045	-	4172956	4173121	-	-	-	-	-	-	-	-	-
CNMG120416MR	12,70	12,90	4,76	1,6	5,16	4171133	5684353	-	-	4172957	4173122	-	-	-	-	-	-	-	-	-
CNMG160608MR	15,88	16,12	6,35	0,8	6,35	4171134	4170549	-	-	4172958	4173133	-	-	-	-	-	-	-	-	-
CNMG160612MR	15,88	16,12	6,35	1,2	6,35	4171135	4170550	4170046	-	4172959	4173134	-	-	-	-	-	-	-	-	-
CNMG160616MR	15,88	16,12	6,35	1,6	6,35	4171136	4170551	4170047	-	4172960	4173135	-	-	-	-	-	-	-	-	-
CNMG190612MR	19,05	19,34	6,35	1,2	7,93	4171137	4170552	4170048	-	4172961	4173136	-	-	-	-	-	-	-	-	-
CNMG190616MR	19,05	19,34	6,35	1,6	7,93	4171138	4170563	4170049	-	4172962	4173137	-	-	-	-	-	-	-	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

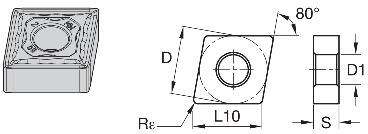


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

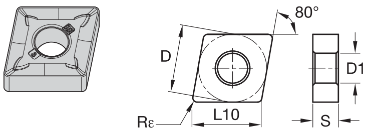
■ CNMG-MS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404MS	12,70	12,90	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5908742	5908743	5908744	-	-	-	-
CNMG120408MS	12,70	12,90	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5908745	5908746	5908747	-	-	-	-
CNMG120412MS	12,70	12,90	4,76	1,2	5,16	-	-	-	-	-	-	-	-	5908748	5908749	5908750	-	-	-	-
CNMG120416MS	12,70	12,90	4,76	1,6	5,16	-	-	-	-	-	-	-	-	5908751	5908752	5908753	-	-	-	-
CNMG160608MS	15,88	16,12	6,35	0,8	6,35	-	-	-	-	-	-	-	-	5908754	5908755	5908756	-	-	-	-
CNMG160612MS	15,88	16,12	6,35	1,2	6,35	-	-	-	-	-	-	-	-	5908757	5908758	5908759	-	-	-	-
CNMG190608MS	19,05	19,34	6,35	0,8	7,93	-	-	-	-	-	-	-	-	5908760	5908761	5908762	-	-	-	-
CNMG190612MS	19,05	19,34	6,35	1,2	7,92	-	-	-	-	-	-	-	-	5908763	5908764	5908765	-	-	-	-
CNMG190616MS	19,05	19,34	6,35	1,6	7,92	-	-	-	-	-	-	-	-	5908766	5908767	5908768	-	-	-	-



■ CNMG-MW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120408MW	12,70	12,90	4,76	0,8	5,16	-	-	-	-	4173112	-	4171682	-	-	-	-	-	-	-	-
CNMG120412MW	12,70	12,90	4,76	1,2	5,16	-	-	-	-	4173113	-	4171684	-	-	-	-	-	-	-	-



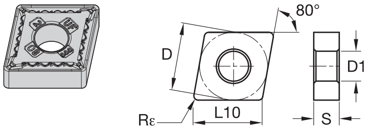
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

CNMG-RH

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120408RH	12,70	12,90	4,76	0,8	5,16	4170979	4171504	5684356	-	4173035	-	-	4171903	-	-	-	-	-	-	-
CNMG120412RH	12,70	12,90	4,76	1,2	5,16	4170980	4171505	4171698	-	4173036	-	-	4171904	-	-	-	-	-	-	-
CNMG120416RH	12,70	12,90	4,76	1,6	5,16	4170981	4171506	4171699	-	4173037	-	-	4171905	-	-	-	-	-	-	-
CNMG160608RH	15,88	16,12	6,35	0,8	6,35	4170982	4171507	4171700	-	4173038	-	-	4171906	-	-	-	-	-	-	-
CNMG160612RH	15,88	16,12	6,35	1,2	6,35	4170983	4171508	4171701	-	4173039	-	-	4171907	-	-	-	-	-	-	-
CNMG160616RH	15,88	16,12	6,35	1,6	6,35	4170984	4171509	4171702	-	4173040	-	-	4171908	-	-	-	-	-	-	-
CNMG190608RH	19,05	19,34	6,35	0,8	7,93	4170985	4171510	4171703	-	4173041	-	-	4171909	-	-	-	-	-	-	-
CNMG190612RH	19,05	19,34	6,35	1,2	7,93	4170986	4171511	4171704	-	4173042	-	-	4171910	-	-	-	-	-	-	-
CNMG190616RH	19,05	19,34	6,35	1,6	7,93	4170987	4171512	4171705	-	4173043	-	-	4171911	-	-	-	-	-	-	-
CNMG190624RH	19,05	19,34	6,35	2,4	7,93	4170988	4171523	4171706	-	4173044	-	-	-	-	-	-	-	-	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

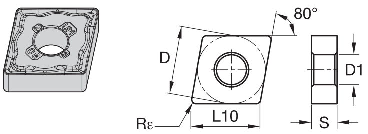


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

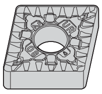
■ CNMG-UF

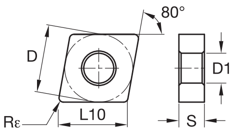
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404UF	12,70	12,90	4,76	0,4	5,16	5645589	–	–	4169353	4169379	–	–	–	5645600	–	–	–	–	–	–
CNMG120408UF	12,70	12,90	4,76	0,8	5,16	–	–	–	4169354	4169380	–	–	–	5645588	–	–	–	–	–	–
CNMG120412UF	12,70	12,90	4,76	1,2	5,16	–	–	–	4169355	4169381	–	–	–	–	–	–	–	–	–	–



■ CNMG-UM

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404UM	12,70	12,90	4,76	0,4	5,16	–	–	–	4172334	4172380	4172410	–	–	5645217	–	–	–	–	–	–
CNMG120408UM	12,70	12,90	4,76	0,8	5,16	5645250	5645219	–	4172335	4172381	4172411	–	–	–	–	–	–	–	–	–
CNMG120412UM	12,70	12,90	4,76	1,2	5,16	–	–	–	4172336	4172382	4172412	–	–	5301414	–	–	–	–	–	–



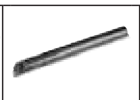


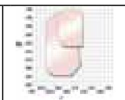
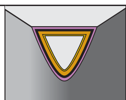
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CNMG-UR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404UR	12,70	12,90	4,76	0,4	5,16	4171022	4170500	–	4169406	4169444	4169479	–	–	5578894	5578895	–	–	–	–	–
CNMG120408UR	12,70	12,90	4,76	0,8	5,16	4171093	4170501	4169960	4169407	4169445	4169480	5680086	5680085	5301400	5301402	–	–	–	–	–
CNMG120412UR	12,70	12,90	4,76	1,2	5,16	4171094	4170502	4169961	4169408	4169446	4169481	5680087	4171419	5301413	5301416	–	–	–	–	–
CNMG120416UR	12,70	12,90	4,76	1,6	5,16	4171095	4170503	–	4169409	4169447	4169482	–	4171420	5680089	5680170	–	–	–	–	–
CNMG160608UR	15,88	16,12	6,35	0,8	6,35	4171096	4170504	–	4169410	4169448	4169483	–	4171421	5578896	5578897	–	–	–	–	–
CNMG160612UR	15,88	16,12	6,35	1,2	6,35	4171097	4170505	4169962	4169411	4169449	4169484	–	4171422	5578898	–	–	–	–	–	–
CNMG160616UR	15,88	16,12	6,35	1,6	6,35	4171098	4170506	4169963	–	4169450	4169485	–	4171423	5578900	5578901	–	–	–	–	–
CNMG190612UR	19,05	19,34	6,35	1,2	7,93	4171099	4170507	4169964	4169412	4169451	4169486	5680088	4171424	5578902	5512536	–	–	–	–	–
CNMG190616UR	19,05	19,34	6,35	1,6	7,93	4171100	4170508	4169965	4169423	4169452	4169487	–	4171425	5345183	5579234	–	–	–	–	–

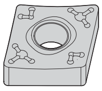

C2–C49

C50–C81

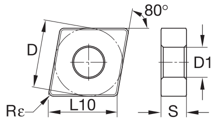
C86–C129

B8–B25

B26–B28

B30–B105

WIDIA

Inserts



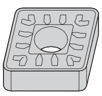


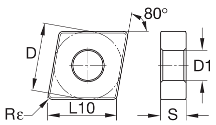
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

CNMM-65

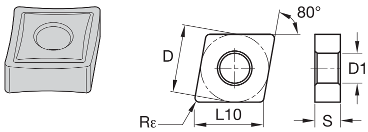
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMM12040865	12,70	12,90	4,76	0,8	5,16	5698348	5698349	5698360	–	5698347	–	–	–	–	–	–	–	–	–	–
CNMM12041265	12,70	12,90	4,76	1,2	5,16	5698362	5698363	–	–	5698361	–	–	–	–	–	–	–	–	–	–
CNMM12041665	12,70	12,90	4,76	1,6	5,16	–	5698365	–	–	5698364	–	–	–	–	–	–	–	–	–	–
CNMM16060865	15,88	16,12	6,35	0,8	6,35	–	5698366	5698367	–	–	–	–	–	–	–	–	–	–	–	–
CNMM16061265	15,88	16,12	6,35	1,2	6,35	5698369	5698370	5698371	–	5698368	–	–	–	–	–	–	–	–	–	–
CNMM16061665	15,88	16,12	6,35	1,6	6,35	5698372	5698373	–	–	–	–	–	–	–	–	–	–	–	–	–
CNMM19061265	19,05	19,34	6,35	1,2	7,93	–	–	5698376	–	5698374	–	–	–	–	–	–	–	–	–	–
CNMM19061665	19,05	19,34	6,35	1,6	7,93	5698378	–	–	–	5698377	–	–	–	–	–	–	–	–	–	–
CNMM19062465	19,05	19,34	6,35	2,4	7,93	5698410	5698411	–	–	5698379	–	–	–	–	–	–	–	–	–	–





CNMM-SR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMM190616SR	19,05	19,34	6,35	1,6	7,93	5696643	–	–	–	5696642	–	–	–	–	–	–	–	–	–	–
CNMM190624SR	19,05	19,34	6,35	2,4	7,93	–	–	5696644	–	–	–	–	–	–	–	–	–	–	–	–
CNMM250924SR	25,40	25,79	9,53	2,4	9,12	5696645	5696646	5696647	–	–	–	–	–	–	–	–	–	–	–	–

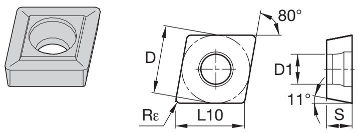


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

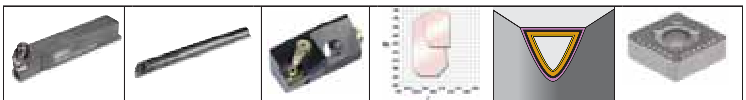
CNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMP120404	12,70	12,90	4,76	0,4	5,16	-	-	-	4171585	4173552	4173681	-	-	4172439	-	-	-	-	-	-
CNMP120408	12,70	12,90	4,76	0,8	5,16	-	-	-	4171586	4173653	4173682	-	-	4172440	4172614	-	-	-	-	-
CNMP120412	12,70	12,90	4,76	1,2	5,16	-	-	-	4171587	4173654	4173693	-	-	4172441	4172615	-	-	-	-	-
CNMP160608	15,88	16,12	6,35	0,8	6,35	-	-	-	4171588	4173655	4173694	-	-	-	-	-	-	-	-	-
CNMP160612	15,88	16,12	6,35	1,2	6,35	-	-	-	4171589	4173656	4173695	-	-	4172442	-	-	-	-	-	-
CNMP190612	19,05	19,34	6,35	1,2	7,93	-	-	-	-	-	-	-	-	4172483	-	-	-	-	-	-
CNMP190616	19,05	19,34	6,35	1,6	7,93	-	-	-	4171590	4173657	4173696	-	-	-	-	-	-	-	-	-



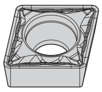
CPGT-3

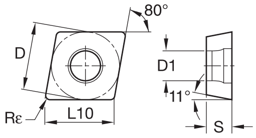
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CPGT04T1043	4,76	4,83	1,98	0,4	2,15	-	-	-	-	-	-	-	-	-	-	-	-	-	2022082	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



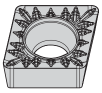


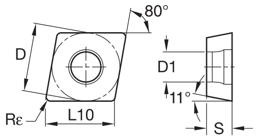
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

CPMT-FP

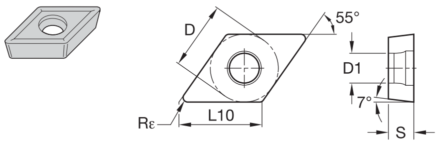
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CPMT060202FP	6,35	6,45	2,38	0,2	2,80	4170015	4170325	-	-	4168822	-	-	-	-	-	-	-	-	-	-
CPMT060204FP	6,35	6,45	2,38	0,4	2,80	4170016	4170326	-	4168812	4168823	-	-	4170105	-	-	-	-	-	-	-
CPMT060208FP	6,35	6,45	2,38	0,8	2,80	4170017	4170327	-	4168813	4168824	-	-	4170106	-	-	-	-	-	-	-
CPMT09T302FP	9,53	9,67	3,97	0,2	4,40	-	-	-	-	4168825	-	-	-	-	-	-	-	-	-	-
CPMT09T304FP	9,53	9,67	3,97	0,4	4,40	4170018	4170328	-	4168814	4168826	-	-	4170107	-	-	-	-	-	-	-
CPMT09T308FP	9,53	9,67	3,97	0,8	4,40	4170019	4170329	-	4168815	4168827	-	-	4170108	-	-	-	-	-	-	-





CPMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CPMT060208MP	6,35	6,45	2,38	0,8	2,80	4170255	4170257	-	-	-	-	-	-	-	-	-	-	-	-	-
CPMT09T308MP	9,53	9,67	3,97	0,8	4,40	4170256	4170258	-	4168923	4168926	-	-	4170266	-	-	-	-	-	-	-
CPMT09T312MP	9,53	9,67	3,97	1,2	4,40	-	4170259	-	4168924	-	-	-	4170267	-	-	-	-	-	-	-



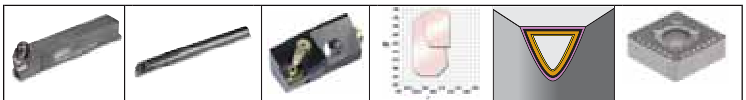
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

Inserts

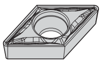
DCMT

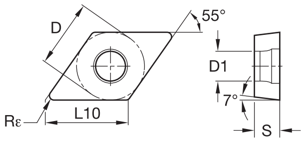
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT070204	6,35	7,75	2,38	0,4	2,80	–	–	–	–	–	–	–	–	–	–	–	2027768	–	–	–
DCMT11T304	9,53	11,63	3,97	0,4	4,40	–	–	–	–	–	–	–	–	–	–	–	2027805	–	2027807	2027804
DCMT11T308	9,53	11,63	3,97	0,8	4,40	–	–	–	–	–	–	–	–	–	–	–	2027843	–	–	–
DCMT11T312	9,53	11,63	3,97	1,2	4,40	–	–	–	–	–	–	–	–	–	–	–	2027868	–	–	–
DCMT150404	12,70	15,50	4,76	0,4	5,50	–	–	–	–	–	–	–	–	–	–	–	2027887	–	–	–
DCMT150408	12,70	15,50	4,76	0,8	5,50	–	–	–	–	–	–	–	–	–	–	–	2027908	–	2027910	–
DCMT150412	12,70	15,50	4,76	1,2	5,50	–	–	–	–	–	–	–	–	–	–	–	2027932	–	–	–
DCMT150416	12,70	15,50	4,76	1,6	5,50	–	–	–	–	–	–	–	–	–	–	–	2027965	–	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



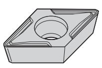


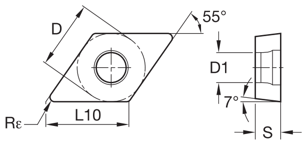
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

DCMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT070202FP	6,35	7,75	2,38	0,2	2,80	-	4170299	-	-	4168787	-	-	-	-	-	-	-	-	-	-
DCMT070204FP	6,35	7,75	2,38	0,4	2,80	4169995	4170300	-	4168764	4168788	-	-	4170089	-	-	-	-	-	-	-
DCMT070208FP	6,35	7,75	2,38	0,8	2,80	-	4170301	-	-	4168789	-	-	-	-	-	-	-	-	-	-
DCMT11T302FP	9,53	11,63	3,97	0,2	4,40	4169996	4170302	-	-	4168790	-	-	-	-	-	-	-	-	-	-
DCMT11T304FP	9,53	11,63	3,97	0,4	4,40	4169997	4170303	-	4168765	4168791	-	-	4170090	-	-	-	-	-	-	-
DCMT11T308FP	9,53	11,63	3,97	0,8	4,40	4169998	4170304	-	4168766	4168792	-	-	4170091	-	-	-	-	-	-	-
DCMT11T312FP	9,53	11,63	3,97	1,2	4,40	4169999	4170305	-	-	-	-	-	-	-	-	-	-	-	-	-
DCMT150404FP	12,70	15,50	4,76	0,4	5,50	4170000	4170306	-	-	4168793	-	-	-	-	-	-	-	-	-	-
DCMT150408FP	12,70	15,50	4,76	0,8	5,50	4170001	4170307	-	-	4168794	-	-	4170092	-	-	-	-	-	-	-



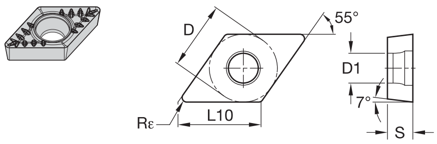


DCMT-FW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT11T304FW	9,53	11,63	3,97	0,2	4,40	5623482	-	-	5623483	-	-	-	-	-	-	-	-	-	-	-
DCMT11T308FW	9,53	11,63	3,97	0,8	4,40	5623486	-	-	5623487	-	-	-	-	-	-	-	-	-	-	-

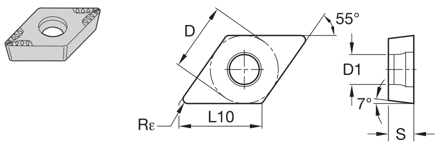
	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

● first choice
○ alternate choice



DCMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT11T304MP	9,53	11,63	3,97	0,4	4,40	4170201	4170223	-	-	-	-	-	4170242	-	-	-	-	-	-	-
DCMT11T308MP	9,53	11,63	3,97	0,8	4,40	4170202	4170224	-	4168898	4168912	-	-	4170243	-	-	-	-	-	-	-
DCMT11T312MP	9,53	11,63	3,97	1,2	4,40	4170213	4170225	-	-	-	-	-	-	-	-	-	-	-	-	-

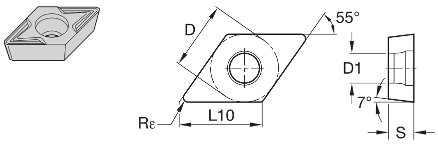


DCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT11T304MU	9,53	11,63	3,97	0,4	4,40	5623585	5623583	-	-	5623581	-	5623586	5623587	5623582	5623584	-	-	-	-	-
DCMT11T308MU	9,52	11,63	3,97	0,8	4,40	5623600	-	-	-	5623588	-	5623602	5623589	5623601	5623603	-	-	-	-	-
DCMT150408MU	12,70	15,50	4,76	0,8	5,50	5623606	5623608	-	-	5623604	-	5623605	5623607	5623609	5623610	-	-	-	-	-
DCMT150412MU	12,70	15,50	4,76	1,2	5,50	-	-	-	-	-	-	5623611	5623612	-	-	-	-	-	-	-


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

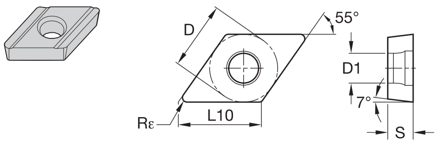


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

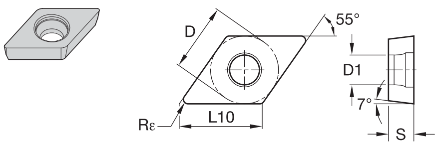
DCMT-MW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT11T304MW	9,52	11,63	3,97	0,2	4,40	5623484	5623485	-	-	-	-	-	-	-	-	-	-	-	-	-
DCMT11T308MW	9,53	11,63	3,97	0,8	4,40	5623488	5623489	-	-	-	-	-	-	-	-	-	-	-	-	-



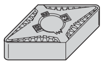
DCMX-18

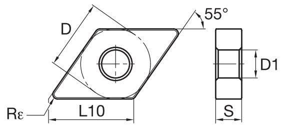
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMX11T302R18	9,53	11,63	3,97	0,2	4,30	-	-	-	-	-	-	-	-	-	-	-	2011507	-	-	-



DCMW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMW070204	6,35	7,75	2,38	0,4	2,80	-	-	-	-	-	-	4170471	4170375	-	-	-	2027966	-	-	-
DCMW11T304	9,53	11,63	3,97	0,4	4,40	-	-	-	-	-	-	4170472	4170376	-	-	-	2027967	-	-	-
DCMW150408	12,70	15,50	4,76	0,8	5,50	-	-	-	-	-	-	4170473	4170377	-	-	-	2031737	-	-	-



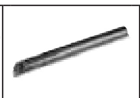


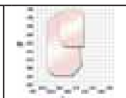
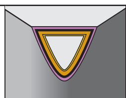
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNGG-FS

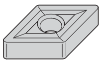
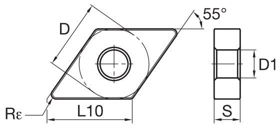
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNGG110402FS	9,52	11,63	4,76	0,2	3,81	–	–	–	–	–	–	–	–	5548670	5538206	5549947	–	–	–	–
DNGG110404FS	9,52	11,63	4,76	0,4	3,81	–	–	–	–	–	–	–	–	5548671	–	5549948	–	–	–	–
DNGG110408FS	9,52	11,63	4,76	0,8	3,81	–	–	–	–	–	–	–	–	5548672	–	5549949	–	–	–	–
DNGG150401FS	12,70	15,50	4,76	0,1	5,16	–	–	–	–	–	–	–	–	5548674	–	5549991	–	–	–	–
DNGG150402FS	12,70	15,50	4,76	0,2	5,16	–	–	–	–	–	–	–	–	5548673	–	5549990	–	–	–	–
DNGG150404FS	12,70	15,50	4,76	0,4	5,16	–	–	–	–	–	–	–	–	5548675	5538207	5549992	–	–	–	–
DNGG150408FS	12,70	15,50	4,76	0,8	5,16	–	–	–	–	–	–	–	–	5548676	5538208	5549993	–	–	–	–
DNGG150412FS	12,70	15,50	4,76	1,2	5,16	–	–	–	–	–	–	–	–	5548677	–	5549994	–	–	–	–
DNGG150604FS	12,70	15,50	6,35	0,4	5,16	–	–	–	–	–	–	–	–	5548678	5538209	5549995	–	–	–	–
DNGG150608FS	12,70	15,50	6,35	0,8	5,16	–	–	–	–	–	–	–	–	5548679	5538230	5549996	–	–	–	–


C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105

Inserts

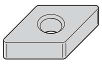
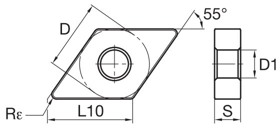



● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

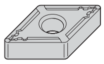
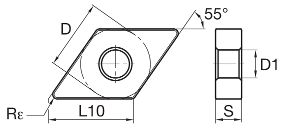
DNGP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNGP150401	12,70	15,50	4,76	0,1	5,16	-	-	-	-	-	-	-	-	5549191	-	-	-	-	-	-
DNGP150402	12,70	15,50	4,76	0,2	5,16	-	-	-	-	-	-	-	-	5549192	-	-	-	-	-	-
DNGP150404	12,70	15,50	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5549193	-	5549209	-	-	-	-
DNGP150408	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5549194	-	5549210	-	-	-	-

DNMA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMA110408	9,53	11,63	4,76	0,8	3,81	-	-	-	-	-	-	4171634	4171873	-	-	-	-	-	-	-
DNMA110412	9,53	11,63	4,76	1,2	3,81	-	-	-	-	-	-	-	4171874	-	-	-	-	-	-	-
DNMA150408	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	-	4171635	4171875	-	-	-	-	-	-	-
DNMA150412	12,70	15,50	4,76	1,2	5,16	-	-	-	-	-	-	4171636	4171876	-	-	-	-	-	-	-
DNMA150416	12,70	15,50	4,76	1,6	5,16	-	-	-	-	-	-	-	4171877	-	-	-	-	-	-	-
DNMA150608	12,70	15,50	6,35	0,8	5,16	-	-	-	-	-	-	4171637	4171878	-	-	-	-	-	-	-
DNMA150612	12,70	15,50	6,35	1,2	5,16	-	-	-	-	-	-	4171638	4171879	-	-	-	-	-	-	-
DNMA150616	12,70	15,50	6,35	1,6	5,16	-	-	-	-	-	-	-	4171880	-	-	-	-	-	-	-

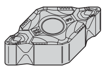
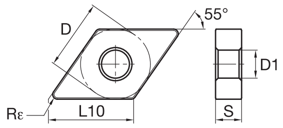



● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

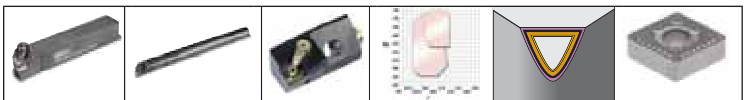
DNMG-22

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG11040822	9,53	11,63	4,76	0,8	3,81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2022221

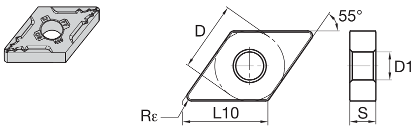



DNMG-CT

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG150604CT	12,70	15,50	6,35	0,3	5,16	-	-	-	4171742	4172699	-	-	-	-	-	-	-	-	-	-
DNMG150608CT	12,70	15,50	6,35	0,8	5,16	-	-	-	4171753	4172700	-	-	-	-	-	-	-	-	-	-
DNMG150612CT	12,70	15,50	6,35	1,1	5,16	-	-	-	4171754	4172701	-	-	-	-	-	-	-	-	-	-


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

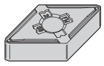


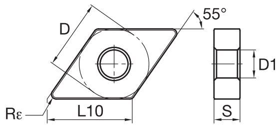
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

■ DNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110404FF	9,53	11,63	4,76	0,4	3,81	4171028	-	-	-	4172348	-	-	4171321	5684273	-	-	-	-	-	-
DNMG110408FF	9,53	11,63	4,76	0,8	3,81	4171029	-	-	-	4172349	-	-	4171322	-	-	-	-	-	-	-
DNMG110412FF	9,53	11,63	4,76	1,2	3,81	-	-	-	-	4172350	-	-	-	-	-	-	-	-	-	-
DNMG150404FF	12,70	15,50	4,76	0,4	5,16	4171030	-	-	-	4172351	-	-	-	5684274	-	-	-	-	-	-
DNMG150408FF	12,70	15,50	4,76	0,8	5,16	4171031	-	-	-	4172352	-	-	4171373	5684275	-	-	-	-	-	-
DNMG150412FF	12,70	15,50	4,76	1,2	5,16	-	-	-	-	-	-	-	4171374	-	-	-	-	-	-	-
DNMG150604FF	12,70	15,50	6,35	0,4	5,16	4171032	-	-	-	4172683	-	-	4171375	5684276	-	-	-	-	-	-
DNMG150608FF	12,70	15,50	6,35	0,8	5,16	4171043	-	-	-	4172684	-	-	4171376	-	-	-	-	-	-	-
DNMG150612FF	12,70	15,50	6,35	1,2	5,16	4171044	-	-	-	4172685	-	-	4171377	-	-	-	-	-	-	-



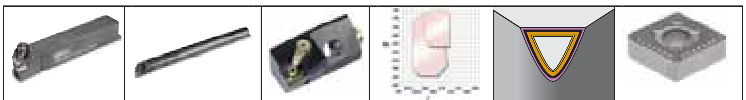


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

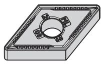
■ DNMG-FW

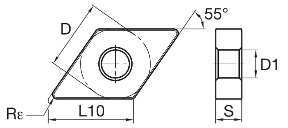
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110404FW	9,53	11,63	4,76	0,4	3,81	5623490	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DNMG110408FW	9,53	11,63	4,76	0,8	3,81	5623491	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150404FW	12,70	15,50	4,76	0,4	5,16	5623492	-	-	4171758	4173105	-	4171685	-	-	-	-	-	-	-	-
DNMG150408FW	12,70	15,50	4,76	0,4	5,16	5623493	-	-	4171759	4173106	-	4171686	-	-	-	-	-	-	-	-
DNMG150604FW	12,70	15,50	6,35	0,4	5,16	5623496	-	-	4171760	4173107	-	4171689	-	-	-	-	-	-	-	-
DNMG150608FW	12,70	15,50	6,35	0,4	5,16	5623497	-	-	4171761	4173108	-	4171690	-	-	-	-	-	-	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



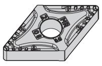


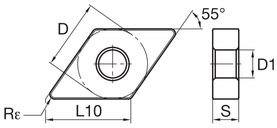
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

DNMG-ML

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110404ML	9,53	11,63	4,76	0,4	3,81	4171062	4170461	-	-	-	-	4171660	4171394	-	-	-	-	-	-	-
DNMG110408ML	9,53	11,63	4,76	0,8	3,81	4171063	4170462	-	-	-	-	4171661	4171395	-	-	-	-	-	-	-
DNMG110412ML	9,53	11,63	4,76	1,2	3,81	4171064	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150404ML	12,70	15,50	4,76	0,4	5,16	4171065	4170483	-	-	-	-	4171662	4171396	-	-	-	-	-	-	-
DNMG150408ML	12,70	15,50	4,76	0,8	5,16	4171066	4170484	-	-	-	-	4171663	4171397	-	-	-	-	-	-	-
DNMG150412ML	12,70	15,50	4,76	1,2	5,16	4171067	-	-	-	-	-	4171664	4171398	-	-	-	-	-	-	-
DNMG150604ML	12,70	15,50	6,35	0,4	5,16	4171068	4170485	-	-	-	-	4171665	4171399	-	-	-	-	-	-	-
DNMG150608ML	12,70	15,50	6,35	0,8	5,16	4171069	4170486	-	-	-	-	4171666	4171400	-	-	-	-	-	-	-
DNMG150612ML	12,70	15,50	6,35	1,2	5,16	4171070	4170487	-	-	-	-	4171667	4171401	-	-	-	-	-	-	-





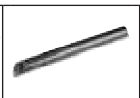
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

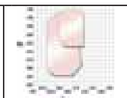
DNMG-MR

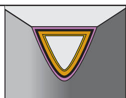
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110408MR	9,53	11,63	4,76	0,8	3,81	4171139	4170564	4170050	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150404MR	12,70	15,50	4,76	0,4	5,16	4171140	4170565	4170051	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150408MR	12,70	15,50	4,76	0,8	5,16	4171141	4170566	4170052	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150412MR	12,70	15,50	4,76	1,2	5,16	4171142	4170567	4170053	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150604MR	12,70	15,50	6,35	0,4	5,16	4171143	4170568	4170054	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150608MR	12,70	15,50	6,35	0,8	5,16	4171144	4170569	4170055	-	4173023	4173138	-	-	-	-	-	-	-	-	-
DNMG150612MR	12,70	15,50	6,35	1,2	5,16	4171145	4170570	4170056	-	4173024	4173139	-	-	-	-	-	-	-	-	-


C2–C49


C50–C81

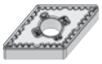

C86–C129

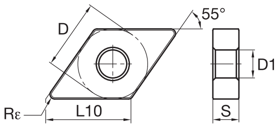

B8–B25


B26–B28


B30–B105

Inserts



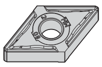


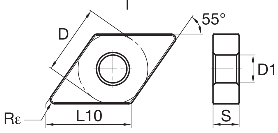
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNMG-MS

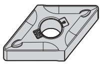
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110408MS	9,53	11,63	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5908769	5908770	5908781	-	-	-	-
DNMG150404MS	12,70	15,50	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5908782	5908783	5908784	-	-	-	-
DNMG150408MS	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5908785	5908787	5908788	-	-	-	-
DNMG150412MS	12,70	15,50	4,76	1,2	5,16	-	-	-	-	-	-	-	-	5908789	5908790	5908791	-	-	-	-
DNMG150604MS	12,70	15,50	6,35	0,4	5,16	-	-	-	-	-	-	-	-	5908792	5908793	5908794	-	-	-	-
DNMG150608MS	12,70	15,50	6,35	0,8	5,16	-	-	-	-	-	-	-	-	5908795	5908796	5908797	-	-	-	-
DNMG150612MS	12,70	15,50	6,35	1,2	5,16	-	-	-	-	-	-	-	-	5908798	5908799	5908800	-	-	-	-

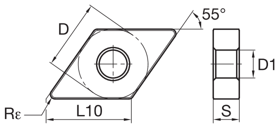




■ DNMG-MW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG150408MW	12,70	15,50	4,76	0,4	5,16	5623494	5623495	-	-	4173114	-	4171687	-	-	-	-	-	-	-	-
DNMG150412MW	12,70	15,50	4,76	1,2	5,16	-	-	-	-	4173115	-	4171688	-	-	-	-	-	-	-	-
DNMG150608MW	12,70	15,50	6,35	0,4	5,16	5623498	5623499	-	-	4173116	-	4171691	-	-	-	-	-	-	-	-
DNMG150612MW	12,70	15,50	6,35	1,2	5,16	-	-	-	-	4173117	-	4171692	-	-	-	-	-	-	-	-



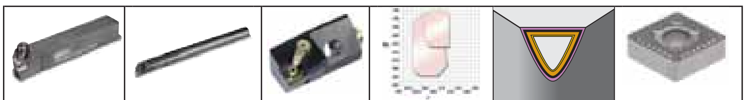


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

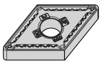
DNMG-RH

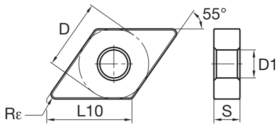
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG150408RH	12,70	15,50	4,76	0,8	5,16	4170989	4171524	4171707	-	4173045	-	-	4171912	-	-	-	-	-	-	-
DNMG150412RH	12,70	15,50	4,76	1,2	5,16	4170990	4171525	4171708	-	-	-	-	4171913	-	-	-	-	-	-	-
DNMG150608RH	12,70	15,50	6,35	0,8	5,16	4170991	4171526	4171709	-	4173046	-	-	4171914	-	-	-	-	-	-	-
DNMG150612RH	12,70	15,50	6,35	1,2	5,16	4170992	4171527	4171710	-	4173047	-	-	4171915	-	-	-	-	-	-	-
DNMG150616RH	12,70	15,50	6,35	1,6	5,16	4170993	4171528	4171711	-	4173048	-	-	4171916	-	-	-	-	-	-	-
DNMG190612RH	15,88	19,38	6,35	1,2	6,35	4170994	4171529	4171712	-	-	-	-	-	-	-	-	-	-	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts





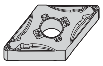
● first choice
○ alternate choice

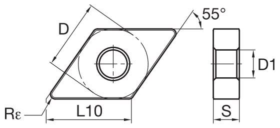
	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

DNMG-UF

ISO catalogue number	D	L10	S	Rε	D1
DNMG110404UF	9,53	11,63	4,76	0,4	3,81
DNMG110408UF	9,53	11,63	4,76	0,8	3,81
DNMG150404UF	12,70	15,50	4,76	0,4	5,16
DNMG150408UF	12,70	15,50	4,76	0,8	5,16
DNMG150412UF	12,70	15,50	4,76	1,2	5,16
DNMG150604UF	12,70	15,50	6,35	0,4	5,16
DNMG150608UF	12,70	15,50	6,35	0,8	5,16
DNMG150612UF	12,70	15,50	6,35	1,2	5,16

ISO catalogue number	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110404UF	–	–	–	4169356	4169382	–	–	–	5645603	–	–	–	–	–	–
DNMG110408UF	–	–	–	4169357	4169383	–	–	–	5645604	–	–	–	–	–	–
DNMG150404UF	–	–	–	4169358	4169384	–	–	–	5645601	–	–	–	–	–	–
DNMG150408UF	5645606	5645605	–	4169359	4169385	–	–	–	5645602	–	–	–	–	–	–
DNMG150412UF	–	–	–	4169360	4169386	–	–	–	–	–	–	–	–	–	–
DNMG150604UF	–	–	–	4169361	4169387	–	–	–	5645608	–	–	–	–	–	–
DNMG150608UF	–	5645609	–	4169362	4169388	–	–	–	5645607	–	–	–	–	–	–
DNMG150612UF	–	–	–	4169363	4169389	–	–	–	–	–	–	–	–	–	–



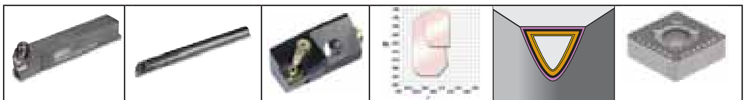


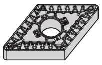
● first choice
○ alternate choice

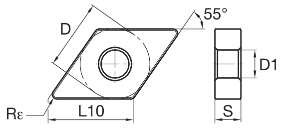
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNMG-UM

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110404UM	9,53	11,63	4,76	0,4	3,81	–	–	–	4172337	4172383	4172413	–	–	–	–	–	–	–	–	–
DNMG110408UM	9,53	11,63	4,76	0,8	3,81	–	–	–	4172338	4172384	4172414	–	–	5645256	–	–	–	–	–	–
DNMG110412UM	9,53	11,63	4,76	1,2	3,81	–	–	–	4172339	4172385	4172415	–	–	–	–	–	–	–	–	–
DNMG150404UM	12,70	15,50	4,76	0,4	5,16	–	–	–	4172340	4172386	4172416	–	–	5645254	–	–	–	–	–	–
DNMG150408UM	12,70	15,50	4,76	0,8	5,16	5645260	5645261	–	4172341	4172387	4172417	–	–	5645251	–	–	–	–	–	–
DNMG150412UM	12,70	15,50	4,76	1,2	5,16	–	–	–	4172342	4172388	4172418	–	–	5645259	–	–	–	–	–	–
DNMG150604UM	12,70	15,50	6,35	0,4	5,16	–	–	–	4172363	4172389	4172419	–	–	5645255	–	–	–	–	–	–
DNMG150608UM	12,70	15,50	6,35	0,8	5,16	–	5645262	–	4172364	4172390	4172420	–	–	5645253	5645264	–	–	–	–	–
DNMG150612UM	12,70	15,50	6,35	1,2	5,16	–	–	–	4172365	4172391	4172421	–	–	5645258	5645257	–	–	–	–	–
DNMG150616UM	12,70	15,50	6,35	1,6	5,16	–	–	–	–	4172392	4172422	–	–	–	–	–	–	–	–	–


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



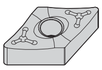


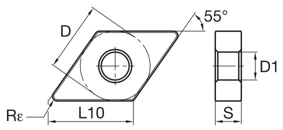
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

DNMG-UR

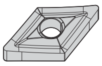
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110408UR	9,53	11,63	4,76	0,8	3,81	4171101	4170509	4169966	4169424	4169453	4169488	-	4171426	-	-	-	-	-	-	-
DNMG110412UR	9,53	11,63	4,76	1,2	3,81	4171102	4170510	-	4169425	-	-	-	4171427	-	-	-	-	-	-	-
DNMG150408UR	12,70	15,50	4,76	0,8	5,16	4171103	4170511	4169967	4169426	4169454	4169489	-	4171428	-	5579271	-	-	-	-	-
DNMG150412UR	12,70	15,50	4,76	1,2	5,16	4171104	4170512	4169968	-	4169455	4169490	-	4171429	-	5579292	-	-	-	-	-
DNMG150416UR	12,70	15,50	4,76	1,6	5,16	-	-	-	-	-	4169491	-	4171430	5680171	-	-	-	-	-	-
DNMG150608UR	12,70	15,50	6,35	0,8	5,16	4171105	4170513	4169969	4169427	4169456	4169492	-	4171431	-	5579276	-	-	-	-	-
DNMG150612UR	12,70	15,50	6,35	1,2	5,16	4171106	4170514	4169970	4169428	4169457	4169493	5680172	4171432	-	-	-	-	-	-	-
DNMG150616UR	12,70	15,50	6,35	1,6	5,16	4171107	4170515	4169971	-	-	4169494	-	4171433	-	-	-	-	-	-	-

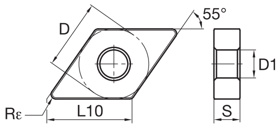




DNMM-65

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMM15060865	12,70	15,50	6,35	0,8	5,16	5698413	5698414	5698415	-	5698412	-	-	-	-	-	-	-	-	-	-
DNMM15061265	12,70	15,50	6,35	1,2	5,16	5698417	-	-	-	5698416	-	-	-	-	-	-	-	-	-	-
DNMM15061665	12,70	15,50	6,35	1,6	5,16	5698418	5698419	-	-	-	-	-	-	-	-	-	-	-	-	-





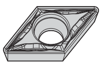
● first choice
○ alternate choice

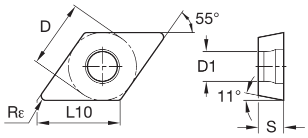
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMP150404	12,70	15,50	4,76	0,4	5,16	–	–	–	4171591	4173658	4173697	–	–	4172484	–	–	–	–	–	–
DNMP150408	12,70	15,50	4,76	0,8	5,16	–	–	–	4171592	4173659	4173698	–	–	4172485	–	–	–	–	–	–
DNMP150412	12,70	15,50	4,76	1,2	5,16	–	–	–	4172133	4173660	4173699	–	–	–	–	–	–	–	–	–
DNMP150604	12,70	15,50	6,35	0,4	5,16	–	–	–	4172134	4173661	4173700	–	–	4172486	–	–	–	–	–	–
DNMP150608	12,70	15,50	6,35	0,8	5,16	–	–	–	4172135	4173662	4173701	–	–	4172487	4172616	–	–	–	–	–
DNMP150612	12,70	15,50	6,35	1,2	5,16	–	–	–	4172136	4173663	4173702	–	–	4172488	4172617	–	–	–	–	–

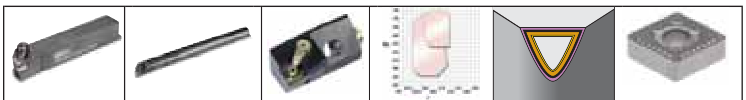
NOTE: DNMP-style inserts are single sided.





■ DPMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DPMT070204FP	6,35	7,75	2,38	0,4	2,80	4170020	4170330	–	4168816	4168828	–	–	–	–	–	–	–	–	–	–
DPMT11T304FP	9,53	11,63	3,97	0,4	4,40	4170021	4170331	–	4168817	4168829	–	–	–	–	–	–	–	–	–	–
DPMT11T308FP	9,53	11,63	3,97	0,8	4,40	4170022	4170332	–	–	4168830	–	–	4170109	–	–	–	–	–	–	–

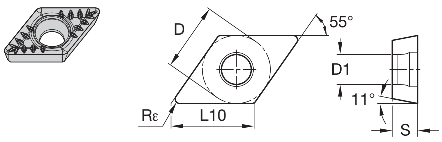


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

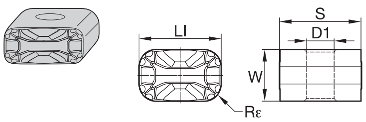
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			



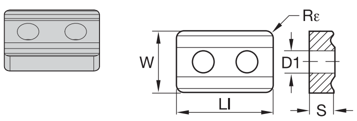
DPMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DPMT11T308MP	9,53	11,63	3,97	0,8	4,40	-	4170260	-	-	-	-	-	4170268	-	-	-	-	-	-	-



LNUX-13

ISO catalogue number	W	LI	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
LNUX19194013	10,00	19,05	19,05	4,0	6,35	-	-	-	-	-	-	-	4170966	-	-	-	-	-	-	-
LNUX30194013	12,00	30,00	19,05	4,0	6,35	-	-	-	-	-	-	-	4170968	-	-	-	-	-	-	-

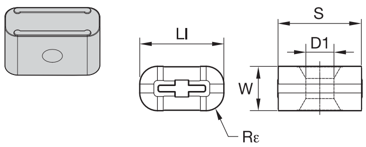


LNUX-EN95

ISO catalogue number	W	LI	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
LNUX400924EN95	25,40	40,00	9,53	2,4	9,12	-	-	-	-	-	-	-	-	-	-	-	-	-	2012231	-

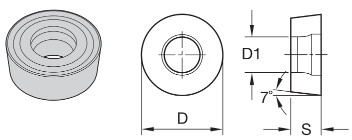
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

● first choice
○ alternate choice



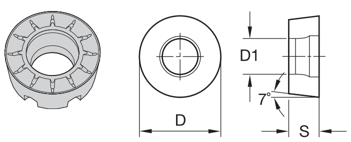
■ LNUX-T

ISO catalogue number	W	LI	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
LNUX191940T	10,00	19,05	19,05	4,0	6,35	-	-	-	-	-	-	-	4170967	-	-	-	-	-	-	-
LNUX301940T	12,00	30,00	19,05	4,0	6,35	-	-	-	-	-	-	-	4170969	-	-	-	-	-	-	-



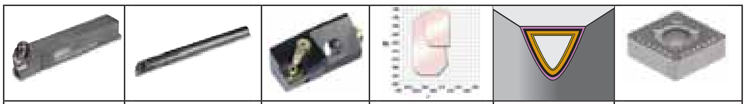
■ RCMT

ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RCMT0602M0	6,00	2,38	2,80	4169975	4170536	-	-	-	-	-	4170478	-	-	-	2028115	-	-	-
RCMT0803M0	8,00	3,18	3,40	4169976	4170537	-	-	-	-	-	4170479	-	-	-	2028129	-	-	-
RCMT10T3M0	10,00	3,97	4,40	4169977	4170538	4170752	-	-	-	-	4170480	-	-	-	2028143	-	2028145	-
RCMT1204M0	12,00	4,76	4,40	4169978	4170539	4170803	-	-	-	-	4170481	-	-	-	2028157	-	-	-
RCMT1606M0	16,00	6,35	5,50	4169979	-	4170804	-	-	-	-	4170482	-	-	-	-	-	-	-



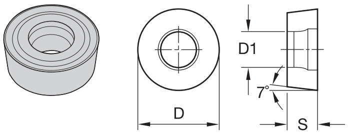
■ RCMT-43

ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RCMT1606M043	16,00	6,35	5,50	-	-	-	-	-	-	-	-	-	-	-	2028170	-	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

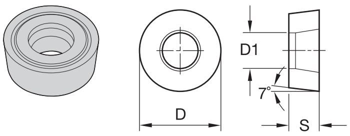


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

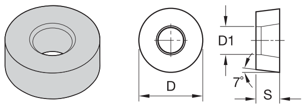
■ RCMT-T

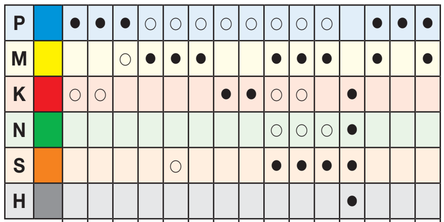
ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RCMT1606M0T	16,00	6,35	5,50	–	4170540	–	–	–	–	–	–	–	–	–	–	–	–	–



■ RCMX

ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RCMX2006M0T	20,00	6,35	6,50	4169980	4170541	4170805	–	–	–	–	4170543	–	–	–	–	–	–	–
RCMX2507M0T	25,00	7,94	7,40	4169981	4170542	4170806	–	–	–	–	4170544	–	–	–	–	–	2028196	–
RCMX3209M0T	32,00	9,53	9,50	4169982	–	–	–	–	–	–	–	–	–	–	–	–	–	–



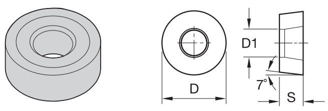


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

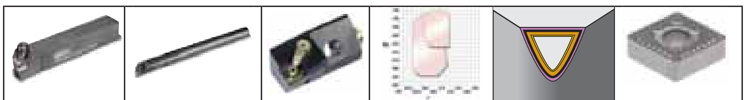
RNMA

ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RNMA120400	12,70	4,76	5,16	-	-	-	-	-	-	4171639	4171881	-	-	-	-	-	-	-

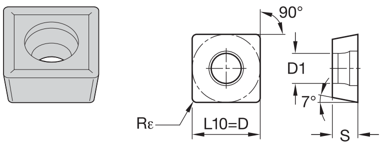


RNMG-RH

ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RNMG090300RH	9,53	3,18	3,81	4170995	4171530	-	-	-	-	-	-	-	-	-	-	-	-	-
RNMG120400RH	12,70	4,76	5,16	4170996	4171531	4171713	-	-	-	-	-	-	-	-	-	-	-	-
RNMG190600RH	19,05	6,35	7,93	4170997	4171532	4171714	-	-	-	-	4171917	-	-	-	-	-	-	-


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

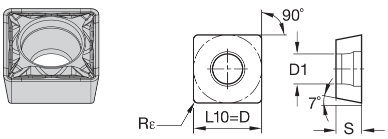


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

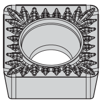
■ SCMT

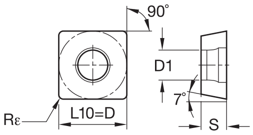
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SCMT090304	9,53	9,53	3,18	0,4	4,40	-	-	-	-	-	-	-	-	-	-	-	-	-	2028225	-
SCMT09T304	9,53	9,53	3,97	0,4	4,40	-	-	-	-	-	-	-	-	-	-	-	2028255	-	-	-
SCMT09T308	9,53	9,53	3,97	0,8	4,40	-	-	-	-	-	-	-	-	-	-	-	2028270	-	2028272	-
SCMT120408	12,70	12,70	4,76	0,8	5,50	-	-	-	-	-	-	-	-	-	-	-	2028286	-	2028289	-
SCMT120412	12,70	12,70	4,76	1,2	5,50	-	-	-	-	-	-	-	-	-	-	-	2028296	-	-	2028295
SCMT150512	15,88	15,88	5,56	1,2	5,50	-	-	-	-	-	-	-	-	-	-	-	2028306	-	2028307	-



■ SCMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SCMT09T304FP	9,53	9,53	3,97	0,4	4,40	4170002	4170308	-	4168767	4168795	-	-	4170093	-	-	-	-	-	-	-
SCMT09T308FP	9,53	9,53	3,97	0,8	4,40	4170003	4170309	-	4168768	4168796	-	-	4170094	-	-	-	-	-	-	-
SCMT120404FP	12,70	12,70	4,76	0,4	5,50	-	4170310	-	-	4168797	-	-	-	-	-	-	-	-	-	-
SCMT120408FP	12,70	12,70	4,76	0,8	5,50	4170004	4170311	-	4168769	4168798	-	-	4170095	-	-	-	-	-	-	-
SCMT120412FP	12,70	12,70	4,76	1,2	5,50	4170005	4170312	-	-	4168799	-	-	4170096	-	-	-	-	-	-	-



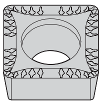


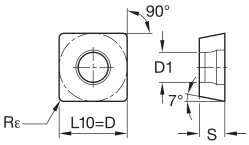
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

SCMT-MP

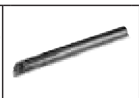
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SCMT09T304MP	9,53	9,53	3,97	0,4	4,40	-	4170226	-	4168899	4168913	-	-	4170244	-	-	-	-	-	-	-
SCMT09T308MP	9,53	9,53	3,97	0,8	4,40	4170214	4170227	-	4168900	4168914	-	-	4170245	-	-	-	-	-	-	-
SCMT120404MP	12,70	12,70	4,76	0,4	5,50	-	4170228	-	4168901	4168915	-	-	4170246	-	-	-	-	-	-	-
SCMT120408MP	12,70	12,70	4,76	0,8	5,50	4170215	4170229	-	4168902	4168916	-	-	4170247	-	-	-	-	-	-	-
SCMT120412MP	12,70	12,70	4,76	1,2	5,50	-	4170230	-	4168903	4168917	-	-	4170248	-	-	-	-	-	-	-

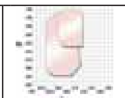
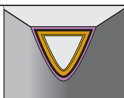




SCMT-MU

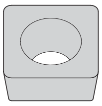
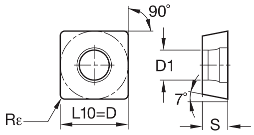
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SCMT090308MU	9,53	9,53	3,18	0,8	4,40	5623446	-	-	-	-	-	-	5623445	-	-	-	-	-	-	-
SCMT09T304MU	9,53	9,53	3,97	0,4	4,40	-	-	-	-	5623447	-	-	-	-	-	-	-	-	-	-
SCMT09T308MU	9,53	9,53	3,97	0,8	4,40	5623461	5623464	5623462	-	5623448	-	-	5623449	5623460	-	-	-	-	-	-


C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105

Inserts

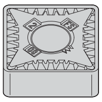
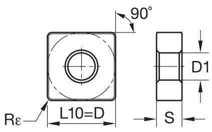



● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

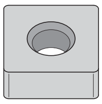
SCMW

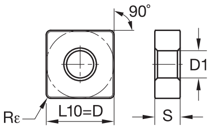
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SCMW090304	9,53	9,53	3,18	0,4	4,40	-	-	-	-	-	-	4170474	4170378	-	-	-	2028308	-	-	-
SCMW09T308	9,53	9,53	3,97	0,8	4,40	-	-	-	-	-	-	-	4170379	-	-	-	-	-	-	-
SCMW120408	12,70	12,70	4,76	0,8	5,50	-	-	-	-	-	-	4170475	4170380	-	-	-	2028310	-	-	-

SNGG-FS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNGG120408FS	12,70	12,70	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5548680	-	5549997	-	-	-	-



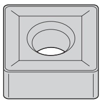


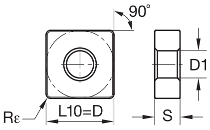
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

SNMA

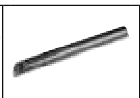
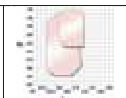
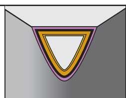
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMA120408	12,70	12,70	4,76	0,8	5,16	-	-	-	-	-	-	4171640	4171882	-	-	-	2028371	-	-	-
SNMA120412	12,70	12,70	4,76	1,2	5,16	-	-	-	-	-	-	4171641	4171883	-	-	-	-	-	-	-
SNMA120416	12,70	12,70	4,76	1,6	5,16	-	-	-	-	-	-	4171642	4171884	-	-	-	-	-	-	-
SNMA150608	15,88	15,88	6,35	0,8	6,35	-	-	-	-	-	-	-	4171885	-	-	-	-	-	-	-
SNMA150612	15,88	15,88	6,35	1,2	6,35	-	-	-	-	-	-	4171643	4171886	-	-	-	-	-	-	-
SNMA150616	15,88	15,88	6,35	1,6	6,35	-	-	-	-	-	-	4171644	4171887	-	-	-	-	-	-	-
SNMA190612	19,05	19,05	6,35	1,2	7,93	-	-	-	-	-	-	4171645	4171888	-	-	-	-	-	-	-
SNMA190616	19,05	19,05	6,35	1,6	7,93	-	-	-	-	-	-	4171646	4171889	-	-	-	-	-	-	-



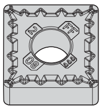
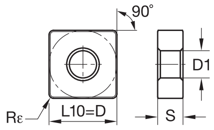


SNMG

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG250924	25,40	25,40	9,53	2,4	9,12	-	-	5091303	-	-	-	-	-	-	-	-	-	-	-	-

					
C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts

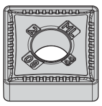
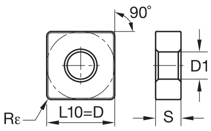



● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

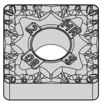
SNMG-FF

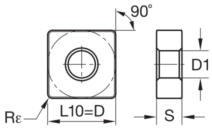
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG090304FF	9,53	9,53	3,18	0,4	3,81	4171045	-	-	-	-	-	-	4171378	5684279	-	-	-	-	-	-
SNMG090308FF	9,53	9,53	3,18	0,8	3,81	4171046	-	-	-	4172686	-	-	4171379	5684277	-	-	-	-	-	-
SNMG120404FF	12,70	12,70	4,76	0,4	5,16	4171047	-	-	-	4172687	-	-	4171380	5684330	-	-	-	-	-	-
SNMG120408FF	12,70	12,70	4,76	0,8	5,16	4171048	-	-	-	4172688	-	-	4171381	5684278	-	-	-	-	-	-
SNMG120412FF	12,70	12,70	4,76	1,2	5,16	4171049	-	-	-	4172689	-	-	4171382	-	-	-	-	-	-	-
SNMG120416FF	12,70	12,70	4,76	1,6	5,16	-	-	-	-	4172690	-	-	-	-	-	-	-	-	-	-

SNMG-ML

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG090304ML	9,53	9,53	3,18	0,4	3,81	4171071	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SNMG090308ML	9,53	9,53	3,18	0,8	3,81	4171072	4170488	-	-	-	-	4171668	4171402	-	-	-	-	-	-	-
SNMG120404ML	12,70	12,70	4,76	0,4	5,16	-	-	-	-	-	-	-	4171403	-	-	-	-	-	-	-
SNMG120408ML	12,70	12,70	4,76	0,8	5,16	4171073	4170489	-	-	-	-	4171669	4171404	-	-	-	-	-	-	-
SNMG120412ML	12,70	12,70	4,76	1,2	5,16	4171074	4170490	-	-	-	-	4171670	4171405	-	-	-	-	-	-	-
SNMG120416ML	12,70	12,70	4,76	1,6	5,16	-	-	-	-	-	-	-	4171406	-	-	-	-	-	-	-



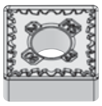


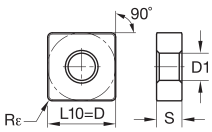
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

SNMG-MR

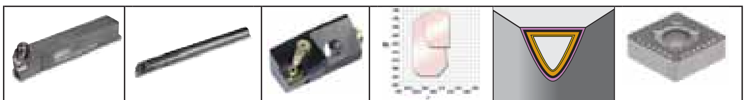
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120408MR	12,70	12,70	4,76	0,8	5,16	4171146	4170571	4170057	–	4173025	4173140	–	–	–	–	–	–	–	–	–
SNMG120412MR	12,70	12,70	4,76	1,2	5,16	5684354	5684355	–	–	4173026	4173141	–	–	–	–	–	–	–	–	–
SNMG120416MR	12,70	12,70	4,76	1,6	5,16	–	–	–	–	4173027	4173142	–	–	–	–	–	–	–	–	–
SNMG150608MR	15,88	15,88	6,35	0,8	6,35	–	–	–	–	4173028	4173143	–	–	–	–	–	–	–	–	–
SNMG150612MR	15,88	15,88	6,35	1,2	6,35	4171147	–	–	–	4173029	4173144	–	–	–	–	–	–	–	–	–
SNMG150616MR	15,88	15,88	6,35	1,6	6,35	–	–	–	–	4173030	4173145	–	–	–	–	–	–	–	–	–
SNMG190612MR	19,05	19,05	6,35	1,2	7,93	4171148	4170572	4170058	–	4173031	4173146	–	–	–	–	–	–	–	–	–
SNMG190616MR	19,05	19,05	6,35	1,6	7,93	4171149	–	–	–	4173032	4173147	–	–	–	–	–	–	–	–	–



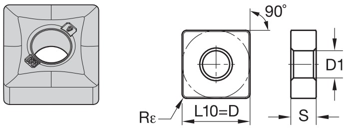


SNMG-MS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120408MS	12,70	12,70	4,76	0,8	5,16	–	–	–	–	–	–	–	–	5908847	5908848	5908849	–	–	–	–
SNMG120412MS	12,70	12,70	4,76	1,2	5,16	–	–	–	–	–	–	–	–	5908850	5908921	5908922	–	–	–	–
SNMG150612MS	15,88	15,88	6,35	1,2	6,35	–	–	–	–	–	–	–	–	–	5908923	5908924	–	–	–	–
SNMG190612MS	19,05	19,05	6,35	1,2	7,94	–	–	–	–	–	–	–	–	5908925	5908926	–	–	–	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

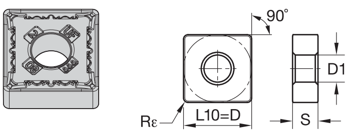


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

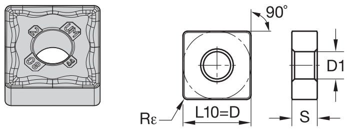
SNMG-RH

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120408RH	12,70	12,70	4,76	0,8	5,16	4170998	4171533	4171715	-	4173049	-	-	4171918	-	-	-	-	-	-	-
SNMG120412RH	12,70	12,70	4,76	1,2	5,16	4170999	4171534	4171716	-	4173050	-	-	4171919	-	-	-	-	-	-	-
SNMG120416RH	12,70	12,70	4,76	1,6	5,16	4171000	4171535	4171717	-	4173051	-	-	4171920	-	-	-	-	-	-	-
SNMG150608RH	15,88	15,88	6,35	0,8	6,35	4171001	4171536	4171718	-	4173052	-	-	4171921	-	-	-	-	-	-	-
SNMG150612RH	15,88	15,88	6,35	1,2	6,35	4171002	4171537	4171719	-	4173053	-	-	4171922	-	-	-	-	-	-	-
SNMG150616RH	15,88	15,88	6,35	1,6	6,35	4171003	4171538	4171720	-	4173054	-	-	4171923	-	-	-	-	-	-	-
SNMG190608RH	19,05	19,05	6,35	0,8	7,93	4171004	4171539	4171721	-	4173055	-	-	4171924	-	-	-	-	-	-	-
SNMG190612RH	19,05	19,05	6,35	1,2	7,93	4171005	4171540	4171722	-	4173056	-	-	4171925	-	-	-	-	-	-	-
SNMG190616RH	19,05	19,05	6,35	1,6	7,93	4171006	4171541	4171723	-	4173057	-	-	4171926	-	-	-	-	-	-	-



SNMG-UF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120404UF	12,70	12,70	4,76	0,4	5,16	-	-	-	4169364	4169390	-	-	-	5645610	-	-	-	-	-	-
SNMG120408UF	12,70	12,70	4,76	0,8	5,16	-	-	-	4169365	4169391	-	-	-	5645611	-	-	-	-	-	-
SNMG120412UF	12,70	12,70	4,76	1,2	5,16	-	-	-	4169366	4169392	-	-	-	-	-	-	-	-	-	-

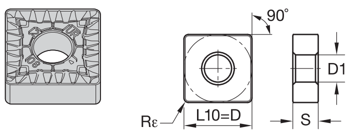


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

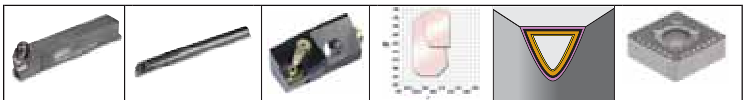
SNMG-UM

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120404UM	12,70	12,70	4,76	0,4	5,16	-	-	-	4172366	4172393	4172423	-	-	-	-	-	-	-	-	-
SNMG120408UM	12,70	12,70	4,76	0,8	5,16	-	-	-	4172367	4172394	4172424	-	-	-	-	-	-	-	-	-
SNMG120412UM	12,70	12,70	4,76	1,2	5,16	-	-	-	4172368	4172395	4172425	-	-	-	-	-	-	-	-	-

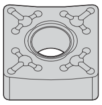


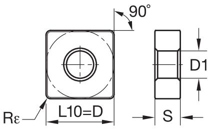
SNMG-UR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120408UR	12,70	12,70	4,76	0,8	5,16	4171108	4170516	4169989	4169429	4169458	4169495	-	4171434	-	-	-	-	-	-	-
SNMG120412UR	12,70	12,70	4,76	1,2	5,16	4171109	4170517	4169990	4169430	4169459	4169496	-	4171435	-	5579350	-	-	-	-	-
SNMG120416UR	12,70	12,70	4,76	1,6	5,16	4171110	-	-	-	4169460	4169497	-	4171436	5680174	5680173	-	-	-	-	-
SNMG150612UR	15,88	15,88	6,35	1,2	6,35	4171111	4170518	4169991	4169431	4169461	4169498	-	4171437	-	5579352	-	-	-	-	-
SNMG150616UR	15,88	15,88	6,35	1,6	6,35	4171112	4170519	4169992	4169432	4169462	4169499	-	4171438	-	-	-	-	-	-	-
SNMG190612UR	19,05	19,05	6,35	1,2	7,93	4171113	4170520	4170033	-	4169463	4169500	-	4171439	-	5512538	-	-	-	-	-
SNMG190616UR	19,05	19,05	6,35	1,6	7,93	4171114	4170521	4170034	-	4169464	4169501	-	4171440	-	5579357	-	-	-	-	-
SNMG190616UR	19,05	19,05	6,35	1,2	7,93	-	-	-	4169433	-	-	-	-	-	-	-	-	-	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



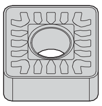


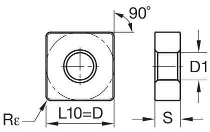
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

SNMM-65

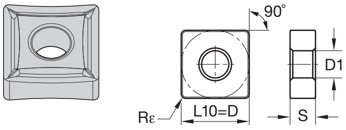
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMM12040865	12,70	12,70	4,76	0,8	5,16	-	5696554	5696555	-	5696553	-	-	-	-	-	-	-	-	-	-
SNMM12041265	12,70	12,70	4,76	1,2	5,16	-	5696557	-	-	5696556	-	-	-	-	-	-	-	-	-	-
SNMM15061665	15,88	15,88	6,35	1,6	6,35	-	5696559	-	-	5696558	-	-	-	-	-	-	-	-	-	-
SNMM19061265	19,05	19,05	6,35	1,2	7,93	5696611	5696612	5696613	-	5696610	-	-	-	-	-	-	-	-	-	-
SNMM19061665	19,05	19,05	6,35	1,6	7,93	5696615	-	-	-	5696614	-	-	-	-	-	-	-	-	-	-
SNMM19062465	19,05	19,05	6,35	2,4	7,93	-	5696617	-	-	5696616	-	-	-	-	-	-	-	-	-	-





SNMM-SR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMM190616SR	19,05	19,05	6,35	1,6	7,93	-	-	-	-	5696648	-	-	-	-	-	-	-	-	-	-
SNMM190624SR	19,05	19,05	6,35	2,4	7,93	5696680	5696681	-	-	5696649	-	-	-	-	-	-	-	-	-	-

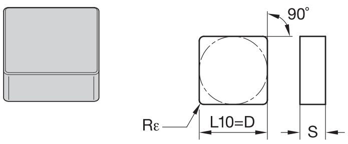


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

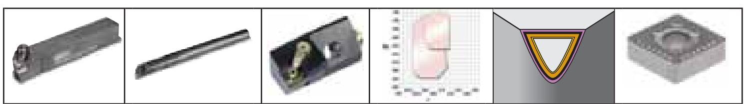
■ SNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMP120408	12,70	12,70	4,76	0,8	5,16	-	-	-	4172137	4173664	4173703	-	-	4172489	4172618	-	-	-	-	-
SNMP120412	12,70	12,70	4,76	1,2	5,16	-	-	-	4172138	4173665	4173704	-	-	4172490	4172619	-	-	-	-	-
SNMP150608	15,88	15,88	6,35	0,8	6,35	-	-	-	4172139	4173666	4173705	-	-	-	4172620	-	-	-	-	-
SNMP150612	15,88	15,88	6,35	1,2	6,35	-	-	-	4172140	4173667	4173706	-	-	-	4172621	-	-	-	-	-
SNMP150616	15,88	15,88	6,35	1,6	6,35	-	-	-	4172141	4173668	4173707	-	-	-	4172622	-	-	-	-	-
SNMP190616	19,05	19,05	6,35	1,6	7,93	-	-	-	4172142	4173669	4173708	-	-	-	-	-	-	-	-	-



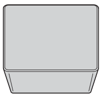
■ SNU

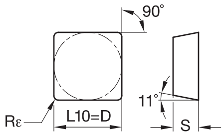
ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNUN120408	12,70	12,70	4,76	0,8	-	-	-	-	-	-	-	4170962	-	-	-	-	-	-	-
SNUN120412	12,70	12,70	4,76	1,2	-	-	-	-	-	-	-	4170963	-	-	-	-	-	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



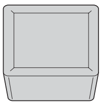


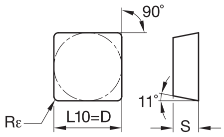
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

SPG

ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPGN090308	9,53	9,53	3,18	0,8	-	-	-	-	-	-	-	4170943	-	-	-	-	-	-	-
SPGN120308	12,70	12,70	3,18	0,8	-	-	-	-	-	-	-	4170944	-	-	-	-	-	-	-
SPGN120312	12,70	12,70	3,18	1,2	-	-	-	-	-	-	-	4170945	-	-	-	-	-	-	-



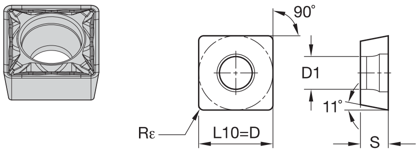


SPMR

ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPMR090308	9,53	9,53	3,18	0,8	-	-	4170650	-	-	-	-	4170946	-	-	-	-	-	-	-
SPMR120304	12,70	12,70	3,18	0,4	4170853	-	4170651	-	-	-	-	4170947	-	-	-	-	-	-	-
SPMR120308	12,70	12,70	3,18	0,8	4170854	-	4170652	-	-	-	-	4170948	-	-	-	-	-	-	-
SPMR120312	12,70	12,70	3,18	1,2	-	-	4170783	-	-	-	-	4170949	-	-	-	-	-	-	-

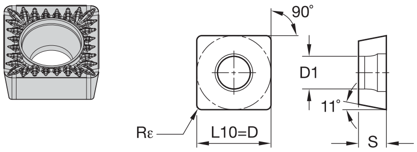
	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

● first choice
○ alternate choice



SPMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPMT09T304FP	9,53	9,53	3,97	0,4	4,40	4170023	4170333	-	-	4168831	-	-	4170110	-	-	-	-	-	-	-
SPMT09T308FP	9,53	9,53	3,97	0,8	4,40	4170024	4170334	-	-	4168832	-	-	4170111	-	-	-	-	-	-	-

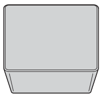
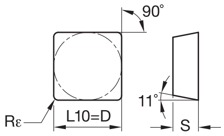


SPMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPMT09T308MP	9,53	9,53	3,97	0,8	4,40	-	4170261	-	4168925	-	-	-	4170269	-	-	-	-	-	-	-
SPMT120408MP	12,70	12,70	4,76	0,8	5,50	-	4170262	-	-	-	-	-	4170270	-	-	-	-	-	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

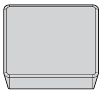
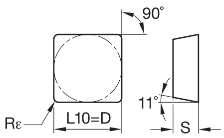



● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

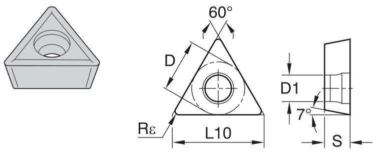
SPU

ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPUN090308	9,53	9,53	3,18	0,8	–	–	–	–	–	–	–	–	–	–	–	2028543	–	–	–
SPUN120304	12,70	12,70	3,18	0,4	4170856	–	–	–	–	–	–	–	–	–	–	2028547	–	–	–
SPUN120308	12,70	12,70	3,18	0,8	4170857	–	–	–	–	–	–	4170950	–	–	–	2028555	–	–	–
SPUN120312	12,70	12,70	3,18	1,2	–	–	–	–	–	–	–	4170951	–	–	–	2028560	–	–	–
SPUN120412	12,70	12,70	4,76	1,2	–	–	–	–	–	–	–	–	–	–	–	2028562	–	–	–
SPUN150412	15,88	15,88	4,76	1,2	–	–	–	–	–	–	–	–	–	–	–	2028565	–	2028567	–
SPUN190412	19,05	19,05	4,76	1,2	–	–	–	–	–	–	–	–	–	–	–	2028568	–	–	–
SPUN190416	19,05	19,05	4,76	1,6	–	–	–	–	–	–	–	–	–	–	–	2561892	–	–	–

SPU-T

ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPUN250620T	25,40	25,40	6,35	2,0	4170858	–	–	–	–	–	–	–	–	–	–	–	–	–	–

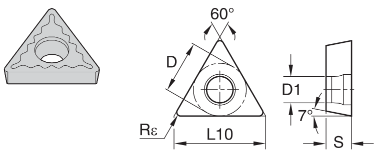


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S					○					●	●	●	●			
H													●			

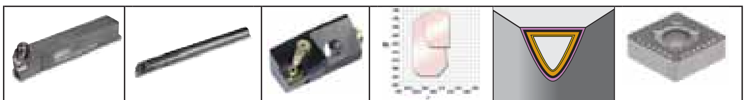
TCMT

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMT110202	6,35	11,00	2,38	0,2	2,80	–	–	–	–	–	–	–	–	–	–	–	2028579	–	–	–
TCMT110204	6,35	11,00	2,38	0,4	2,80	–	–	–	–	–	–	–	–	–	–	–	2028587	–	2028589	–
TCMT16T304	9,53	16,50	3,97	0,4	4,40	–	–	–	–	–	–	–	–	–	–	–	2028607	–	–	–
TCMT16T308	9,53	16,50	3,97	0,8	4,40	–	–	–	–	–	–	–	–	–	–	–	2028624	–	2028627	–
TCMT220408	12,70	22,00	4,76	0,8	5,50	–	–	–	–	–	–	–	–	–	–	–	2028660	–	–	–



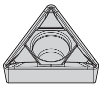
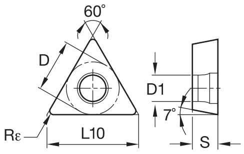
TCMT-2

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMT1102042	6,35	11,00	2,38	0,4	2,80	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2014082



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

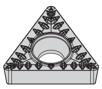
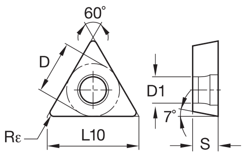



● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

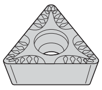
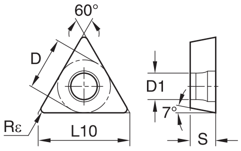
TCMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMT110202FP	6,35	11,00	2,38	0,2	2,90	-	-	-	-	4168800	-	-	-	-	-	-	-	-	-	-
TCMT110204FP	6,35	11,00	2,38	0,4	2,80	4170006	4170313	-	4168770	4168801	-	-	4170097	-	-	-	-	-	-	-
TCMT110208FP	6,35	11,00	2,38	0,8	2,80	4170007	4170314	-	4168771	4168802	-	-	4170098	-	-	-	-	-	-	-
TCMT16T304FP	9,53	16,50	3,97	0,4	4,40	4170008	4170315	-	4168772	4168803	-	-	4170099	-	-	-	-	-	-	-
TCMT16T308FP	9,53	16,50	3,97	0,8	4,40	4170009	4170316	-	4168773	4168804	-	-	4170100	-	-	-	-	-	-	-
TCMT16T312FP	9,53	16,50	3,97	1,2	4,40	4170010	-	-	-	4168805	-	-	4170101	-	-	-	-	-	-	-
TCMT220408FP	12,70	22,00	4,76	0,8	5,50	4170011	4170317	-	-	4168806	-	-	4170102	-	-	-	-	-	-	-

TCMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMT110208MP	6,35	11,00	2,38	0,8	2,80	-	4170231	-	-	-	-	-	4170249	-	-	-	-	-	-	-
TCMT16T304MP	9,53	16,50	3,97	0,4	4,40	-	4170232	-	4168904	4168918	-	-	4170250	-	-	-	-	-	-	-
TCMT16T308MP	9,53	16,50	3,97	0,8	4,40	4170216	4170233	-	4168905	4168919	-	-	4170251	-	-	-	-	-	-	-
TCMT16T312MP	9,53	16,50	3,97	1,2	4,40	-	4170234	-	-	4168920	-	-	4170252	-	-	-	-	-	-	-

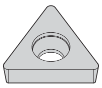
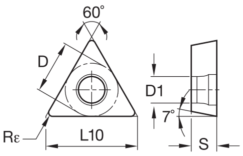



● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

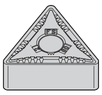
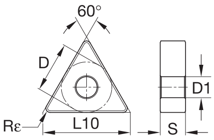
■ TCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMT16T304MU	9,53	16,50	3,97	0,4	4,40	5623614	5623615	–	–	5623613	–	–	5623616	–	5623617	–	–	–	–	–
TCMT16T308MU	9,53	16,50	3,97	0,8	4,40	5623621	5623620	–	–	5623619	–	–	5623618	5623622	–	–	–	–	–	–

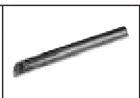
■ TCMW

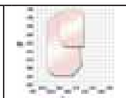
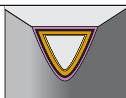
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMW110204	6,35	11,00	2,38	0,4	2,80	–	–	–	–	–	–	4170476	4170381	–	–	–	2028668	–	–	–
TCMW16T304	9,53	16,50	3,97	0,4	4,40	–	–	–	–	–	–	4170477	4170382	–	–	–	2028670	–	–	–

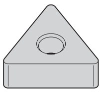
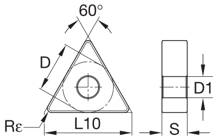
■ TNGG-FS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNGG160404FS	9,53	16,50	4,76	0,4	3,81	–	–	–	–	–	–	–	–	5548681	5538231	5549998	–	–	–	–
TNGG220408FS	12,70	22,00	4,76	0,8	5,16	–	–	–	–	–	–	–	–	5548682	–	–	–	–	–	–


C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105

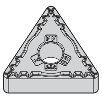
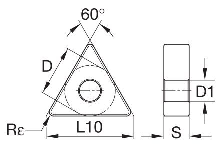



● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

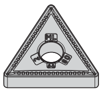
■ TNMA

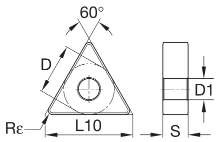
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMA160408	9,53	16,50	4,76	0,8	3,81	-	-	-	-	-	-	4171647	4171890	-	-	-	-	-	-	-
TNMA160412	9,53	16,50	4,76	1,2	3,81	-	-	-	-	-	-	4171648	4171891	-	-	-	-	-	-	-
TNMA160416	9,53	16,50	4,76	1,6	3,81	-	-	-	-	-	-	-	4171892	-	-	-	-	-	-	-
TNMA220408	12,70	22,00	4,76	0,8	5,16	-	-	-	-	-	-	4171649	4171893	-	-	-	-	-	-	-
TNMA220412	12,70	22,00	4,76	1,2	5,16	-	-	-	-	-	-	4172230	4171894	-	-	-	-	-	-	-
TNMA220416	12,70	22,00	4,76	1,6	5,16	-	-	-	-	-	-	4171651	4171895	-	-	-	-	-	-	-
TNMA270616	15,88	27,50	6,35	1,6	6,35	-	-	-	-	-	-	-	4171896	-	-	-	-	-	-	-

■ TNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG110304FF	6,35	11,00	3,18	0,4	2,26	-	-	-	-	-	-	-	4171383	5684331	-	-	-	-	-	-
TNMG110308FF	6,35	11,00	3,18	0,8	2,26	-	-	-	-	-	-	-	4171384	5684332	-	-	-	-	-	-
TNMG160404FF	9,53	16,50	4,76	0,4	3,81	4171050	-	-	-	4172691	-	-	4171385	-	-	-	-	-	-	-
TNMG160408FF	9,53	16,50	4,76	0,8	3,81	4171051	-	-	-	4172692	-	-	4171386	-	-	-	-	-	-	-
TNMG160412FF	9,53	16,50	4,76	1,2	3,81	4171052	-	-	-	4172693	-	-	4171387	-	-	-	-	-	-	-



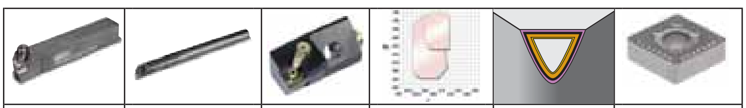


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S					○					●	●	●	●			
H													●			

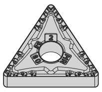
■ TNMG-ML

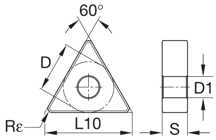
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG110304ML	6,35	11,00	3,18	0,4	2,26	-	5684347	-	-	-	-	-	4171407	-	-	-	-	-	-	-
TNMG110308ML	6,35	11,00	3,18	0,8	2,26	-	-	-	-	-	-	-	4171408	-	-	-	-	-	-	-
TNMG160404ML	9,53	16,50	4,76	0,4	3,81	4171075	4170491	-	-	-	-	4171671	4171409	-	-	-	-	-	-	-
TNMG160408ML	9,53	16,50	4,76	0,8	3,81	4171076	4170492	-	-	-	-	4171672	4171410	-	-	-	-	-	-	-
TNMG160412ML	9,53	16,50	4,76	1,2	3,81	4171077	4170493	-	-	-	-	4171673	4171411	-	-	-	-	-	-	-
TNMG220404ML	12,70	22,00	4,76	0,4	5,16	5684348	-	-	-	-	-	-	4171412	-	-	-	-	-	-	-
TNMG220408ML	12,70	22,00	4,76	0,8	5,16	4171078	4170494	-	-	-	-	-	-	-	-	-	-	-	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



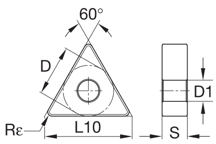


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

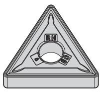
TNMG-MR

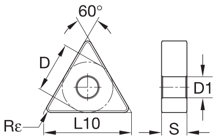
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160404MR	9,53	16,50	4,76	0,4	3,81	4171150	4170573	4170059	-	-	-	-	-	-	-	-	-	-	-	-
TNMG160408MR	9,53	16,50	4,76	0,8	3,81	4171151	4170574	4170060	-	-	-	-	-	-	-	-	-	-	-	-
TNMG160412MR	9,53	16,50	4,76	1,2	3,81	4171152	4170575	4170061	-	-	-	-	-	-	-	-	-	-	-	-
TNMG220404MR	12,70	22,00	4,76	0,4	5,16	4171153	4170576	4170062	-	-	-	-	-	-	-	-	-	-	-	-
TNMG220408MR	12,70	22,00	4,76	0,8	5,16	4171154	4170577	4170063	-	-	-	-	-	-	-	-	-	-	-	-
TNMG220412MR	12,70	22,00	4,76	1,2	5,16	4171155	4170578	4170064	-	-	-	-	-	-	-	-	-	-	-	-
TNMG220416MR	12,70	22,00	4,76	1,6	5,16	4171156	4170579	4170065	-	-	-	-	-	-	-	-	-	-	-	-



TNMG-MS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160404MS	9,53	16,50	4,76	0,4	3,81	-	-	-	-	-	-	-	-	5908927	5908928	5908929	-	-	-	-
TNMG160408MS	9,53	16,50	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5908930	5908931	5908932	-	-	-	-
TNMG220404MS	12,70	22,00	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5908933	5908934	5908935	-	-	-	-
TNMG220408MS	12,70	22,00	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5908936	5908937	5908938	-	-	-	-
TNMG220412MS	12,70	22,00	4,76	1,2	5,16	-	-	-	-	-	-	-	-	5908939	5908940	5908941	-	-	-	-
TNMG270608MS	15,88	27,50	6,35	0,8	6,35	-	-	-	-	-	-	-	-	-	5908942	5908943	-	-	-	-



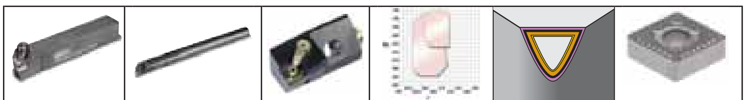


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

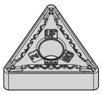
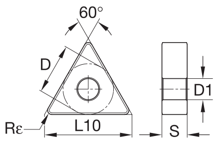
TNMG-RH

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160408RH	9,53	16,50	4,76	0,8	3,81	4171007	4171542	4171724	–	4173058	–	–	4171927	–	–	–	–	–	–	–
TNMG160412RH	9,53	16,50	4,76	1,2	3,81	4171008	4171543	4171725	–	4173059	–	–	4171928	–	–	–	–	–	–	–
TNMG220408RH	12,70	22,00	4,76	0,8	5,16	4171009	4171544	4171726	–	4173060	–	–	4171929	–	–	–	–	–	–	–
TNMG220412RH	12,70	22,00	4,76	1,2	5,16	4171010	4171545	4171727	–	4173061	–	–	4171930	–	–	–	–	–	–	–
TNMG220416RH	12,70	22,00	4,76	1,6	5,16	4171011	4171546	4171728	–	4173062	–	–	4171931	–	–	–	–	–	–	–
TNMG270612RH	15,88	27,50	6,35	1,2	6,35	4171012	4171547	4171729	–	–	–	–	–	–	–	–	–	–	–	–
TNMG270616RH	15,88	27,50	6,35	1,6	6,35	4171013	4171548	4171730	–	–	–	–	–	–	–	–	–	–	–	–
TNMG330924RH	19,05	33,00	9,53	2,4	7,93	4171014	4171549	4171731	–	–	–	–	–	–	–	–	–	–	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

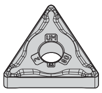
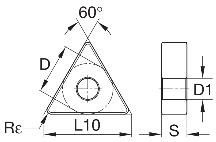



● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

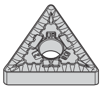
■ TNMG-UF

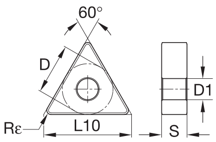
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160404UF	9,53	16,50	4,76	0,4	3,81	-	-	-	4169367	4169393	-	-	-	5432605	-	-	-	-	-	-
TNMG160408UF	9,53	16,50	4,76	0,8	3,81	5645615	-	-	4169368	4169394	-	-	-	5432606	-	-	-	-	-	-
TNMG160412UF	9,53	16,50	4,76	1,2	3,81	-	-	-	4169369	4169395	-	-	-	5645613	-	-	-	-	-	-
TNMG220404UF	12,70	22,00	4,76	0,4	5,16	-	-	-	4169370	4169396	-	-	-	5645612	-	-	-	-	-	-
TNMG220408UF	12,70	22,00	4,76	0,8	5,16	-	-	-	4169371	4169397	-	-	-	5645614	-	-	-	-	-	-

■ TNMG-UM

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160404UM	9,53	16,50	4,76	0,4	3,81	-	-	-	4172369	4172396	4172426	-	-	5550226	-	-	-	-	-	-
TNMG160408UM	9,53	16,50	4,76	0,8	3,81	-	-	-	4172370	4172397	4172427	-	-	5550228	-	-	-	-	-	-
TNMG160412UM	9,53	16,50	4,76	1,2	3,81	-	-	-	4172371	4172398	4172428	-	-	-	-	-	-	-	-	-
TNMG160416UM	9,53	16,50	4,76	1,6	3,81	-	-	-	-	4172399	4172429	-	-	-	-	-	-	-	-	-
TNMG220404UM	12,70	22,00	4,76	0,4	5,16	-	-	-	4172372	4172400	4172430	-	-	-	-	-	-	-	-	-
TNMG220408UM	12,70	22,00	4,76	0,8	5,16	5645266	-	-	4172373	4172401	4172431	-	-	5645265	-	-	-	-	-	-
TNMG220412UM	12,70	22,00	4,76	1,2	5,16	-	-	-	4172374	4172402	-	-	-	5473222	-	-	-	-	-	-





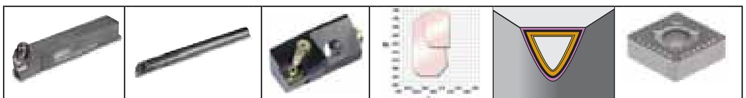
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

Inserts

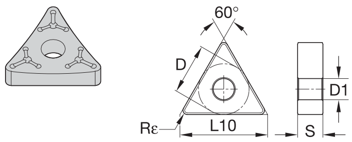
TNMG-UR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160408UR	9,53	16,50	4,76	0,8	3,81	4171115	4170522	4170035	4169434	4169465	–	–	4171441	–	5579395	–	–	–	–	–
TNMG160412UR	9,53	16,50	4,76	1,2	3,81	4171116	4170523	–	–	4169466	4169502	–	4171442	–	5680175	–	–	–	–	–
TNMG160416UR	9,53	16,50	4,76	1,6	3,81	4171117	–	–	–	4169467	–	–	4171443	–	–	–	–	–	–	–
TNMG220408UR	12,70	22,00	4,76	0,8	5,16	4171118	4170524	4170036	4169435	4169468	4169503	–	4171444	–	5579397	–	–	–	–	–
TNMG220412UR	12,70	22,00	4,76	1,2	5,16	4171119	4170525	4170037	4169436	4169469	4169504	–	4171445	–	5473198	–	–	–	–	–
TNMG220416UR	12,70	22,00	4,76	1,6	5,16	4171120	4170526	–	–	4169470	4169505	–	4171446	–	–	–	–	–	–	–
TNMG270612UR	15,88	27,50	6,35	1,2	6,35	4171121	4170527	–	4169437	4169471	4169506	–	4171447	–	5579405	–	–	–	–	–
TNMG270616UR	15,88	27,50	6,35	1,6	6,35	4171122	4170528	–	4169438	4169472	4169507	–	4171448	–	–	–	–	–	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

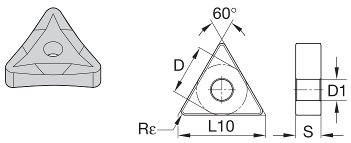


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

TNMM-65

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMM16040865	9,53	16,50	4,76	0,8	3,81	-	5696618	5696619	-	-	-	-	-	-	-	-	-	-	-	-
TNMM16041265	9,53	16,50	4,76	1,2	3,81	-	-	5696620	-	-	-	-	-	-	-	-	-	-	-	-
TNMM22040865	12,70	22,00	4,76	0,8	5,16	5696621	5696622	5696623	-	-	-	-	-	-	-	-	-	-	-	-
TNMM22041265	12,70	22,00	4,76	1,2	5,16	-	5696625	5696626	-	5696624	-	-	-	-	-	-	-	-	-	-
TNMM22041665	12,70	22,00	4,76	1,6	5,16	5696628	5696629	-	-	5696627	-	-	-	-	-	-	-	-	-	-

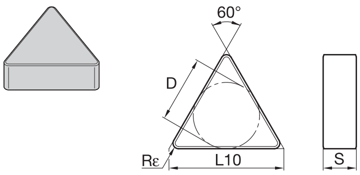


TNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMP160404	9,53	16,50	4,76	0,4	3,81	-	-	-	4172143	4173670	4173709	-	-	4172491	-	-	-	-	-	-
TNMP160408	9,53	16,50	4,76	0,8	3,81	-	-	-	4172144	4173671	4173710	-	-	4172492	4172623	-	-	-	-	-
TNMP160412	9,53	16,50	4,76	1,2	3,81	-	-	-	4172145	4173672	4173711	-	-	4172493	4172624	-	-	-	-	-
TNMP220404	12,70	22,00	4,76	0,4	5,16	-	-	-	4172146	4173673	4173712	-	-	4172494	-	-	-	-	-	-
TNMP220408	12,70	22,00	4,76	0,8	5,16	-	-	-	4172147	4173674	4173713	-	-	4172495	4172625	-	-	-	-	-
TNMP220412	12,70	22,00	4,76	1,2	5,16	-	-	-	4172148	4173675	4173714	-	-	4172496	4172626	-	-	-	-	-

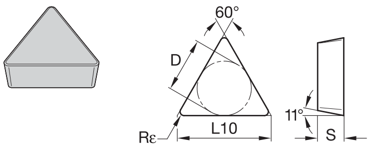
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			



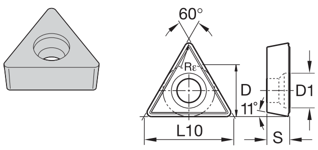
■ TNU

ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNUN160408	9,53	16,50	4,76	0,8	-	-	-	-	-	-	-	4170964	-	-	-	-	-	-	-



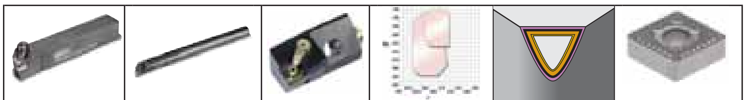
■ TPG

ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPGN110308	6,35	11,00	3,18	0,8	-	-	-	-	-	-	-	4170952	-	-	-	-	-	-	-
TPGN160308	9,53	16,50	3,18	0,8	-	-	-	-	-	-	-	4170953	-	-	-	-	-	-	-



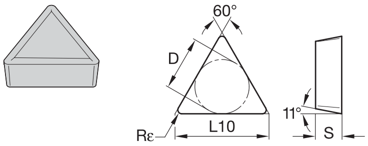
■ TPGA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPGA110204	6,35	11,00	2,38	0,4	2,80	-	-	-	-	-	-	-	-	-	-	-	2015081	-	-	-
TPGA110208	6,35	11,00	2,38	0,8	2,80	-	-	-	-	-	-	-	-	-	-	-	2031786	-	-	-



C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts

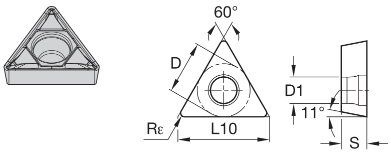


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

TPMR

ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPMR110304	6,35	11,00	3,18	0,4	4170859	-	4170784	-	-	-	-	-	-	-	-	-	-	-	-
TPMR110308	6,35	11,00	3,18	0,8	4170860	-	4170785	-	-	-	-	4170954	-	-	-	-	-	-	-
TPMR160304	9,53	16,50	3,18	0,4	4170861	-	4170786	-	-	-	-	4170955	-	-	-	-	-	-	-
TPMR160308	9,53	16,50	3,18	0,8	4170862	-	4170787	-	-	-	-	4170956	-	-	-	-	-	-	-
TPMR160312	9,53	16,50	3,18	1,2	4170863	-	4170788	-	-	-	-	4170957	-	-	-	-	-	-	-



TPMT-FP

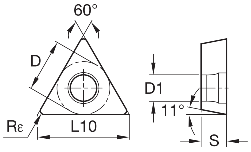
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPMT090208FP	5,56	9,63	2,38	0,8	2,50	4170025	4170335	-	4168818	4168833	-	-	4170112	-	-	-	-	-	-	-
TPMT110204FP	6,35	11,00	2,38	0,4	2,80	4170026	4170336	-	4168819	4168834	-	-	4170113	-	-	-	-	-	-	-
TPMT110208FP	6,35	11,00	2,38	0,8	2,80	4170027	4170337	-	4168820	4168835	-	-	4170114	-	-	-	-	-	-	-
TPMT16T304FP	9,53	16,50	3,97	0,4	4,40	4170028	4170338	-	-	4168836	-	-	4170115	-	-	-	-	-	-	-
TPMT16T308FP	9,53	16,50	3,97	0,8	4,40	4170029	4170339	-	-	4168837	-	-	4170116	-	-	-	-	-	-	-
TPMT16T312FP	9,53	16,50	3,97	1,2	4,40	-	-	-	-	4168838	-	-	-	-	-	-	-	-	-	-
TPMT220408FP	12,70	22,00	4,76	0,8	5,50	-	4170340	-	-	-	-	-	-	-	-	-	-	-	-	-

WIDIA

Inserts

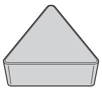
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

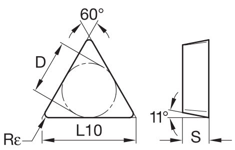
● first choice
○ alternate choice



■ TPMT-MP

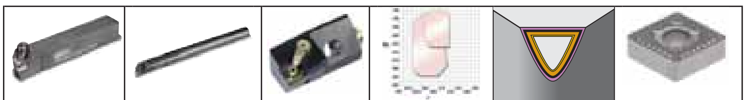
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPMT110208MP	6,35	11,00	2,38	0,8	2,80	-	4170263	-	-	-	-	-	4170271	-	-	-	-	-	-	-
TPMT16T308MP	9,53	16,50	3,97	0,8	4,40	-	4170264	-	-	-	-	-	4170272	-	-	-	-	-	-	-
TPMT16T312MP	9,53	16,50	3,97	1,2	4,40	-	4170265	-	-	-	-	-	4170273	-	-	-	-	-	-	-





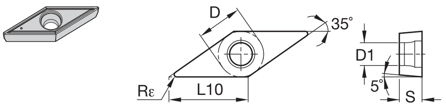
■ TPU

ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPUN110304	6,35	11,00	3,18	0,4	4170864	-	4170789	-	-	-	-	-	-	-	-	2028806	-	-	-
TPUN110308	6,35	11,00	3,18	0,8	4170865	-	-	-	-	-	-	-	-	-	-	2028814	-	-	-
TPUN160304	9,53	16,50	3,18	0,4	4170866	4170645	-	-	-	-	-	4170958	-	-	-	2028821	-	-	-
TPUN160308	9,53	16,50	3,18	0,8	4170867	4170646	-	-	-	-	-	4170959	-	-	-	2028830	-	2028832	-
TPUN160312	9,53	16,50	3,18	1,2	-	4170647	-	-	-	-	-	4170960	-	-	-	2028833	-	-	-
TPUN220408	12,70	22,00	4,76	0,8	4170868	4170648	4170790	-	-	-	-	-	-	-	-	-	-	-	-
TPUN220412	12,70	22,00	4,76	1,2	-	4170649	4170791	-	-	-	-	4170961	-	-	-	2028843	-	2028847	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

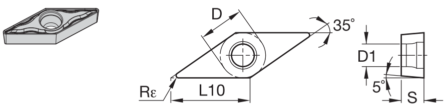


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

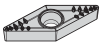
■ VBMT

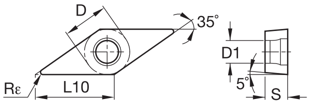
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VBMT160404	9,53	16,61	4,76	0,4	4,40	4169983	4170553	4170807	–	–	–	–	–	–	–	–	–	–	–	–
VBMT160408	9,53	16,61	4,76	0,8	4,40	4169984	4170554	4170808	–	–	–	–	–	–	–	–	–	–	–	–
VBMT160412	9,53	16,61	4,76	1,2	4,40	4169985	4170555	4170809	–	–	–	–	–	–	–	–	–	–	–	–



■ VBMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VBMT110302FP	6,35	11,07	3,18	0,2	2,80	–	4170318	–	–	–	–	–	–	–	–	–	–	–	–	–
VBMT110304FP	6,35	11,07	3,18	0,4	2,80	4170012	4170319	–	4168774	4168807	–	–	–	–	–	–	–	–	–	–
VBMT110308FP	6,35	11,07	3,18	0,8	2,80	–	4170320	–	4168775	4168808	–	–	–	–	–	–	–	–	–	–
VBMT160402FP	9,53	16,61	4,76	0,2	4,40	–	4170321	–	–	4168809	–	–	–	–	–	–	–	–	–	–
VBMT160404FP	9,53	16,61	4,76	0,4	4,40	4170013	4170322	–	4168776	4168810	–	–	4170103	–	–	–	–	–	–	–
VBMT160408FP	9,53	16,61	4,76	0,8	4,40	4170014	4170323	–	4168777	4168811	–	–	4170104	–	–	–	–	–	–	–
VBMT160412FP	9,53	16,61	4,76	1,2	4,40	–	4170324	–	–	–	–	–	–	–	–	–	–	–	–	–



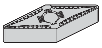


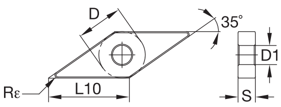
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ VBMT-MP

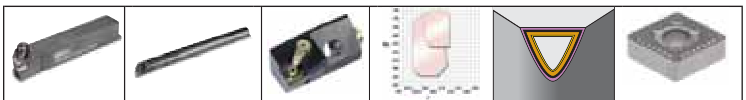
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VBMT160404MP	9,53	16,61	4,76	0,4	4,40	-	4170235	-	-	4168921	-	-	4170253	-	-	-	-	-	-	-
VBMT160408MP	9,53	16,61	4,76	0,8	4,40	-	4170236	-	-	4168922	-	-	4170254	-	-	-	-	-	-	-





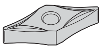
■ VNGG-FS

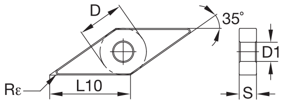
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNGG160401FS	9,53	16,61	4,76	0,1	3,81	-	-	-	-	-	-	-	-	5548684	-	5550000	-	-	-	-
VNGG160402FS	9,53	16,61	4,76	0,2	3,81	-	-	-	-	-	-	-	-	5548683	-	5549999	-	-	-	-
VNGG160404FS	9,53	16,61	4,76	0,4	3,81	-	-	-	-	-	-	-	-	5548685	5538232	5550001	-	-	-	-
VNGG160408FS	9,53	16,61	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5548686	5538233	5550002	-	-	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



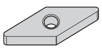


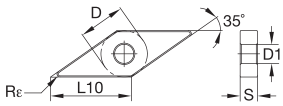
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

VNGP

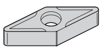
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNGP160401	9,53	16,61	4,76	0,1	3,81	-	-	-	-	-	-	-	-	5549195	-	5549211	-	-	-	-
VNGP160402	9,53	16,61	4,76	0,2	3,81	-	-	-	-	-	-	-	-	5549196	-	-	-	-	-	-
VNGP220404	12,70	22,14	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5549197	-	-	-	-	-	-
VNGP220408	12,70	22,14	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5549198	-	5549212	-	-	-	-

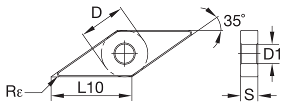




VNMA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMA160408	9,53	16,61	4,76	0,8	3,81	-	-	-	-	-	-	4171652	4171897	-	-	-	-	-	-	-



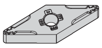
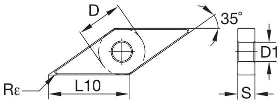


VNMG

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG12T304	7,14	12,45	3,97	0,4	3,60	-	-	-	-	-	-	-	-	5095163	5095164	-	-	-	-	-
VNMG12T308	7,14	12,45	3,97	0,8	3,65	-	-	-	-	-	-	-	4170965	5095165	5095166	-	-	-	-	-

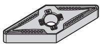
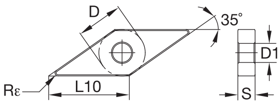
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

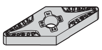
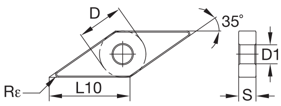
VNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160404FF	9,53	16,61	4,76	0,4	3,81	4171053	-	-	-	4172694	-	-	-	5684334	-	-	-	-	-	-
VNMG160408FF	9,53	16,61	4,76	0,8	3,81	4171054	-	-	-	4172695	-	-	-	5684333	-	-	-	-	-	-

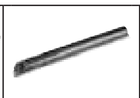
VNMG-ML

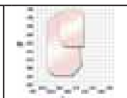
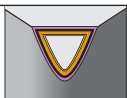
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160404ML	9,53	16,61	4,76	0,4	3,81	4171079	4170495	-	-	-	-	4171674	4171413	-	-	-	-	-	-	-
VNMG160408ML	9,53	16,61	4,76	0,8	3,81	4171080	4170496	-	-	-	-	4171675	4171414	-	-	-	-	-	-	-

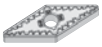
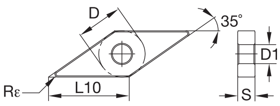
VNMG-MR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160408MR	9,53	16,61	4,76	0,8	3,81	4171157	4170580	4170066	-	-	-	-	-	-	-	-	-	-	-	-


C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105

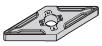
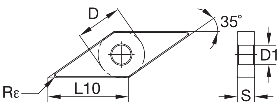



● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

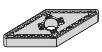
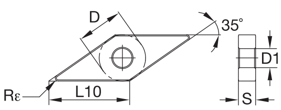
VNMG-MS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160404MS	9,53	16,61	4,76	0,4	3,81	-	-	-	-	-	-	-	-	5908944	5908945	5908946	-	-	-	-
VNMG160408MS	9,53	16,61	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5908947	5908948	5908949	-	-	-	-
VNMG220404MS	12,70	22,14	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5908950	5908961	5908962	-	-	-	-
VNMG220408MS	12,70	22,14	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5908963	5908964	5908965	-	-	-	-

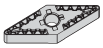
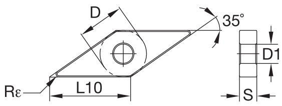
VNMG-RH

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160408RH	9,53	16,61	4,76	0,8	3,81	4171015	4171550	4171732	-	-	-	-	-	-	-	-	-	-	-	-
VNMG220408RH	12,70	22,14	4,76	0,8	5,16	4171016	4171551	4171733	-	-	-	-	-	-	-	-	-	-	-	-
VNMG220412RH	12,70	22,14	4,76	1,2	5,16	4171017	4171552	4171734	-	-	-	-	-	-	-	-	-	-	-	-

VNMG-UF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160404UF	9,53	16,61	4,76	0,4	3,81	-	-	-	4169372	4169398	-	-	-	5645616	-	-	-	-	-	-
VNMG160408UF	9,53	16,61	4,76	0,8	3,81	5645618	-	-	4169373	4169399	-	-	-	5645617	-	-	-	-	-	-

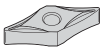
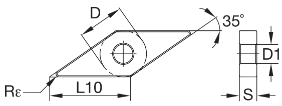



● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

VNMG-UR

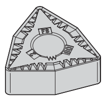
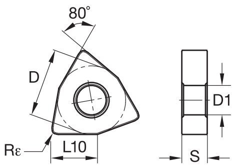
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160408UR	9,53	16,61	4,76	0,8	3,81	4171123	4170529	4170038	4169439	4169473	4169508	–	4171449	–	5579416	–	–	–	–	–
VNMG160412UR	9,53	16,61	4,76	1,2	3,81	4171124	4170530	–	4169440	4169474	–	–	4171450	5680176	–	–	–	–	–	–

VNMP

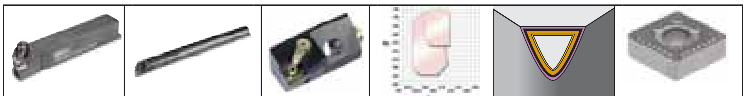
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMP160404	9,53	16,61	4,76	0,4	3,81	–	–	–	–	–	–	–	–	4172497	–	–	–	–	–	–
VNMP160408	9,52	16,61	4,76	0,8	3,81	–	–	–	–	–	–	–	–	4172498	–	–	–	–	–	–

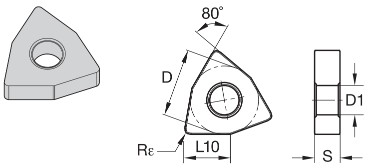
NOTE: DNMP-style inserts are single-sided.

WNGG-FS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNGG080404FS	12,70	8,69	4,76	0,4	5,16	–	–	–	–	–	–	–	–	5548687	5538234	5550003	–	–	–	–
WNGG080408FS	12,70	8,69	4,76	0,8	5,16	–	–	–	–	–	–	–	–	5548688	5538235	5550004	–	–	–	–


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

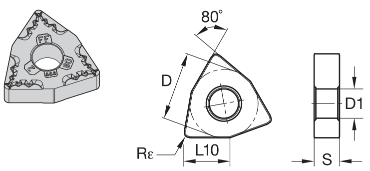


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

WNMA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMA060408	9,53	6,52	4,76	0,8	3,81	–	–	–	–	–	–	4171653	4171898	–	–	–	–	–	–	–
WNMA060412	9,53	6,52	4,76	1,2	3,81	–	–	–	–	–	–	–	4171899	–	–	–	–	–	–	–
WNMA080408	12,70	8,69	4,76	0,8	5,16	–	–	–	–	–	–	4171654	4171900	–	–	–	–	–	–	–
WNMA080412	12,70	8,69	4,76	1,2	5,16	–	–	–	–	–	–	4171655	4171901	–	–	–	–	–	–	–
WNMA080416	12,70	8,69	4,76	1,6	5,16	–	–	–	–	–	–	4171656	4171902	–	–	–	–	–	–	–



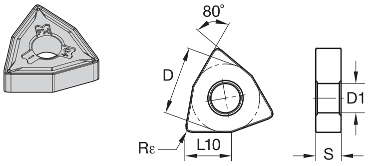
WNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060404FF	9,53	6,52	4,76	0,4	3,81	4171055	–	–	–	4172696	–	–	4171388	–	–	–	–	–	–	–
WNMG060408FF	9,53	6,52	4,76	0,8	3,81	4171056	–	–	–	–	–	–	4171389	–	–	–	–	–	–	–
WNMG080404FF	12,70	8,69	4,76	0,4	5,16	4171057	–	–	–	4172697	–	–	–	5684336	–	–	–	–	–	–
WNMG080408FF	12,70	8,69	4,76	0,8	5,16	4171058	–	–	–	4172698	–	–	–	5684335	–	–	–	–	–	–

Inserts

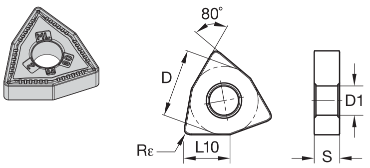
	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

● first choice
○ alternate choice



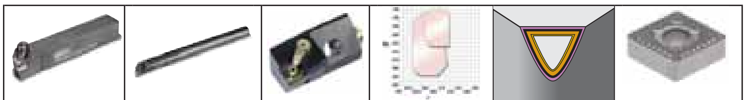
WNMG-FW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060404FW	9,53	6,52	4,76	0,4	3,81	5623510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WNMG060408FW	9,53	6,52	4,76	0,8	3,81	5623511	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WNMG080404FW	12,70	8,69	4,76	0,4	5,16	5623514	-	-	4171762	4173109	-	4171693	-	-	-	-	-	-	-	-
WNMG080408FW	12,70	8,69	4,76	0,8	5,16	5623515	-	-	4171763	4173110	-	4171694	-	-	-	-	-	-	-	-
WNMG080412FW	12,70	8,69	4,76	1,2	5,16	-	-	-	4171764	4173111	-	4171696	-	-	-	-	-	-	-	-



WNMG-ML

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060404ML	9,53	6,52	4,76	0,4	3,81	4171081	-	-	-	-	-	4171676	4171415	-	-	-	-	-	-	-
WNMG060408ML	9,53	6,52	4,76	0,8	3,81	4171082	4170497	-	-	-	-	4171677	4171416	-	-	-	-	-	-	-
WNMG080404ML	12,70	8,69	4,76	0,4	5,16	4171083	4170498	-	-	-	-	4171678	4171417	-	-	-	-	-	-	-
WNMG080408ML	12,70	8,69	4,76	0,8	5,16	4171084	4170499	-	-	-	-	4171679	4171418	-	-	-	-	-	-	-

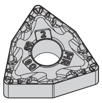
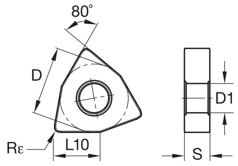


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

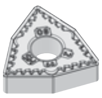
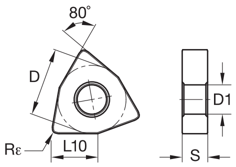
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	blue	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M	yellow			○	●	●	●			●	●	●		●		●
K	red	○	○					●	●	○	○		●			
N	green									○	○	○	●			
S	orange					○				●	●	●	●			
H	grey												●			

● first choice
○ alternate choice

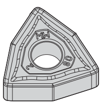
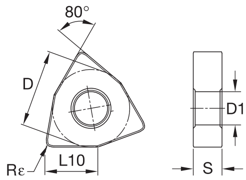
■ WNMG-MR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG080408MR	12,70	8,69	4,76	0,8	5,16	4171158	4170581	4170067	-	4173033	4173148	-	-	-	-	-	-	-	-	-
WNMG080412MR	12,70	8,69	4,76	1,2	5,16	4171159	4170582	4170068	-	4173034	4173149	-	-	-	-	-	-	-	-	-
WNMG080416MR	12,70	8,69	4,76	1,6	5,16	4171160	4170583	-	-	-	-	-	-	-	-	-	-	-	-	-

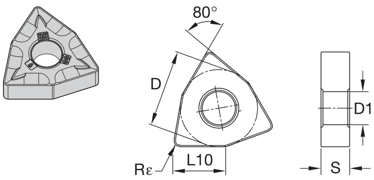
■ WNMG-MS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060408MS	9,53	6,52	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5908966	5908967	5908968	-	-	-	-
WNMG080404MS	12,70	8,69	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5908969	5908970	5908971	-	-	-	-
WNMG080408MS	12,70	8,69	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5908972	5908973	5908974	-	-	-	-

■ WNMG-MW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060408MW	9,53	6,52	4,76	0,8	3,81	5623512	5623513	-	-	-	-	-	-	-	-	-	-	-	-	-
WNMG080408MW	12,70	8,69	4,76	0,8	5,16	5623516	5623517	-	-	4173118	-	4171695	-	-	-	-	-	-	-	-
WNMG080412MW	12,70	8,69	4,76	1,2	5,16	-	-	-	-	4173119	-	4171697	-	-	-	-	-	-	-	-

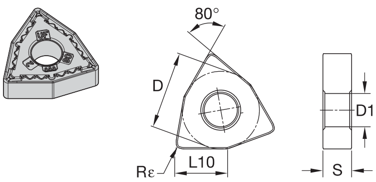


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

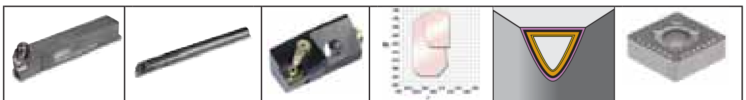
WNMG-RH

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060408RH	9,53	6,52	4,76	0,8	3,81	4171018	4171553	4171735	-	4173063	-	-	-	-	-	-	-	-	-	-
WNMG080408RH	12,70	8,69	4,76	0,8	5,16	4171019	4171554	4171736	-	4173064	-	-	4171932	-	-	-	-	-	-	-
WNMG080412RH	12,70	8,69	4,76	1,2	5,16	4171020	4171555	4171737	-	4173065	-	-	4171933	-	-	-	-	-	-	-
WNMG080416RH	12,70	8,69	4,76	1,6	5,16	4171021	4171556	4171738	-	4173066	-	-	4171934	-	-	-	-	-	-	-



WNMG-UF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060404UF	9,53	6,52	4,76	0,4	3,81	-	-	-	4169374	4169400	-	-	-	5645621	-	-	-	-	-	-
WNMG060408UF	9,53	6,52	4,76	0,8	3,81	-	-	-	4169375	4169401	-	-	-	5645622	-	-	-	-	-	-
WNMG080404UF	12,70	8,69	4,76	0,4	5,16	-	-	-	4169376	4169402	-	-	-	5645619	-	-	-	-	-	-
WNMG080408UF	12,70	8,69	4,76	0,8	5,16	-	-	-	4169377	4169403	-	-	-	5645623	-	-	-	-	-	-
WNMG080412UF	12,70	8,69	4,76	1,2	5,16	-	-	-	4169378	4169404	-	-	-	5645624	-	-	-	-	-	-

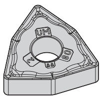


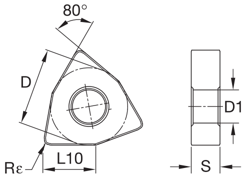
C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

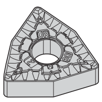
● first choice
○ alternate choice

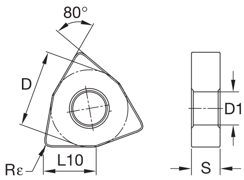




WNMG-UM

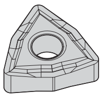
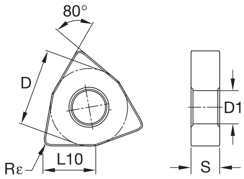
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060404UM	9,53	6,52	4,76	0,4	3,81	–	–	–	4172375	4172403	4172432	–	–	5645268	–	–	–	–	–	–
WNMG060408UM	9,53	6,52	4,76	0,8	3,81	–	–	–	4172376	4172404	4172433	–	–	5645267	–	–	–	–	–	–
WNMG060412UM	9,53	6,52	4,76	1,2	3,81	–	–	–	–	4172405	4172434	–	–	–	–	–	–	–	–	–
WNMG080404UM	12,70	8,69	4,76	0,4	5,16	–	–	–	4172377	4172406	4172435	–	–	–	–	–	–	–	–	–
WNMG080408UM	12,70	8,69	4,76	0,8	5,16	–	5645270	–	4172378	4172407	4172436	–	–	–	–	–	–	–	–	–
WNMG080412UM	12,70	8,69	4,76	1,2	5,16	5645271	–	–	4172379	4172408	4172437	–	–	5645269	–	–	–	–	–	–
WNMG080416UM	12,70	8,69	4,76	1,6	5,16	–	–	–	–	4172409	4172438	–	–	–	–	–	–	–	–	–





WNMG-UR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060408UR	9,53	6,52	4,76	0,8	3,81	4171125	4170531	4170039	4169441	4169475	–	–	4171451	5680178	5680177	–	–	–	–	–
WNMG060412UR	9,53	6,52	4,76	1,2	3,81	4171126	4170532	–	–	–	–	–	4171452	–	–	–	–	–	–	–
WNMG080408UR	12,70	8,69	4,76	0,8	5,16	4171127	4170533	4170040	4169442	4169476	4169509	5680179	4171453	–	–	–	–	–	–	–
WNMG080412UR	12,70	8,69	4,76	1,2	5,16	4171128	4170534	4170041	4169443	4169477	4169510	–	4171454	5579420	–	–	–	–	–	–
WNMG080416UR	12,70	8,69	4,76	1,6	5,16	4171129	4170535	4170042	–	4169478	4169511	–	4171455	–	–	–	–	–	–	–

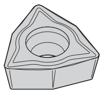
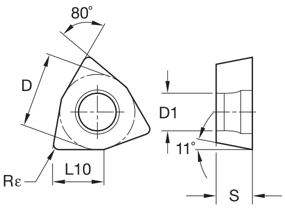



● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

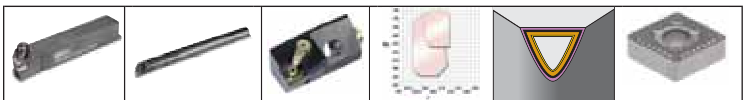
WNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMP080408	12,70	8,69	4,76	0,8	5,16	–	–	–	–	–	–	–	–	4172499	–	–	–	–	–	–
WNMP080412	12,70	8,69	4,76	1,2	5,16	–	–	–	–	–	–	–	–	4172500	–	–	–	–	–	–

WPMT-FP

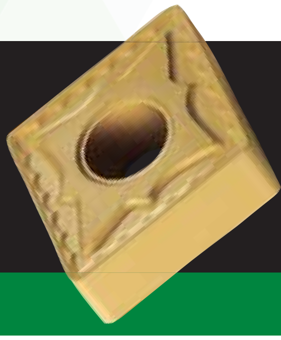
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WPMT040204FP	6,35	4,34	2,38	0,4	2,80	–	4170341	–	–	–	–	–	–	–	–	–	–	–	–	–
WPMT06T304FP	9,53	6,52	3,97	0,4	4,40	4170030	–	–	4168821	4168839	–	–	–	–	–	–	–	–	–	–
WPMT06T308FP	9,53	6,52	3,97	0,8	4,40	4170031	4170342	–	–	4168840	–	–	–	–	–	–	–	–	–	–
WPMTS3T104FP	4,76	3,25	1,98	0,4	2,15	–	4170343	–	–	4168841	–	–	–	–	–	–	–	–	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

The Gold Standard for Value •
WIDIA™ VariTurn™

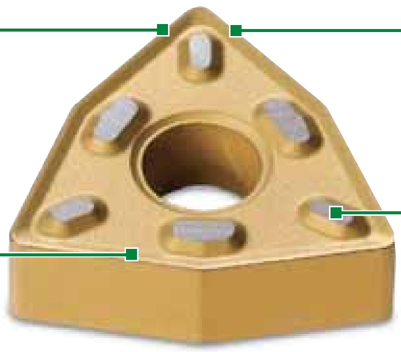
VariTurn



WIDIA VariTurn is the cost-effective line of inserts from the brand you already know and trust for quality. Each insert is 100% manufactured by WIDIA to outperform the competition. WIDIA VariTurn offers the versatility for those operators that are cutting steel today and cast iron tomorrow and need an insert to get the job done. A focused portfolio with a simple grade selection method allows WIDIA VariTurn to be used for up to approximately 80% of all turning applications.

- Engineered to optimise performance.
- Gold coating on every insert.
- Proven grade technologies.

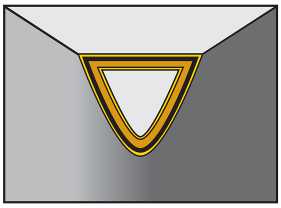
Post-coat treatment
- Improves edge toughness.
- Wide range of applications.



Improved edge toughness
- Provides smooth outer surface to reduce forces, friction, and workpiece sticking.

Post-coat grinding
- Provides secure seating surface.

MT-CVD/CVD–
TiN-TiCN-Al203-TiN



Getting the Most from Every Insert

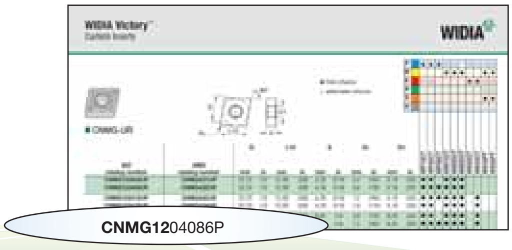
WIDIA™ VariTurn™ products make it simple to get the most out of your inserts, and your money. Every insert is gold, which exposes wear as the tool continues to be used. This makes it easy to detect when an insert is ready to be changed — maximising the product's value and protecting the workpiece. Also, because WIDIA VariTurn inserts can be used in most applications, a single insert can take on any number of tasks, thus reducing your inventory. WIDIA VariTurn products are also reliable enough to cut steel, stainless steel, cast iron, and high-temperature alloys, enabling quick changes in workpiece materials without the need to swap inserts, saving time and money.

WIDIA VariTurn Options

This versatile line offers a simple geometry selection system, eight grades, and eight geometries, including negative rake and screw-on. With these options, WIDIA VariTurn inserts cover 80% of all general turning applications.

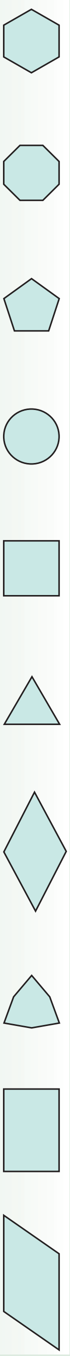
How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



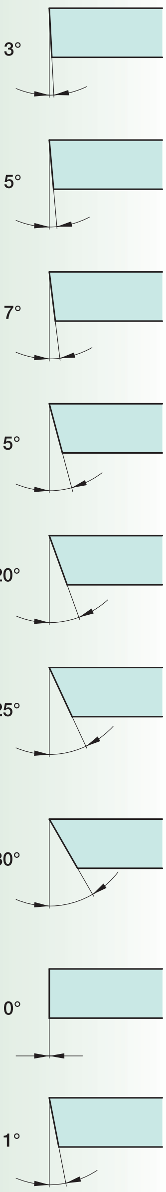
C — Insert Shape

H	Hexagon	120°
O	Octagon	135°
P	Pentagon	108°
R	Round	–
S	Square	90°
T	Triangular	60°
C D E M V	Rhomboid	80° 55° 75° 86° 35°
W	Trigon with enlarged corner angles	80°
L	Rectangular	90°
A B N/K	Parallelogram	85° 82° 55°



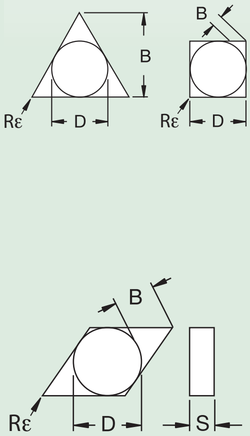
N — Insert Clearance Angle

A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	Indicated for other clearance angles requiring descriptions.



M — Tolerance Class

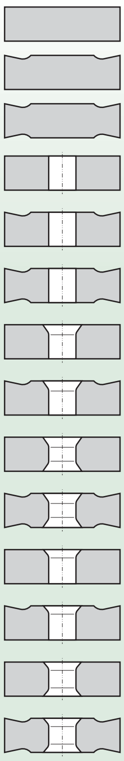
Tolerances apply prior to edge prep and coating



D = Theoretical diameter of the insert inscribed circle
S = Thickness
B = See figures below

G — Insert Features

N, R, F, A, M, G, W, T, Q, U, B, H, C, J



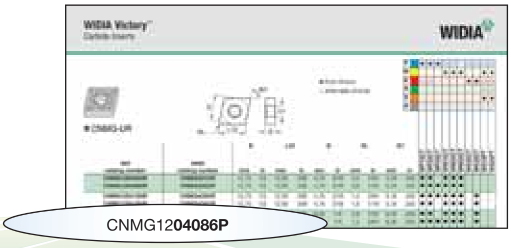
X, V — Special Design

12 — Size

"D" mm	C	D	R	S	T	V	W
	"Code for mm cutting edge length "L10"						
3,97	S4	04	03	03	06	–	–
4,76	04	05	04	04	08	08	S3
5,56	05	06	05	05	09	09	03
6,00	–	–	06	–	–	–	–
6,35	06	07	06	06	11	11	04
7,94	08	09	07	07	13	13	05
8,00	–	–	08	–	–	–	–
9,52	09	11	09	09	16	16	06
10,00	–	–	10	–	–	–	–
11,11	11	13	11	11	19	19	07
12,00	–	–	12	–	–	–	–
12,70	12	15	12	12	22	22	08
14,29	14	17	14	14	24	24	09
15,88	16	19	15	15	27	27	10
16,00	–	–	16	–	–	–	–
17,46	17	21	17	17	30	30	11
19,05	19	23	19	19	33	33	13
20,00	–	–	20	–	–	–	–
22,22	22	27	22	22	38	38	15
25,00	–	–	25	–	–	–	–
25,40	25	31	25	25	44	44	17
31,75	32	38	31	31	54	54	21
32,00	–	–	32	–	–	–	–

tolerance class	tolerance on "D"	tolerance on "B"	tolerance on "S"
C	±0,025	±0,013	±0,025
H	±0,013	±0,013	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,025	±0,13
M	See tables on next page		±0,13
U	See tables on next page		±0,13

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



04 — Thickness S

symbol mm	thickness mm
–	0,79
T0	1,00
01	1,59
T1	1,98
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94
9	9,52
11	11,11
12	12,70

08 — Corner Radius “Rε”

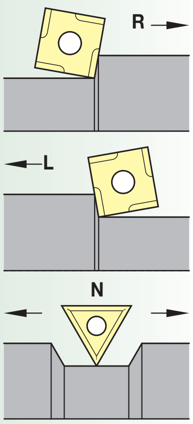
symbol mm	corner radius mm
X0	0,04
01	0,1
02	0,2
04	0,4
08	0,8
12	1,2
16	1,6
20	2,0
24	2,4
28	2,8
32	3,2
00	round insert
M0	
–	

Hand of Insert (optional)

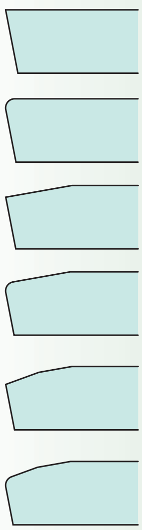
R = Right hand

L = Left hand

N = Neutral



Cutting Edge (optional)



F Sharp

E Rounded

T Chamfered

S Chamfered and Rounded

K Double-Chamfered

P Double-Chamfered and Rounded

6P — Chipbreaker (optional)

1P = Finishing

2P = Finishing

..GP = Medium Machining

4P = Medium Machining

6P = Medium Roughing

..MA = Roughing

7N = Heavy Roughing

± Tolerance on “D”

“D” mm	Class M Tolerance: Shapes S, T, C, R, & W mm	Class M Tolerance: Shape D mm	Class M Tolerance: Shape V mm	Class U Tolerance: Shapes S, T, & C mm
3,97	0,05	–	–	–
4,76	0,05	–	–	0,08
5,56	0,05	0,05	0,05	0,08
6,35	0,05	0,05	0,05	0,08
7,94	0,05	0,05	0,05	0,08
9,52	0,05	0,05	0,05	0,08
11,11	0,08	0,08	0,08	0,13
12,70	0,08	0,08	0,08	0,13
14,29	0,08	0,08	0,08	0,13
15,88	0,10	0,10	0,10	0,18
17,46	0,10	0,10	0,10	0,18
19,05	0,10	0,10	0,10	0,18
22,22	0,13	–	–	0,25
25,40	0,13	–	–	0,25
31,75	0,15	–	–	0,25

± Tolerance on “B”

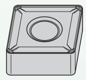
“D” mm	Class M Tolerance: Shapes S, T, C, R, & W mm	Class M Tolerance: Shape D mm	Class M Tolerance: Shape V mm	Class U Tolerance: Shapes S, T, & C mm
3,97	0,08	–	–	–
4,76	0,08	–	–	0,13
5,56	0,08	0,11	–	0,13
6,35	0,08	0,11	–	0,13
7,94	0,08	0,11	–	0,13
9,52	0,08	0,11	0,18	0,13
11,11	0,13	0,15	–	–
12,70	0,13	0,15	0,25	0,20
14,29	0,13	0,15	–	–
15,88	0,15	0,18	–	0,27
17,46	0,15	0,18	–	0,27
19,05	0,15	0,18	–	0,27
22,22	0,15	–	–	0,38
25,40	0,18	–	–	0,38
31,75	0,20	–	–	0,38

A system of grades, geometries, and application guidelines to provide optimal solutions for your metalcutting needs. It's easy to determine which WIDIA™ chip-control cutting tool will work best in your specific workpiece materials and applications!

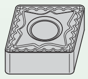
TN	15	M
Brand	Relative Hardness (ISO 513)	Primary Workpiece Material (ISO 513)
TN = WIDIA	**01** = **Hardest** **10** **20** **30** **40** **50** = **Toughest**	**P** Steel **M** Stainless Steel **K** Cast Iron **N** Non-Ferrous **S** High-Temp Alloys **H** Hardened Materials **U** Universal Machining

Step 1 • Select the insert geometry

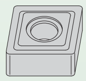
Negative Inserts



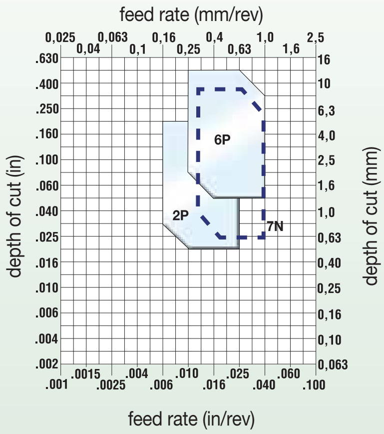
2P
Finishing



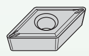
6P
Roughing



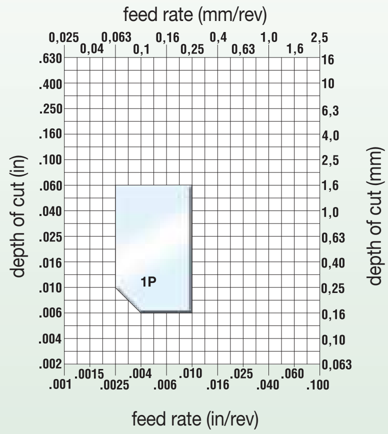
7N
Heavy Roughing



Positive Inserts



1P
Finishing



Step 2 • Select the grade

	Negative Insert Geometry			Positive Insert Geometry
cutting condition	**2P**	**6P**	**7N**	**1P**
heavily interrupted cut	TN30P	TN30P	TN30P	TN30P
lightly interrupted cut	TN20P/TN30P	TN20P/TN30P	TN20P/TN30P	TN20P
varying depth of cut, casting, or forging skin	TN20P/TN30P	TN20P/TN30P	TN20P/TN30P	TN10P
smooth cut, pre-turned surface	TN10P	TN10P	TN10P	TN10P

(continued)

Step 3 • Selecting the cutting speed *(continued)*

Low-Carbon (<0.3% C) and Free-Machining Steel — speed — m/min — Starting Conditions

Material Group	grade	135	180	225	275	320	360	410	455	495	m/min
P0/P1	TN10P										316
	TN20P										248
	TN30P										189

Medium- and High-Carbon Steels (>0.3% C) — speed — m/min — Starting Conditions

Material Group	grade	135	180	225	275	320	360	410	455	495	m/min
P2	TN10P										212
	TN20P										176
	TN30P										135

Alloy Steels and Tool Steels (≤330 HB) (≤35 HRC) — speed — m/min — Starting Conditions

Material Group	grade	135	180	225	275	320	360	410	455	495	m/min
P3	TN10P										152
	TN20P										140
	TN30P										108

Alloy Steels and Tool Steels (340–450 HB) (36–48 HRC) — speed — m/min — Starting Conditions

Material Group	grade	60	90	120	150	180	210	240	270	300	m/min
P4	TN10P										116
	TN20P										95
	TN30P										86

Ferritic, Martensitic, and PH Stainless Steels (≤330 HB) (≤35 HRC) — speed — m/min — Starting Conditions

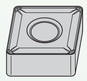
Material Group	grade	120	150	180	210	240	270	300	330	360	m/min
P5	TN10P										172
	TN20P										176
	TN30P										122

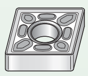
Ferritic, Martensitic, and PH Stainless Steels (340–450 HB) (36–48 HRC) — speed — m/min — Starting Conditions

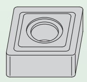
Material Group	grade	105	135	165	195	225	255	285	315	345	m/min
P6	TN10P										144
	TN20P										135
	TN30P										95

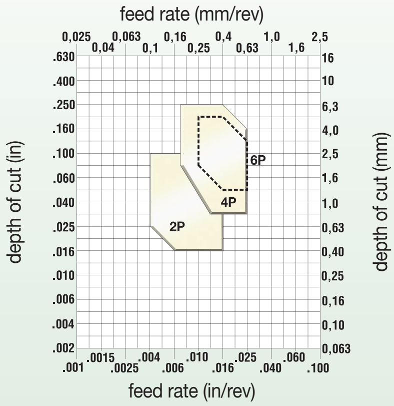
Step 1 • Select the insert geometry

Negative Inserts

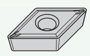

2P
Finishing

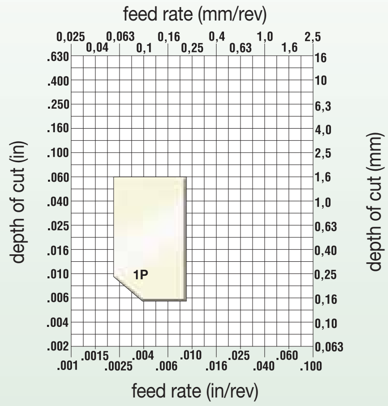

4P
Medium


6P
Roughing



Positive Inserts


1P
Finishing



Step 2 • Select the grade

cutting condition	Negative Insert Geometry 2P	Negative Insert Geometry 4P	Negative Insert Geometry 6P	Positive Insert Geometry 1P
heavily interrupted cut	TN15M/TN10	TN30M	TN30M	TN30M/TN10
lightly interrupted cut	TN15M/TN10	TN30M	TN30M	TN30M
varying depth of cut, casting, or forging skin	TN15M	TN15M/TN30M	TN15M/TN30M	TN15M/TN30M
smooth cut, pre-turned surface	TN15M	TN15M	TN15M	TN15M

Step 3 • Selecting the cutting speed

Austenitic Stainless Steel — speed — m/min — Starting Conditions

Material Group	grade	90	135	180	225	270	315	360	405	450	m/min
M1	TN15M										162
	TN30M										135
	TN10U										194
	TN15U										129

Austenitic Stainless Steel — speed — m/min — Starting Conditions

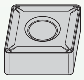
Material Group	grade	90	135	180	225	270	315	360	405	450	m/min
M2	TN15M										149
	TN30M										135
	TN10U										180
	TN15U										120

Austenitic Stainless Steel: Duplex (Ferritic and Austenitic Mixture) — speed — m/min — Starting Conditions

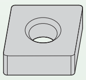
Material Group	grade	90	135	180	225	270	315	360	405	450	m/min
M3	TN15M										135
	TN30M										108
	TN10U										167
	TN15U										111

Step 1 • Select the insert geometry

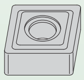
Negative Inserts



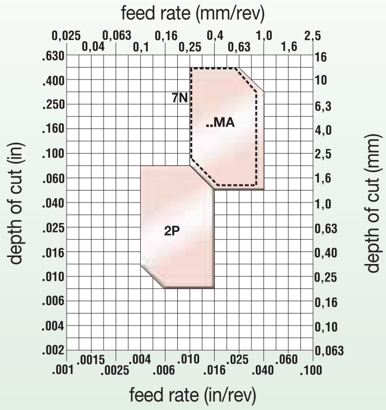
2P
Finishing



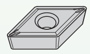
..MA
Heavy Roughing



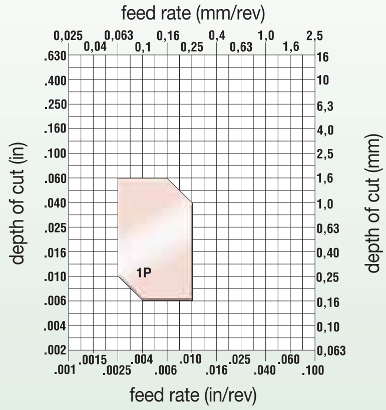
7N
Heavy Roughing



Positive Inserts



1P
Finishing



Step 2 • Select the grade

cutting condition	Negative Insert Geometry 2P	..MA	7N	Positive Insert Geometry 1P
heavily interrupted cut	TN20K	TN20K	TN20K	TN20K
lightly interrupted cut	TN20K	TN20K	TN20K	TN20K
varying depth of cut, casting, or forging skin	TN20K	TN20K	TN20K	TN20K
smooth cut, pre-turned surface	TN20K	TN20K	TN20K	TN20K

Step 3 • Selecting the cutting speed

Grey Cast Iron — speed — m/min — Starting Conditions

Material Group	grade	60	150	240	330	420	510	600	690	780	m/min
K1	TN20K										270

Ductile, Compacted Graphite, and Malleable Cast Irons (<80 KSI tensile strength) — speed — m/min — Starting Conditions

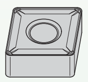
Material Group	grade	60	150	240	330	420	510	600	690	780	m/min
K2	TN20K										216

Ductile, Compacted Graphite, and Malleable Cast Irons (>80 KSI tensile strength) — speed — m/min — Starting Conditions

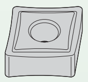
Material Group	grade	60	150	240	330	420	510	600	690	780	m/min
K3	TN20K										189

Step 1 • Select the insert geometry

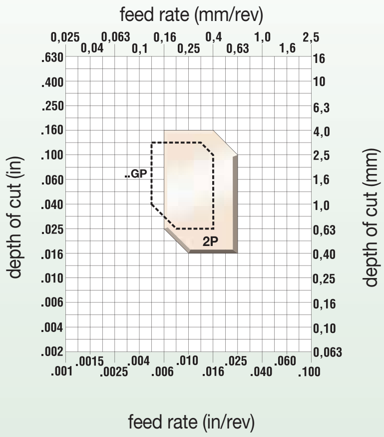
Negative Inserts



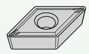
2P
Finishing



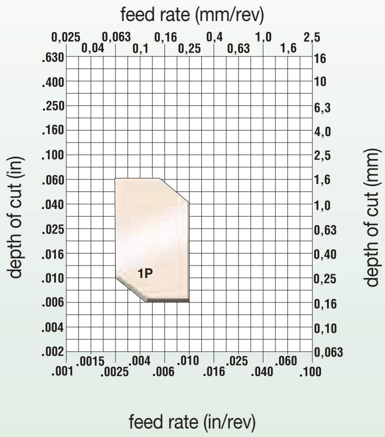
..GP
Medium



Positive Inserts



1P
Finishing



Step 2 • Select the grade

cutting condition	Negative Insert Geometry 2P	..GP	Positive Insert Geometry 1P
heavily interrupted cut	TN15U	–	TN15U
lightly interrupted cut	TN10U	TN10U	TN15U
varying depth of cut, casting, or forging skin	TN10U	TN10U	TN10U
smooth cut, pre-turned surface	TN10U	TN10U	TN10U

Step 3 • Select the cutting speed

Iron-Based, Heat-Resistant Alloys
(135–320 HB) (≤34 HRC)

Material Group	grade	15	45	75	105	140	170	200	230	260	Starting Conditions m/min
S1	TN10U										50
	TN15U										33

Cobalt-Based, Heat-Resistant Alloys
(150–425 HB) (≤45 HRC)

Material Group	grade	15	45	75	105	140	170	200	230	260	Starting Conditions m/min
S2	TN10U										54
	TN15U										36

Nickel-Based, Heat-Resistant Alloys
(140–475 HB) (≤48 HRC)

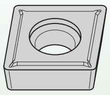
Material Group	grade	15	45	75	105	140	170	200	230	260	Starting Conditions m/min
S3	TN10U										63
	TN15U										42

Titanium and Titanium Alloys
(110–450 HB) (≤48 HRC)

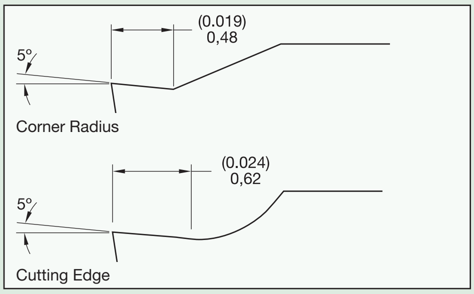
Material Group	grade	15	45	75	105	140	170	200	230	260	Starting Conditions m/min
S4	TN10U										63
	TN15U										42

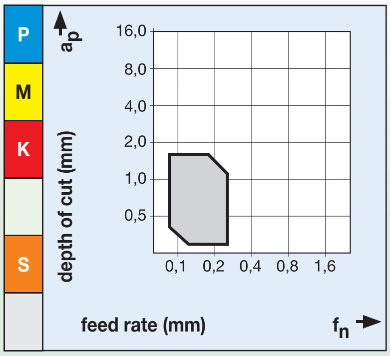
Positive and Negative Inserts

1P

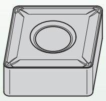


Preferred for light finishing. Low cutting forces and reduced power requirements due to positive rake angle. Good chip control over a wide range.

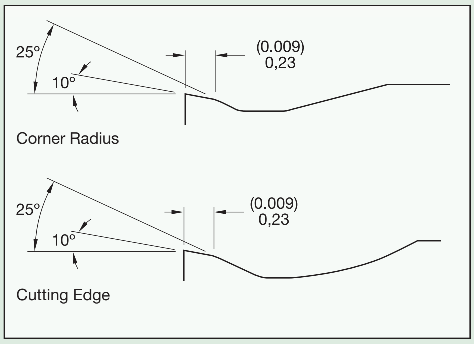


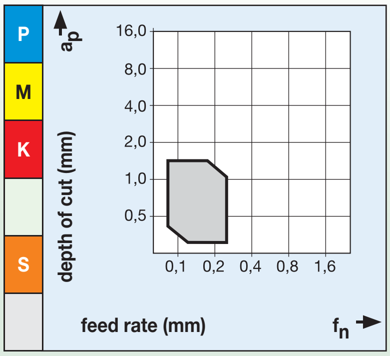


2P

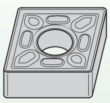


For finish turning, producing smooth, accurate surfaces. Very good chip control, especially at low depths of cut.

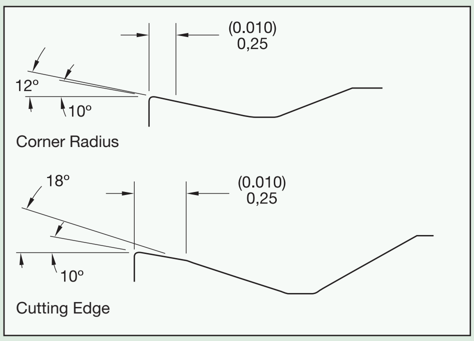


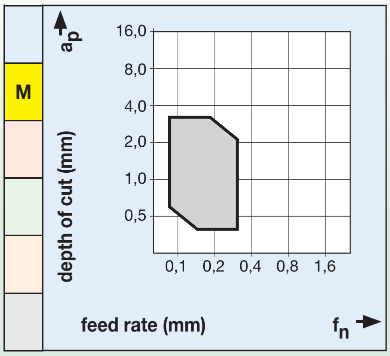


4P



For medium-duty turning operations. Soft-cutting chipbreaker. Used in applications producing varying chip sections, such as profile or copy turning. Good dimensional accuracy. For soft steel materials and stainless steels.

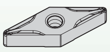




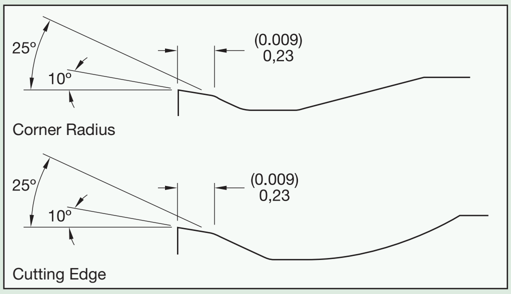
(continued)

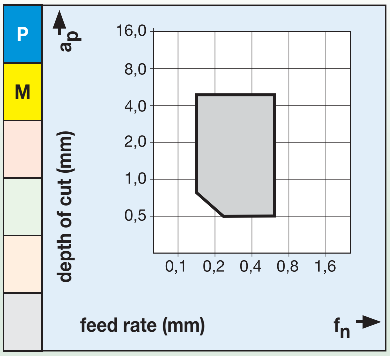
Positive and Negative Inserts *(continued)*

6P

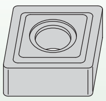


For medium to rough turning. Outstanding chip control due to specially configured chipbreaker element in corner area. Good chip forming with low depths of cut.

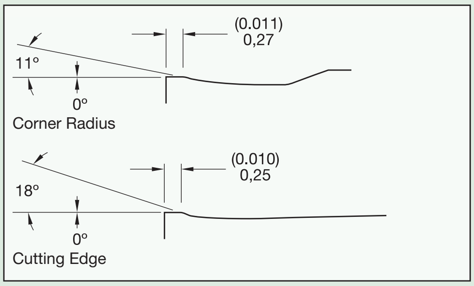


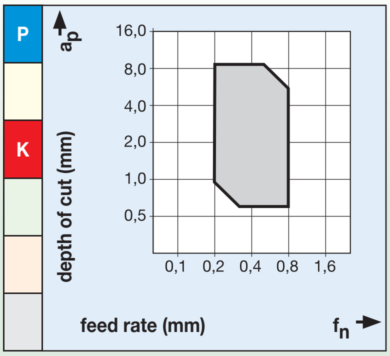


7N



For medium-duty to roughing. Outstanding chip control. High edge strength for interrupted cuts, forging skin, or scale. Preferred for all cast iron such as grey, malleable, and nodular.

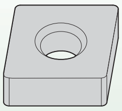




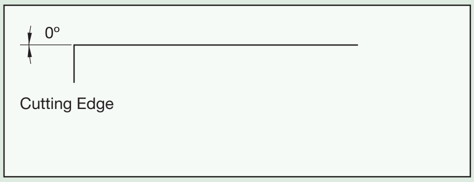
(continued)

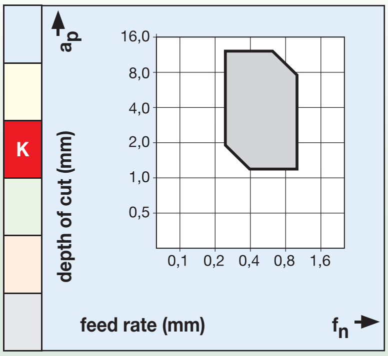
Positive and Negative Inserts *(continued)*

..MA

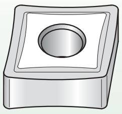


Flat top geometry for machining cast iron. For finishing to roughing applications.

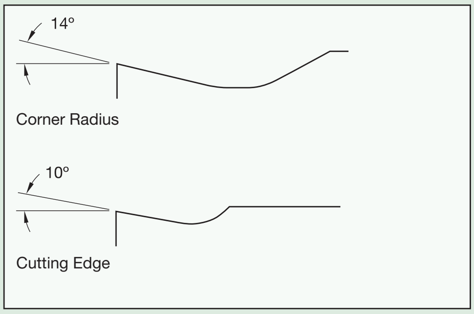


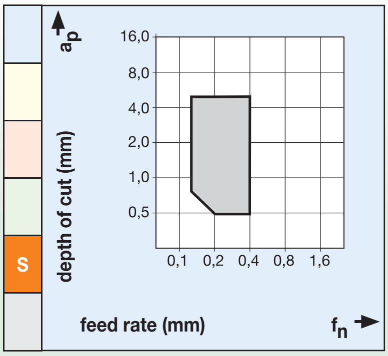


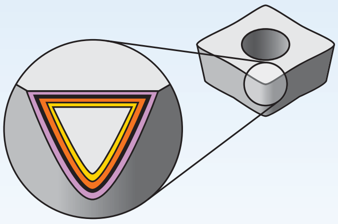
..GP



For light machining to light roughing.





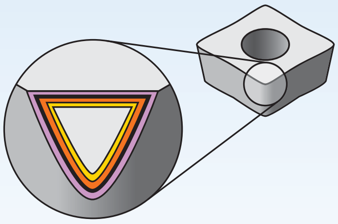


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ←——→ **toughness**

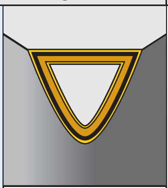
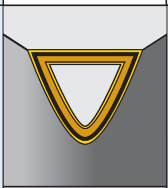
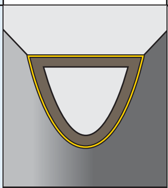
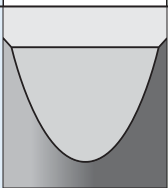
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
TN10P	HC-P10	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Ideal for light finishing to medium machining applications. Superior wear resistance.	P	x	x	x	x					
			K			x	x					
TN20P	HC-P20	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Great general-purpose turning grade for steels. Ideal for semi-finishing to moderately heavy roughing.	P			x	x	x	x			
			K					x	x	x		
TN30P	HC-P30	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Tough carbide grade. Ideal for roughing and heavy roughing applications.	P						x	x	x	x
TN15M	HC-M15	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Ideal for general-purpose machining of stainless steels.	P			x	x	x				
			M		x	x	x					
			S		x	x	x					



Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

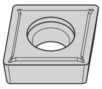
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

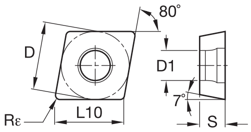
wear resistance ⟷ toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
TN30M	 HC-M30	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Ideal for general-purpose machining of stainless steels.	P						■	■	■	
			M					■	■	■	■	
			S					■	■	■		
TN20K	 HC-K20	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Great when used for straight or lightly interrupted cut applications of ductile and cast irons.	P	■	■	■						
			K		■	■	■	■				
TN10U	 HC-S10	Coated carbide. PVD-TiAlN-TiN. Ideal for finishing of difficult to machine alloys and stainless steels.	P		■	■	■					
			M		■	■	■					
			K		■	■	■					
			N		■	■	■					
			S		■	■	■					
TN15U	 HW-P15	Uncoated carbide. Excellent abarasion resistance for machining cast irons, austentic stainless steels, and most high-temperature alloys.	P		■	■	■					
			M		■	■	■					
			K		■	■	■					
			N		■	■	■					
			S		■	■	■					

WIDIA

Inserts



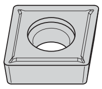


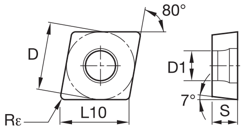
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ CCGT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CCGT0602021P	6,35	6,45	2,38	0,2	2,80	-	-	-	-	-	-	4163978	4163979
CCGT0602041P	6,35	6,45	2,38	0,4	2,80	-	-	-	-	-	-	4163980	4163981
CCGT0602081P	6,35	6,45	2,38	0,8	2,80	-	-	-	-	-	-	4163982	-
CCGT09T3011P	9,53	9,67	3,97	0,1	4,40	-	-	-	-	-	-	4164495	4164496
CCGT09T3021P	9,53	9,67	3,97	0,2	4,40	-	-	-	-	-	-	4164493	4164494
CCGT09T3041P	9,53	9,67	3,97	0,4	4,40	-	-	-	-	-	-	4164497	4164498
CCGT09T3081P	9,53	9,67	3,97	0,8	4,40	-	-	-	-	-	-	4164499	4164500





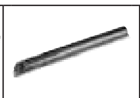
● first choice
○ alternate choice

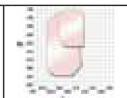
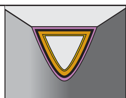
		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

Inserts

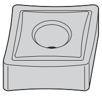
CCMT-1P

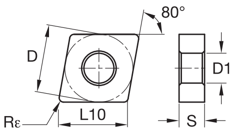
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CCMT0602021P	6,35	6,45	2,38	0,2	2,80	4165244	-	-	4166242	4166323	4165245	4166324	4166325
CCMT0602041P	6,35	6,45	2,38	0,4	2,80	4166326	4166327	-	4166329	4166330	4166328	4166331	4166332
CCMT0602081P	6,35	6,45	2,38	0,8	2,80	4166333	4166334	-	4166336	4166337	4166335	4166338	-
CCMT09T3021P	9,53	9,67	3,97	0,2	4,40	-	-	-	-	-	-	4166339	4166340
CCMT09T3041P	9,53	9,67	3,97	0,4	4,40	4166341	4166342	-	4166344	4166345	4166343	4166346	4166347
CCMT09T3081P	9,53	9,67	3,97	0,8	4,40	4166348	4166349	-	4166351	4166352	4166350	4166353	4166354
CCMT1204041P	12,70	12,90	4,76	0,4	5,50	4166355	4166356	-	4166358	4166359	4166357	4166558	-
CCMT1204081P	12,70	12,90	4,76	0,8	5,50	4166559	4166560	-	4166562	4166623	4166561	4166624	-


C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105



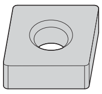


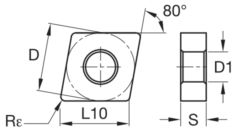
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

CNGP

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNGP120401	12,70	12,90	4,76	0,1	5,16	-	-	-	-	-	-	4164565	-
CNGP120402	12,70	12,90	4,76	0,2	5,16	-	-	-	-	-	-	4164564	-
CNGP120404	12,70	12,90	4,76	0,4	5,16	-	-	-	-	-	-	4164566	4164567
CNGP120408	12,70	12,90	4,76	0,8	5,16	-	-	-	-	-	-	4164568	4164569
CNGP120412	12,70	12,90	4,76	1,2	5,16	-	-	-	-	-	-	4164570	4164571





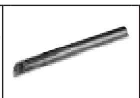
● first choice
○ alternate choice

	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P	●	●	●	○	○	○	○	○
M				●	●		●	●
K	○	○				●	○	○
N							○	○
S				○	○		●	●
H								

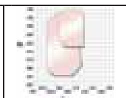
CNMA

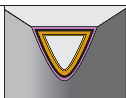
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNMA120404	12,70	12,90	4,76	0,4	5,16	–	–	–	–	–	4165470	–	–
CNMA120408	12,70	12,90	4,76	0,8	5,16	–	–	–	–	–	4165471	–	–
CNMA120412	12,70	12,90	4,76	1,2	5,16	–	–	–	–	–	4165472	–	–
CNMA120416	12,70	12,90	4,76	1,6	5,16	–	–	–	–	–	4165833	–	–
CNMA160612	15,88	16,12	6,35	1,2	6,35	–	–	–	–	–	4165834	–	–
CNMA160616	15,88	16,12	6,35	1,6	6,35	–	–	–	–	–	4165835	–	–
CNMA190612	19,05	19,34	6,35	1,2	7,93	–	–	–	–	–	4165836	–	–
CNMA190616	19,05	19,34	6,35	1,6	7,93	–	–	–	–	–	4165837	–	–


C2–C49

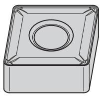

C50–C81

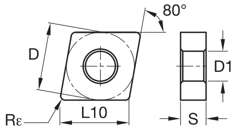

C86–C129


B8–B25


B26–B28


B30–B105



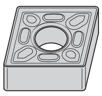


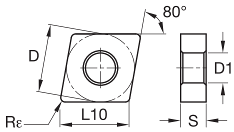
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

CNMG-2P

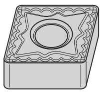
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNMG1204042P	12,70	12,90	4,76	0,4	5,16	4166171	4166172	-	4166244	4166245	4166243	4166246	4166247
CNMG1204082P	12,70	12,90	4,76	0,8	5,16	4166248	4166249	-	4166251	4166252	4166250	4166253	4166254
CNMG1204122P	12,70	12,90	4,76	1,2	5,16	4166255	4166256	-	4166258	-	4166257	4166259	-

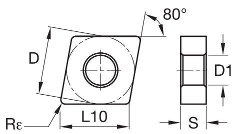




CNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNMG1204044P	12,70	12,90	4,76	0,4	5,16	-	5359116	-	4165830	4165831	-	5359117	-
CNMG1204084P	12,70	12,90	4,76	0,8	5,16	-	5359118	-	4165832	4165853	-	5359119	-
CNMG1204124P	12,70	12,90	4,76	1,2	5,16	-	5359240	-	4165854	4165855	-	5359241	-
CNMG1606124P	15,88	16,12	6,35	1,2	6,35	-	-	-	4165856	4165857	-	-	-
CNMG1906124P	19,05	19,34	6,35	1,2	7,93	-	-	-	4165858	4165859	-	-	-



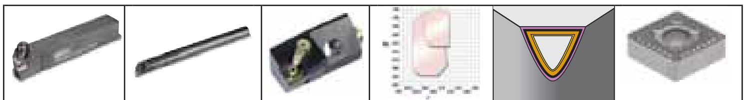


● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

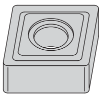
CNMG-6P

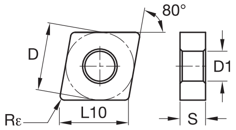
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNMG0903086P	9,53	9,67	3,18	0,8	3,81	4165948	4165949	-	4165950	4165951	-	-	-
CNMG1204046P	12,70	12,90	4,76	0,4	5,16	4165952	4165963	-	4165964	4165965	-	-	-
CNMG1204086P	12,70	12,90	4,76	0,8	5,16	4165966	4165967	4165968	4165969	4165970	-	-	-
CNMG1204126P	12,70	12,90	4,76	1,2	5,16	4165971	4165972	4165973	4165974	4165975	-	-	-
CNMG1606126P	15,88	16,12	6,35	1,2	6,35	-	4165976	4165977	4165978	4165979	-	-	-
CNMG1906126P	19,05	19,34	6,35	1,2	7,93	-	4165980	4165981	4165982	4165983	-	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



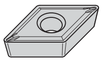
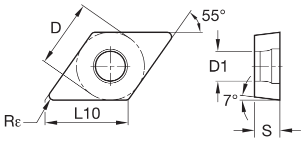


● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ CNMG-7N

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNMG1204047N	12,70	12,90	4,76	0,4	5,16	4166386	4166387	–	–	–	4166388	–	–
CNMG1204087N	12,70	12,90	4,76	0,8	5,16	4166389	4166390	4166391	–	–	4166392	–	–
CNMG1204127N	12,70	12,90	4,76	1,2	5,16	4166433	4166434	4166435	–	–	4166436	–	–
CNMG1204167N	12,70	12,90	4,76	1,6	5,16	4166437	4166438	–	–	–	4166439	–	–
CNMG1606127N	15,88	16,12	6,35	1,2	6,35	4166440	4166441	4166442	–	–	4166443	–	–
CNMG1606167N	15,88	16,12	6,35	1,6	6,35	4166444	4166445	–	–	–	4166446	–	–
CNMG1906087N	19,05	19,34	6,35	0,8	7,93	4166447	–	–	–	–	4166448	–	–
CNMG1906127N	19,05	19,34	6,35	1,2	7,93	4166449	4166450	4166451	–	–	4166452	–	–
CNMG1906167N	19,05	19,34	6,35	1,6	7,93	4166453	4166454	4166455	–	–	4166456	–	–
CNMG2509247N	25,40	25,79	9,53	2,4	9,12	–	–	4166457	–	–	–	–	–

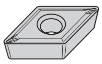
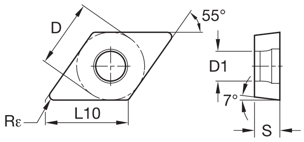



● first choice
○ alternate choice

	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P	●	●	●	○	○	○	○	○
M				●	●		●	●
K	○	○				●	○	○
N							○	○
S				○	○		●	●
H								

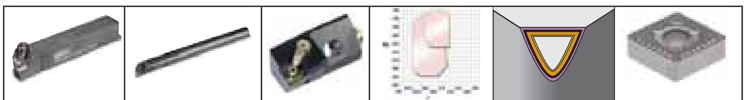
DCGT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DCGT0702011P	6,35	7,75	2,38	0,1	2,80	–	–	–	–	–	–	4164501	4164502
DCGT11T3011P	9,53	11,63	3,97	0,1	4,40	–	–	–	–	–	–	4164523	4164524
DCGT1504081P	12,70	15,50	4,76	0,8	5,50	–	–	–	–	–	–	4164525	–

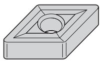
DCMT-1P

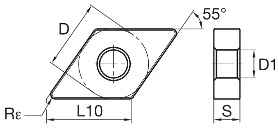
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DCMT0702021P	6,35	7,75	2,38	0,2	2,80	–	–	–	–	–	–	4166625	4166626
DCMT0702041P	6,35	7,75	2,38	0,4	2,80	4166627	4166628	–	4166630	4166631	4166629	4166632	4166633
DCMT11T3021P	9,53	11,63	3,97	0,2	4,40	–	–	–	–	–	–	4166634	4166635
DCMT11T3041P	9,53	11,63	3,97	0,4	4,40	4166636	4166637	–	4166639	4166640	4166638	4166641	4166642
DCMT11T3081P	9,53	11,63	3,97	0,8	4,40	4166643	4166644	–	4166646	4166647	4166645	4166648	–
DCMT11T3121P	9,53	11,63	3,97	1,2	4,40	4166649	–	–	4166651	–	4166650	4166652	–
DCMT1504041P	12,70	15,50	4,76	0,4	5,50	4166653	4166654	–	–	–	4166655	–	–
DCMT1504081P	12,70	15,50	4,76	0,8	5,50	4166656	4166657	–	–	–	4166361	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



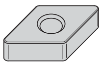


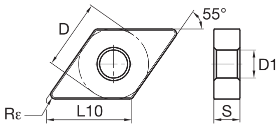
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

DNGP

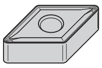
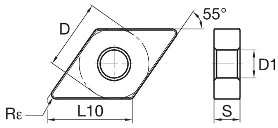
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNGP150401	12,70	15,50	4,76	0,1	5,16	-	-	-	-	-	-	4164784	-
DNGP150402	12,70	15,50	4,76	0,2	5,16	-	-	-	-	-	-	4164572	4164783
DNGP150404	12,70	15,50	4,76	0,4	5,16	-	-	-	-	-	-	4164785	4164786
DNGP150408	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	-	4164787	4164788





DNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNMA150408	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	4165838	-	-
DNMA150608	12,70	15,50	6,35	0,8	5,16	-	-	-	-	-	4165840	-	-
DNMA150412	12,70	15,50	4,76	1,2	5,16	-	-	-	-	-	4165839	-	-
DNMA150612	12,70	15,50	6,35	1,2	5,16	-	-	-	-	-	4165841	-	-

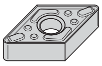
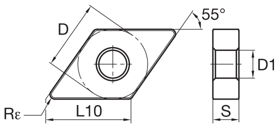
● first choice
○ alternate choice

	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P	●	●	●	○	○	○	○	○
M				●	●		●	●
K	○	○				●	○	○
N							○	○
S				○	○		●	●
H								

Inserts

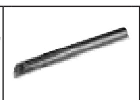
■ DNMG-2P

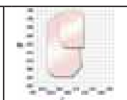
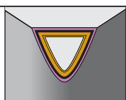
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNMG1504042P	12,70	15,50	4,76	0,4	5,16	4166260	4166261	-	4166263	4166264	4166262	4166265	4166266
DNMG1506042P	12,70	15,50	6,35	0,4	5,16	4166825	4166826	-	4166828	-	4166827	4166829	4166830
DNMG1504082P	12,70	15,50	4,76	0,8	5,16	4166267	4166269	-	4166273	4166275	4166271	4166277	4166279
DNMG1506082P	12,70	15,50	6,35	0,8	5,16	4166831	4166832	-	4166844	-	4166843	4166845	4166846
DNMG1506122P	12,70	15,50	6,35	1,2	5,16	4166847	4166848	-	4166850	4166851	4166849	4166852	-

■ DNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNMG1504044P	12,70	15,50	4,76	0,4	5,16	-	-	-	4165860	4165861	-	-	-
DNMG1506044P	12,70	15,50	6,35	0,4	5,16	-	5359244	-	4165864	4165865	-	-	-
DNMG1504084P	12,70	15,50	4,76	0,8	5,16	-	5359242	-	4165862	4165863	-	5359243	-
DNMG1506084P	12,70	15,50	6,35	0,8	5,16	-	5359245	-	4165866	4165867	-	-	-
DNMG1506124P	12,70	15,50	6,35	1,2	5,16	-	-	-	4165868	4165869	-	-	-


C2–C49

C50–C81

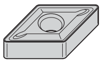
C86–C129

B8–B25

B26–B28

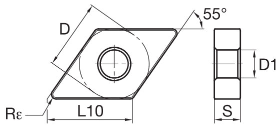
B30–B105

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

WIDIA

Inserts



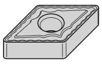


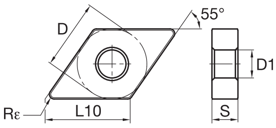
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ DNMG-6P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNMG1104086P	9,53	11,63	4,76	0,8	3,81	4165984	4165985	-	-	4165986	-	-	-
DNMG1504046P	12,70	15,50	4,76	0,4	5,16	4165987	4165988	-	4165989	4165990	-	-	-
DNMG1506046P	12,70	15,50	6,35	0,4	5,16	4166767	4166768	-	4166769	4166770	-	-	-
DNMG1504086P	12,70	15,50	4,76	0,8	5,16	4165991	4165992	4165993	4165994	4165995	-	-	-
DNMG1506086P	12,70	15,50	6,35	0,8	5,16	4166771	4166772	4166793	4166794	4166795	-	-	-
DNMG1504126P	12,70	15,50	4,76	1,2	5,16	4165996	4165997	-	4166765	4166766	-	-	-
DNMG1506126P	12,70	15,50	6,35	1,2	5,16	4166796	4166797	4166798	4166799	4166800	-	-	-
DNMG1906126P	15,88	19,38	6,35	1,2	6,35	-	-	4166801	-	-	-	-	-



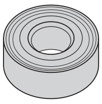


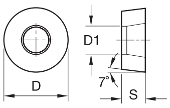
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ DNMG-7N

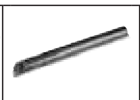
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNMG1504047N	12,70	15,50	4,76	0,4	5,16	4166458	4166459	-	-	-	-	-	-
DNMG1504087N	12,70	15,50	4,76	0,8	5,16	4166460	4166461	4166462	-	-	4166463	-	-
DNMG1506087N	12,70	15,50	6,35	0,8	5,16	4166484	4166485	4166486	-	-	4166487	-	-
DNMG1504127N	12,70	15,50	4,76	1,2	5,16	4166464	4166465	4166432	-	-	4166483	-	-
DNMG1506127N	12,70	15,50	6,35	1,2	5,16	4166488	4166489	4166490	-	-	4166491	-	-
DNMG1906127N	15,88	19,38	6,35	1,2	6,35	-	4166492	4166493	-	-	-	-	-

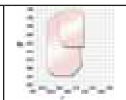
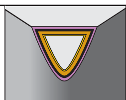




■ RNMG-7N

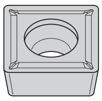
ISO catalogue number	D	S	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
RNMG12047N	12,70	4,76	5,16	-	4166494	-	-	-	4166495	-	-
RNMG19067N	19,05	6,35	7,93	4166496	4166497	-	-	-	-	-	-

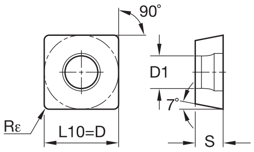

C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105

Inserts



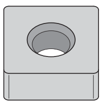


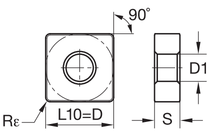
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

SCMT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SCMT09T3041P	9,53	9,53	3,97	0,4	4,40	4166362	4166393	-	4166395	4166396	4166394	4166397	-
SCMT09T3081P	9,53	9,53	3,97	0,8	4,40	4166398	4166399	-	4166401	4166402	4166400	4166403	-
SCMT1204041P	12,70	12,70	4,76	0,4	5,50	-	-	-	-	-	-	4166404	-
SCMT1204081P	12,70	12,70	4,76	0,8	5,50	4166405	4166406	-	4166408	4166409	4166407	4166410	-



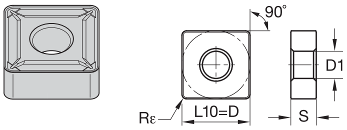


SNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SNMA120408	12,70	12,70	4,76	0,8	5,16	-	-	-	-	-	4165842	-	-
SNMA120412	12,70	12,70	4,76	1,2	5,16	-	-	-	-	-	4165843	-	-
SNMA150612	15,88	15,88	6,35	1,2	6,35	-	-	-	-	-	4165844	-	-
SNMA190612	19,05	19,05	6,35	1,2	7,93	-	-	-	-	-	4165845	-	-

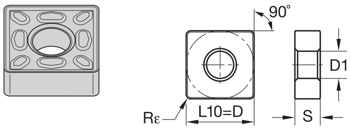
	P	M	K	N	S	H
TN10P	●		○			
TN20P	●		○			
TN30P	●					
TN15M	○	●			○	
TN30M	○	●			○	
TN20K	○		●			
TN10U	○	●	○	○	●	
TN15U	○	●	○	○	●	

● first choice
○ alternate choice



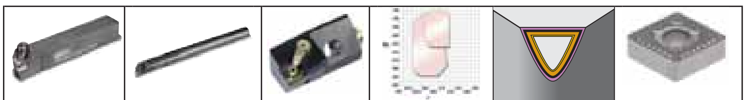
SNMG-2P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SNMG0903082P	9,53	9,53	3,18	0,8	3,81	4166853	4166854	-	-	-	4166855	4166856	-
SNMG1204082P	12,70	12,70	4,76	0,8	5,16	4166857	4166858	-	4166860	-	4166859	4166861	4166862

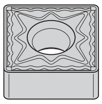


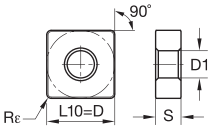
SNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SNMG1204084P	12,70	12,70	4,76	0,8	5,16	-	-	-	4165870	4165871	-	-	-
SNMG1204124P	12,70	12,70	4,76	1,2	5,16	-	-	-	4165872	4165873	-	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



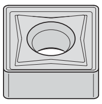


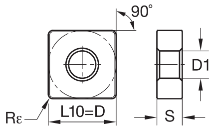
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ SNMG-6P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SNMG0903086P	9,53	9,53	3,18	0,8	3,81	4166802	4166803	-	-	-	-	-	-
SNMG1204046P	12,70	12,70	4,76	0,4	5,16	4166804	4166805	-	4166806	4166807	-	-	-
SNMG1204086P	12,70	12,70	4,76	0,8	5,16	4166808	4166809	4166810	4166811	4166812	-	-	-
SNMG1204126P	12,70	12,70	4,76	1,2	5,16	4166813	4166814	4166815	4166816	4166817	-	-	-
SNMG1906166P	19,05	19,05	6,35	1,6	7,92	-	-	5308173	-	-	-	-	-
SNMG1906126P	19,05	19,05	6,35	1,2	7,93	-	4166818	4166819	4166820	4166821	-	-	-



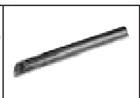


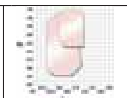
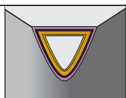
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

SNMG-7N

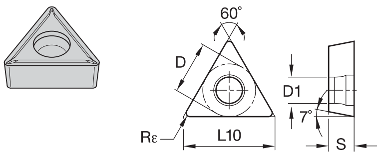
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SNMG1204087N	12,70	12,70	4,76	0,8	5,16	4166498	4166499	-	-	-	4166500	-	-
SNMG1204127N	12,70	12,70	4,76	1,2	5,16	4166501	4166502	4166503	-	-	4166504	-	-
SNMG1204167N	12,70	12,70	4,76	1,6	5,16	4166505	4166506	4166507	-	-	4166508	-	-
SNMG1506127N	15,88	15,88	6,35	1,2	6,35	-	4166509	4166510	-	-	4166511	-	-
SNMG1506167N	15,88	15,88	6,35	1,6	6,35	-	4166512	4166513	-	-	4166514	-	-
SNMG1906127N	19,05	19,05	6,35	1,2	7,93	-	4166515	4166516	-	-	4166517	-	-
SNMG1906167N	19,05	19,05	6,35	1,6	7,93	-	4166518	4166519	-	-	4166520	-	-


C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105

Inserts

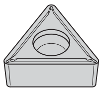


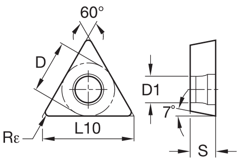
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

TCGT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TCGT1102011P	6,35	11,00	2,38	0,1	2,80	ı	ı	ı	ı	ı	ı	4164526	4164527
TCGT1102041P	6,35	11,00	2,38	0,4	2,80	ı	ı	ı	ı	ı	ı	4164528	4164529
TCGT16T3021P	9,53	16,50	3,97	0,2	4,40	ı	ı	ı	ı	ı	ı	4164530	ı
TCGT16T3041P	9,53	16,50	3,97	0,4	4,40	ı	ı	ı	ı	ı	ı	4164531	4164532
TCGT16T3081P	9,53	16,50	3,97	0,8	4,40	ı	ı	ı	ı	ı	ı	4164543	ı



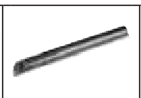


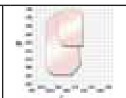
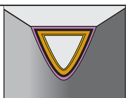
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

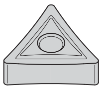
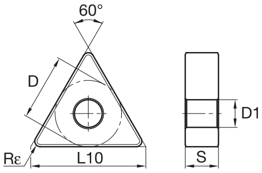
TCMT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TCMT1102041P	6,35	11,00	2,38	0,4	2,80	4166414	4166415	-	4166417	4166418	4166416	4166419	-
TCMT1102081P	6,35	11,00	2,38	0,8	2,80	4166420	4166421	-	-	-	4166422	4166423	-
TCMT1102021P	6,35	11,00	2,38	0,2	2,90	4166411	-	-	-	-	4166412	4166413	-
TCMT16T3021P	9,53	16,50	3,97	0,2	4,40	-	-	-	-	-	-	4166424	-
TCMT16T3041P	9,53	16,50	3,97	0,4	4,40	4166425	4166426	-	4166428	4166429	4166427	4166430	-
TCMT16T3081P	9,53	16,50	3,97	0,8	4,40	4166469	4166471	-	4166563	4166564	4166472	4166565	-
TCMT16T3121P	9,53	16,50	3,97	1,2	4,40	-	-	-	-	-	-	4166566	-
TCMT2204081P	12,70	22,00	4,76	0,8	5,50	4166567	4166568	-	4166570	4166571	4166569	4166572	-


C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105

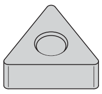
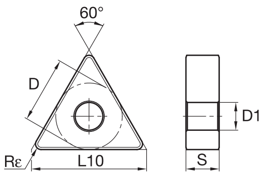



● first choice
○ alternate choice

	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P	●	●	●	○	○	○	○	○
M				●	●		●	●
K	○	○				●	○	○
N							○	○
S				○	○		●	●
H								

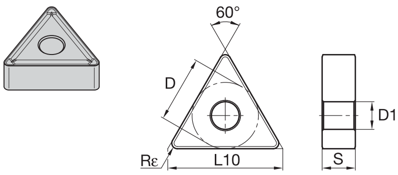
TNGP

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNGP160402	9,53	16,50	4,76	0,2	3,81	-	-	-	-	-	-	4164789	4164790
TNGP160404	9,53	16,50	4,76	0,4	3,81	-	-	-	-	-	-	4164791	4164792
TNGP160408	9,53	16,50	4,76	0,8	3,81	-	-	-	-	-	-	4164793	-

TNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNMA160408	9,53	16,50	4,76	0,8	3,81	-	-	-	-	-	4165846	-	-
TNMA160412	9,53	16,50	4,76	1,2	3,81	-	-	-	-	-	4165847	-	-
TNMA220408	12,70	22,00	4,76	0,8	5,16	-	-	-	-	-	4165848	-	-



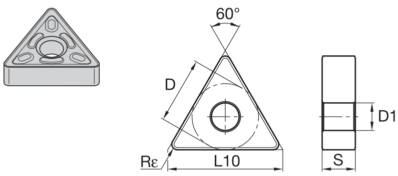
● first choice
○ alternate choice

	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P	●	●	●	○	○	○	○	○
M				●	●		●	●
K	○	○				●	○	○
N							○	○
S				○	○		●	●
H								

Inserts

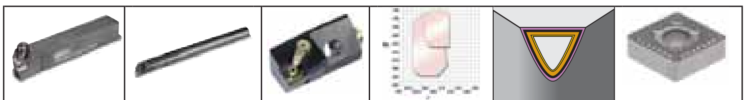
TNMG-2P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNMG1604042P	9,53	16,50	4,76	0,4	3,81	4166863	4166864	-	4166866	4166867	4166865	4166868	4166869
TNMG1604082P	9,53	16,50	4,76	0,8	3,81	4166870	4166871	-	4166873	-	4166872	4166874	4166875
TNMG1604122P	9,53	16,50	4,76	1,2	3,81	4166876	4166877	-	4166879	4166880	4166878	4166881	-
TNMG2204082P	12,70	22,00	4,76	0,8	5,16	4166882	4166883	-	4166885	-	4166884	4166886	4166887

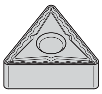


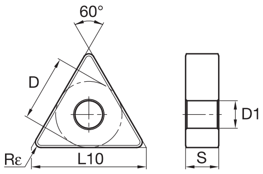
TNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNMG1604044P	9,53	16,50	4,76	0,4	3,81	-	5359246	-	4165874	4165875	-	-	-
TNMG1604084P	9,53	16,50	4,76	0,8	3,81	-	5359247	-	4165876	4165877	-	-	-
TNMG1604124P	9,53	16,50	4,76	1,2	3,81	-	-	-	4165878	4165879	-	-	-
TNMG2204044P	12,70	22,00	4,76	0,4	5,16	-	5359248	-	4165880	4165881	-	-	-
TNMG2204084P	12,70	22,00	4,76	0,8	5,16	-	5359249	-	4165882	4165883	-	-	-
TNMG2204124P	12,70	22,00	4,76	1,2	5,16	-	5359250	-	-	-	-	-	-



C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105



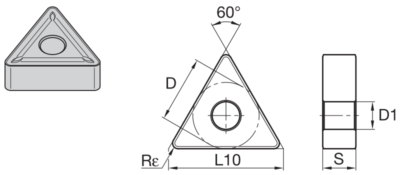


● first choice
○ alternate choice

	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P	●	●	●	○	○	○	○	○
M				●	●		●	●
K	○	○				●	○	○
N							○	○
S				○	○		●	●
H								

TNMG-6P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNMG1604046P	9,53	16,50	4,76	0,4	3,81	4166822	4166823	-	4166824	4167086	-	-	-
TNMG1604086P	9,53	16,50	4,76	0,8	3,81	4167087	4167088	4167089	4167090	4167091	-	-	-
TNMG1604126P	9,53	16,50	4,76	1,2	3,81	4167092	4167113	-	4167114	4167115	-	-	-
TNMG2204046P	12,70	22,00	4,76	0,4	5,16	4167116	4167117	-	4167118	4167119	-	-	-
TNMG2204086P	12,70	22,00	4,76	0,8	5,16	4167120	4167121	4167122	4167123	4167124	-	-	-

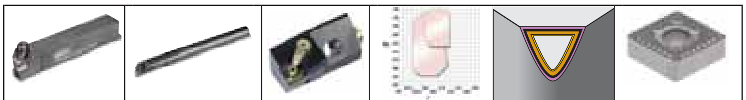


● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

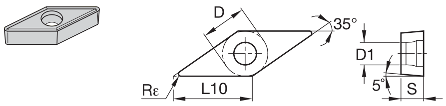
TNMG-7N

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNMG1604047N	9,53	16,50	4,76	0,4	3,81	-	4166521	-	-	-	-	-	-
TNMG1604087N	9,53	16,50	4,76	0,8	3,81	4166522	4166523	4166524	-	-	4166525	-	-
TNMG1604127N	9,53	16,50	4,76	1,2	3,81	4166526	4166527	4166528	-	-	4166529	-	-
TNMG2204047N	12,70	22,00	4,76	0,4	5,16	4166530	4166531	-	-	-	-	-	-
TNMG2204087N	12,70	22,00	4,76	0,8	5,16	4166532	4166533	4166534	-	-	4166535	-	-
TNMG2204127N	12,70	22,00	4,76	1,2	5,16	-	4166536	4166537	-	-	4166538	-	-
TNMG2706127N	15,88	27,50	6,35	1,2	6,35	4166539	4166540	4166541	-	-	4166542	-	-
TNMG3309247N	19,05	33,00	9,53	2,4	7,93	4166543	4166544	4166545	-	-	4166546	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

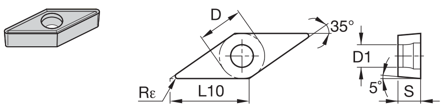


● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

VBGT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VBGT1103011P	6,35	11,07	3,18	0,1	2,80	-	-	-	-	-	-	4164546	4164547
VBGT1103021P	6,35	11,07	3,18	0,2	2,80	-	-	-	-	-	-	4164544	4164545
VBGT1103041P	6,35	11,07	3,18	0,4	2,80	-	-	-	-	-	-	4164548	-
VBGT1604011P	9,53	16,61	4,76	0,1	4,40	-	-	-	-	-	-	4164551	-
VBGT1604021P	9,53	16,61	4,76	0,2	4,40	-	-	-	-	-	-	4164549	4164550
VBGT1604041P	9,53	16,61	4,76	0,4	4,40	-	-	-	-	-	-	4164552	4164563



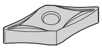
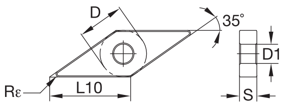
VBMT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VBMT1103021P	6,35	11,07	3,18	0,2	2,80	-	-	-	-	-	-	4166573	4166574
VBMT1103041P	6,35	11,07	3,18	0,4	2,80	4166575	4166576	-	4166578	4166579	4166577	4166580	4166581
VBMT1103081P	6,35	11,07	3,18	0,8	2,80	4166582	4166583	-	4166585	-	4166584	4166586	-
VBMT1604021P	9,53	16,61	4,76	0,2	4,40	4166587	-	-	-	4166589	4166588	4166590	4166591
VBMT1604041P	9,53	16,61	4,76	0,4	4,40	4166592	4166593	-	4166595	4166596	4166594	4166597	4166598
VBMT1604081P	9,53	16,61	4,76	0,8	4,40	4166599	4166600	-	4166602	4166603	4166601	4166604	4166605

WIDIA

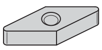
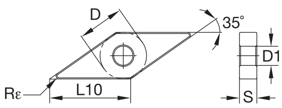
		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

● first choice
○ alternate choice

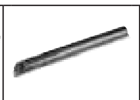
VNGP

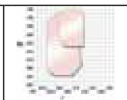
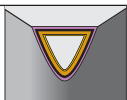
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNGP160401	9,53	16,61	4,76	0,1	3,81	–	–	–	–	–	–	4164795	4164796
VNGP160402	9,53	16,61	4,76	0,2	3,81	–	–	–	–	–	–	4164794	–
VNGP220404	12,70	22,14	4,76	0,4	5,16	–	–	–	–	–	–	4164797	4164798
VNGP220408	12,70	22,14	4,76	0,8	5,16	–	–	–	–	–	–	4164799	4164800

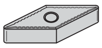
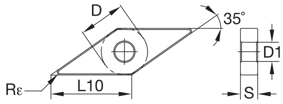
VNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNMA160408	9,53	16,61	4,76	0,8	3,81	–	–	–	–	–	4165849	–	–


C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105

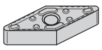
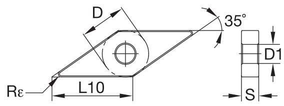



● first choice
○ alternate choice

	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P	●	●	●	○	○	○	○	○
M				●	●		●	●
K	○	○				●	○	○
N							○	○
S				○	○		●	●
H								

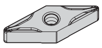
VNMG-2P

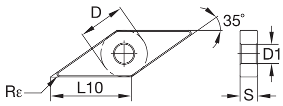
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNMG1604042P	9,53	16,61	4,76	0,4	3,81	4166281	4166282	-	4166284	4166285	4166283	4166286	4166287
VNMG1604082P	9,53	16,61	4,76	0,8	3,81	4166288	4166289	-	4166291	-	4166290	4166292	4166293

VNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNMG1604044P	9,53	16,61	4,76	0,4	3,81	-	5359251	-	4165884	4165885	-	5359252	-
VNMG1604084P	9,53	16,61	4,76	0,8	3,81	-	5359253	-	4165886	4165887	-	5359254	-



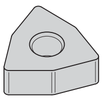


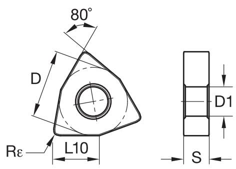
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

VNMG-6P

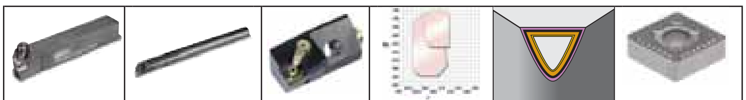
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNMG1604086P	9,53	16,61	4,76	0,8	3,81	4167125	4167126	–	4167127	4167128	–	–	–





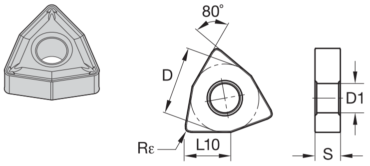
WNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
WNMA060408	9,53	6,52	4,76	0,8	3,81	–	–	–	–	–	4165850	–	–
WNMA080408	12,70	8,69	4,76	0,8	5,16	–	–	–	–	–	4165851	–	–
WNMA080412	12,70	8,69	4,76	1,2	5,16	–	–	–	–	–	4165852	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

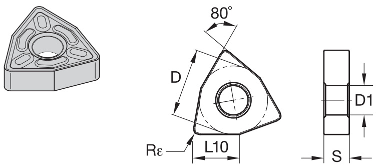


● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

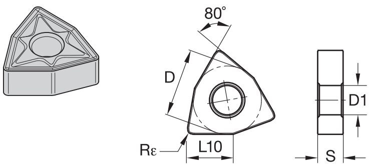
■ WNMG-2P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
WNMG0804042P	12,70	8,69	4,76	0,4	5,16	4166294	4166295	-	4166297	4166298	4166296	4166299	4166300
WNMG0804082P	12,70	8,69	4,76	0,8	5,16	4166301	4166302	-	4166304	-	4166303	4166305	4166306



■ WNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
WNMG0804044P	12,70	8,69	4,76	0,4	5,16	-	-	-	4165888	4165889	-	-	-
WNMG0804084P	12,70	8,69	4,76	0,8	5,16	-	5359255	-	4165890	4165891	-	5359256	-
WNMG0804124P	12,70	8,69	4,76	1,2	5,16	-	-	-	-	4165892	-	-	-

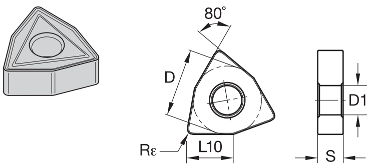


● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

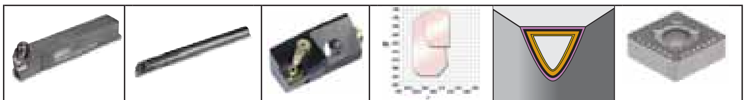
WNMG-6P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
WNMG0604086P	9,53	6,52	4,76	0,8	3,81	4167129	4167130	-	4167131	4167132	-	-	-
WNMG0804086P	12,70	8,69	4,76	0,8	5,16	4167133	4167134	4167135	4167136	4167137	-	-	-
WNMG0804126P	12,70	8,69	4,76	1,2	5,16	4167138	4167139	4167140	4167141	4167142	-	-	-



WNMG-7N

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
WNMG0804087N	12,70	8,69	4,76	0,8	5,16	4166547	4166548	4166549	-	-	4166550	-	-
WNMG0804127N	12,70	8,69	4,76	1,2	5,16	4166551	4166552	4166553	-	-	4166554	-	-
WNMG0804167N	12,70	8,69	4,76	1,6	5,16	-	4166555	4166556	-	-	4166557	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

WIDIA™ Inserts for Machining Aluminium

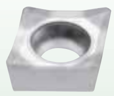
WIDIA offers a series of inserts specifically designed for machining aluminium materials. These inserts are available in both an uncoated and a PVD grade for better performance and better tool life.

Inserts for Aluminium

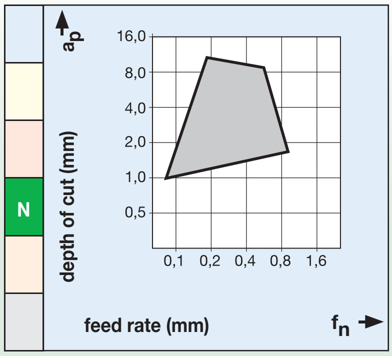
- Easy to choose platform — one geometry and two grades.
- Longer tool life.

Negative Inserts

AL1

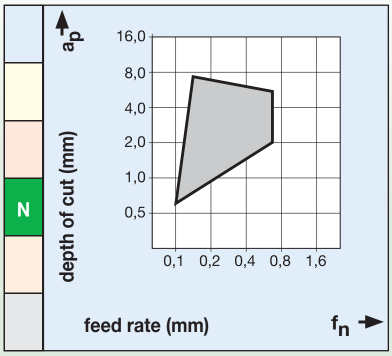


For turning cast aluminium, light alloys, non-ferrous metals, high-melting metals, plastics, glass fibre, reinforced plastics, laminated board, carbon, and fine ceramics.



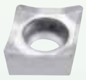
AL3

For cost-effective machining of aluminium, non-ferrous metals, and plastics. Extremely sharp cutting edges result in optimum part finishes with low cutting forces and short chips. Finishing of steel, stainless steel, and grey iron is possible with the coated grade HCK10™.



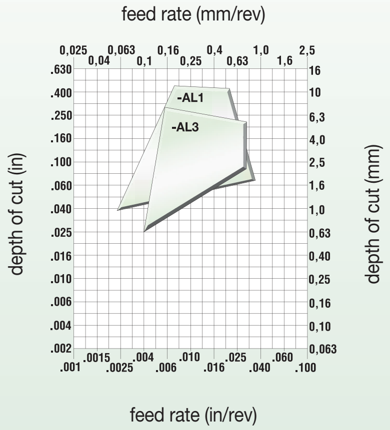
Step 1 • Select the insert geometry

Positive Inserts



AL1

AL3



Step 2 • Select the grade

cutting condition	Positive Insert Geometry -AL1	Positive Insert Geometry -AL3
heavily interrupted cut	HCK10/HWK10	HCK10/HWK15
lightly interrupted cut	HCK10/HWK10	HCK10/HWK15
varying depth of cut, casting, or forging skin	HCK10/HWK10	HCK10/HWK15
smooth cut, pre-turned surface	HCK10/HWK10	HCK10/HWK15

Step 3 • Selecting the cutting speed

Low-Silicon Aluminium Alloys (hypoeutectic <12,2% Si) and Magnesium Alloys

Material Group	grade	250	500	750	1000	1250	1500	1750	2000	2250	2500	Starting Conditions m/min
N2	HCK10											550

speed — m/min

High-Silicon Aluminium Alloys (hypereutectic >12,2% Si) and Magnesium Alloys

Material Group	grade	250	500	750	1000	1250	1500	1750	2000	2250	2500	Starting Conditions m/min
N3	HCK10											550

speed — m/min

Additional cutting speed recommendations for miscellaneous workpiece materials

Copper-, Brass-, Zinc-Based on a Machinability Index Range of 70–100

		speed — m/min				Starting Conditions
Material Group	grade	250	500	750	1000	m/min
N4	HCK10					275
	HWK10/HWK15					260

Nylon, Plastics, Rubbers, Phenolics, Resins, Fibreglass, and Glass

		speed — m/min				Starting Conditions
Material Group	grade	250	500	750	1000	m/min
N5	HCK10					275

Carbon and Graphite Composites:
Brush Alloys, Kevlar, and Graphite (280–400 HB) (30–43 HRC)

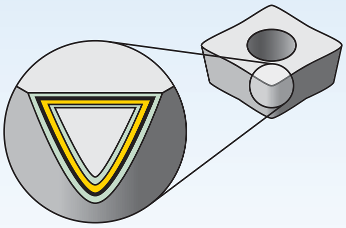
		speed — m/min				Starting Conditions
Material Group	grade	250	500	750	1000	m/min
N6	HCK10					200

MMCs (Aluminium-Based Metal Matrix Composites)

		speed — m/min				Starting Conditions
Material Group	grade	250	500	750	1000	m/min
N7	HCK10					170

Tin Alloys, Cast: ASTM 823, Alloys 1, 2, 3, 11

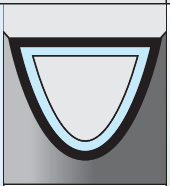
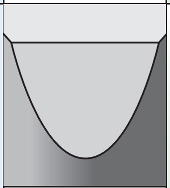
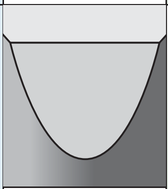
		speed — m/min				Starting Conditions
Material Group	grade	250	500	750	1000	m/min
N8	HCK10					215
	HWK10/HWK15					180

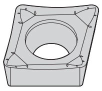


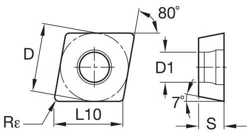
Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟷ toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
HCK10	 HC-N10	Coated carbide. PVD — TIALN-Al_2O_3 on micro-grain carbide. Light and medium machining. For aluminium alloys.	N	■	■	■						
HWK10	 HF-N10	Uncoated carbide. Micro-grain carbide with high cutting edge stability. Light machining. For non-ferrous metals and non-metals.	N	■	■	■	■					
HWK15	 HF-N15	Uncoated carbide. Micro-grain carbide with high cutting edge stability. Light and medium machining. For non-ferrous metals and non-metals.	N		■	■	■					





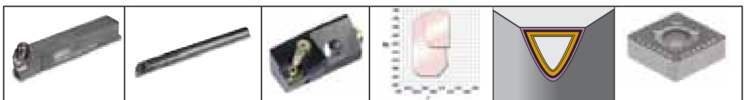
● first choice
○ alternate choice

		HCK10	HWK10	HWK15
P				
M				
K				
N		●	●	●
S				
H				

Inserts

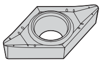
CCGT-AL3

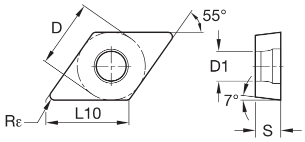
ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
CCGT060202AL3	6,35	6,45	2,38	0,2	2,80	2022257	-	2022258
CCGT060204AL3	6,35	6,45	2,38	0,4	2,80	2022259	-	2022260
CCGT09T302AL3	9,53	9,67	3,97	0,2	4,40	-	-	2022854
CCGT09T304AL3	9,53	9,67	3,97	0,4	4,40	2022261	-	2022262
CCGT09T308AL3	9,53	9,67	3,97	0,8	4,40	-	-	2022858
CCGT120402AL3	12,70	12,90	4,76	0,2	5,50	-	-	2022859
CCGT120404AL3	12,70	12,90	4,76	0,4	5,50	2022323	-	2022324
CCGT120408AL3	12,70	12,90	4,76	0,8	5,50	2022325	-	2022326



C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts



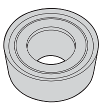


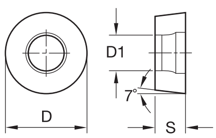
● first choice
○ alternate choice

		HCK10	HWK10	HWK15
P				
M				
K				
N		●	●	●
S				
H				

DCGT-AL3

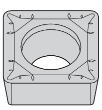
ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
DCGT070202AL3	6,35	7,75	2,38	0,2	2,80	2022327	-	2022328
DCGT070204AL3	6,35	7,75	2,38	0,4	2,80	2022329	-	2022330
DCGT11T302AL3	9,53	11,63	3,97	0,2	4,40	-	-	2022861
DCGT11T304AL3	9,53	11,63	3,97	0,4	4,40	2014890	-	2022331
DCGT11T308AL3	9,53	11,63	3,97	0,8	4,40	2022332	-	2022483

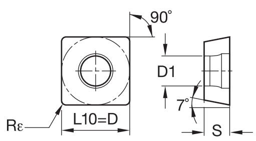




RCGT-AL1

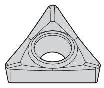
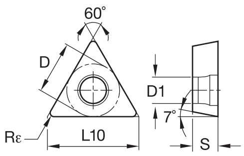
ISO catalogue number	D	S	D1	HCK10	HWK10	HWK15
RCGT0803M0AL1	8,00	3,18	3,40	2002473	2002474	-





SCGT-AL3

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
SCGT120408AL3	12,70	12,70	4,76	0,8	5,50	-	-	2023638

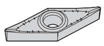
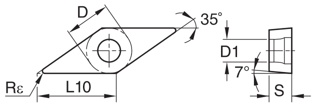
● first choice
○ alternate choice

		HCK10	HWK10	HWK15
P				
M				
K				
N		●	●	●
S				
H				

Inserts

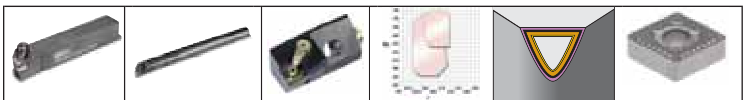
TCGT-AL1

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
TCGT110204AL1	6,35	11,00	2,38	0,4	2,80	-	2006991	-
TCGT16T308AL1	9,53	16,50	3,97	0,8	4,40	-	2007004	-

VCGT-AL3

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
VCGT110302AL3	6,35	11,07	3,18	0,2	2,80	-	-	2024559
VCGT110304AL3	6,35	11,07	3,18	0,4	2,80	-	-	2024561
VCGT160404AL3	9,53	16,61	4,76	0,4	4,40	2022484	-	2022485
VCGT160408AL3	9,53	16,61	4,76	0,8	4,40	2022487	-	2022488
VCGT160412AL3	9,53	16,61	4,76	1,2	4,40	2002503	-	2022489
VCGT220530AL3	12,70	22,14	5,56	3,0	5,50	2002505	-	2002506


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Ceramic, PcBN, and PCD Inserts

Advanced Material Inserts

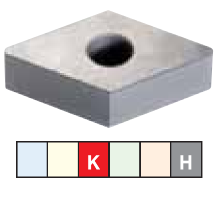
Hard part turning, along with the machining of cast irons, high-temp alloys, and non-ferrous materials, can be accomplished through the use of inserts made from advanced materials. These advanced materials include ceramics, PcBN (polycrystalline cubic boron nitride), and PCD (polycrystalline diamond). WIDIA™ offers:

- Improved performance.
- Greater wear resistance.
- Longer tool life.

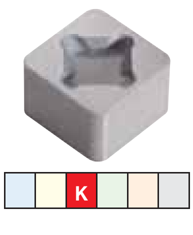
Ceramic Inserts

- Silicon-nitride based ceramic for cast iron machining.
- Mixed ceramic for hard machining and finishing of cast iron.
- Whisker ceramic for high-temp alloy and hard machining.

CW2015 — Mixed Ceramic



CW5025 — Silicon-Nitride Ceramic



PcBN

Solid Inserts

- Inserts are made only from PcBN.
- No material joint.
- Best heat-absorption capacity.
- Can work at highest temperatures.

WBH25P

H

Tipped Inserts

- Require a carrier and a PcBN tip.
- The tips are brazed to a carrier.
- The substrate has to have a pocket that will accommodate and support the tip.

WBH25P

H

PCD

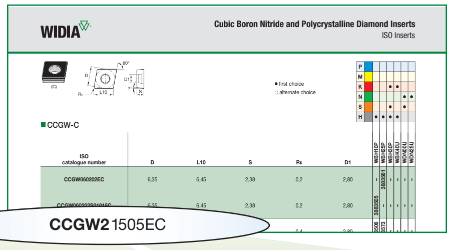
- Targeted machining of non-ferrous materials.
- Significant advantage in hardness over carbide tools.
- Increased productivity through higher speeds and longer tool life.
- Best used in processing materials that are un-machinable with conventional tooling.

WDN25U

N

How Do Catalogue Numbers Work?

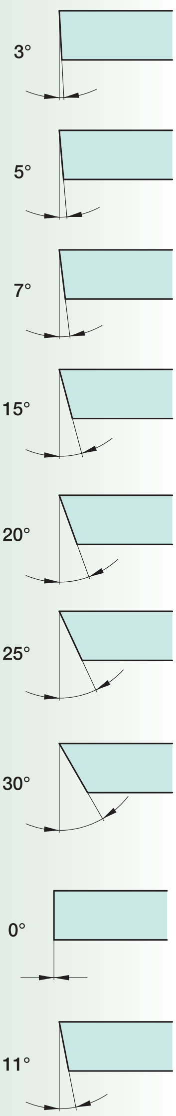
Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



C — Insert Shape

Code	Shape
H	Hexagon 120°
O	Octagon 135°
P	Pentagon 108°
R	Round —
S	Square 90°
T	Triangular 60°
C / D / E / M / V	Rhomboid 80° / 55° / 75° / 86° / 35°
W	Trigon 80° with enlarged corner angles
L	Rectangular 90°
A / B / N/K	Parallelogram 85° / 82° / 55°

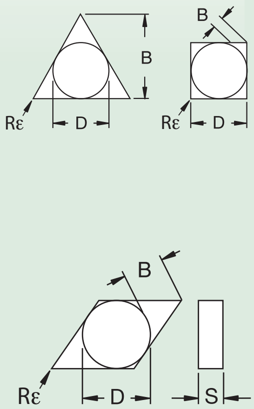
C — Insert Clearance Angle



Code	Angle
A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	For other clearance angles requiring descriptions.

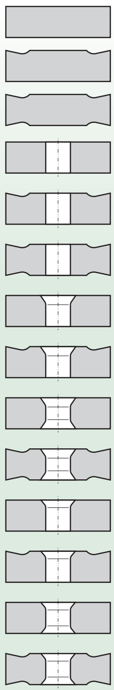
G — Tolerance Class

Tolerances apply prior to edge prep and coating



D = Theoretical diameter of the insert inscribed circle
S = Thickness
B = See figures below

W — Insert Features



X V — Special Design

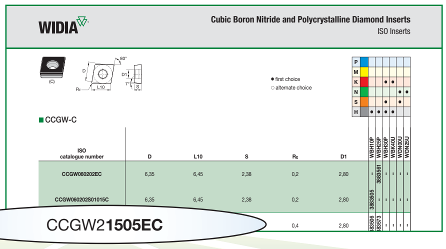
2 — Size

"D" mm	C	D	R	S	T	V	W
	Code for metric cutting edge length "L10"						
3,97	S4	04	03	03	06	—	—
4,76	04	05	04	04	08	08	S3
5,56	05	06	05	05	09	09	03
6,00	—	—	06	—	—	—	—
6,35	06	07	06	06	11	11	04
7,94	08	09	07	07	13	13	05
8,00	—	—	08	—	—	—	—
9,52	09	11	09	09	16	16	06
10,00	—	—	10	—	—	—	—
11,11	11	13	11	11	19	19	07
12,00	—	—	12	—	—	—	—
12,70	12	15	12	12	22	22	08
14,29	14	17	14	14	24	24	09
15,88	16	19	15	15	27	27	10
16,00	—	—	16	—	—	—	—
17,46	17	21	17	17	30	30	11
19,05	19	23	19	19	33	33	13
20,00	—	—	20	—	—	—	—
22,22	22	27	22	22	38	38	15
25,00	—	—	25	—	—	—	—
25,40	25	31	25	25	44	44	17
31,75	32	38	31	31	54	54	21
32,00	—	—	32	—	—	—	—

tolerance class*	tolerance on "D"	tolerance on "B"	tolerance on "S"
C	±0,025	±0,013	±0,025
H	±0,013	±0,013	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,025	±0,013
M	See tables on next page		±0,013
U	See tables on next page		±0,013

**Tolerances apply prior to edge prep and coating.*

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



CCGW2**1505EC**

15	05		E			C	
Thickness "S"	Corner Radius "Rε"	Hand of Insert (optional)	Cutting Edge (optional)	T-Land Width (optional)	T-Land Angle (optional)	Tip Style (optional)	Chipbreaker (optional)

Thickness "S"

symbol mm	thickness mm
–	0,79
T0	1,00
01	1,59
T1	1,98
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94
09	9,52
11	11,11
12	12,70

Corner Radius "Rε"

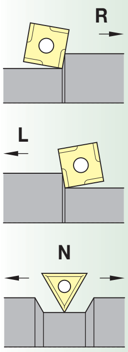
symbol mm	corner radius mm
X0	.04
01	0,1
02	0,2
04	0,4
08	0,8
12	1,2
16	1,6
20	2,0
24	2,4
28	2,8
32	3,2
00	round insert
M0	

Hand of Insert (optional)

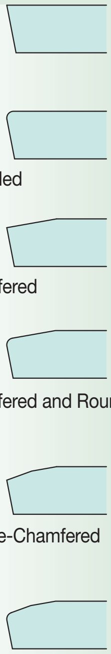
R = Right hand

L = Left hand

N = Neutral



Cutting Edge (optional)



F* Sharp

E Rounded

T* Chamfered

S* Chamfered and Rounded

K Double-Chamfered

P Double-Chamfered and Rounded

**Also available in wiper style.*

T-Land Width (optional)

symbol ISO	mm size
010	0,01
020	0,02

T-Land Angle (optional)

symbol	size
10	10°
15	15°
20	20°
25	25°
30	30°

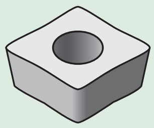
Chipbreaker (optional)

FW = Finishing Wiper

MW = Medium Wiper

Tip Style (optional)

symbol	usage
C	full top
M	mini tip
MT	multi-tip
ST	single tip



"D"	± Tolerance on "D"				"D"	± Tolerance on "B"			
	Class M Tolerance			Class U Tolerance		Class M Tolerance			Class U Tolerance
	Shapes S, T, C, R, & W	Shape D	Shape V	Shapes S, T, & C		Shapes S, T, C, R, & W	Shape D	Shape V	Shapes S, T, & C
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
3,97	0,05	–	–	–	3,97	0,08	–	–	–
4,76	0,05	–	–	0,08	4,76	0,08	–	–	0,13
5,56	0,05	0,05	0,05	0,08	5,56	0,08	0,11	–	0,13
6,35	0,05	0,05	0,05	0,08	6,35	0,08	0,11	–	0,13
7,94	0,05	0,05	0,05	0,08	7,94	0,08	0,11	–	0,13
9,52	0,05	0,05	0,05	0,08	9,52	0,08	0,11	0,18	0,13
11,11	0,08	0,08	0,08	0,13	11,11	0,13	0,15	–	–
12,70	0,08	0,08	0,08	0,13	12,70	0,13	0,15	0,25	0,20
14,29	0,08	0,08	0,08	0,13	14,29	0,13	0,15	–	–
15,88	0,10	0,10	0,10	0,18	15,88	0,15	0,18	–	0,27
17,46	0,10	0,10	0,10	0,18	17,46	0,15	0,18	–	0,27
19,05	0,10	0,10	0,10	0,18	19,05	0,15	0,18	–	0,27
22,22	0,13	–	–	0,25	22,22	0,15	–	–	0,38
25,40	0,13	–	–	0,25	25,40	0,18	–	–	0,38
31,75	0,15	–	–	0,25	31,75	0,20	–	–	0,38

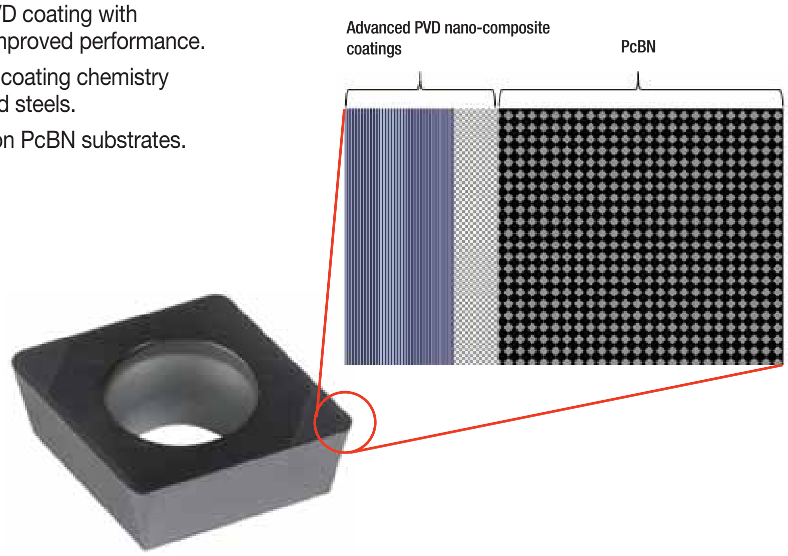
WBH25P for Enhanced Performance — Five Unique Features

1 Newly developed substrate enables application in a wide variety of demanding situations.

The substrate contains superhard grains with a uniquely formulated size distribution and nano-structured binder phase. This unique combination provides an unparalleled balance of wear resistance and toughness. The net result is a robust hard turning tooling solution for a wide range of applications, including continuous to interrupted cutting.

2 Nano-composite coating that enhances speed capabilities and tool life.

- Specially developed, advanced PVD coating with nano-composite architecture for improved performance.
- Improved wear resistance by PVD coating chemistry technology for machining hardened steels.
- Enhanced PVD coating adhesion on PcBN substrates.

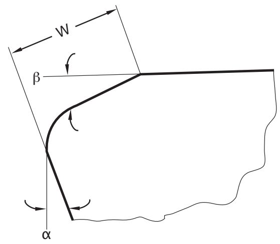


3 Improved edge preparation technology for longer tool life, reliable performance, better surface finish, and tighter workpiece tolerances.

A critical performance factor is the edge preparation itself. The grind direction, surface roughness, hone sizes, and tolerances have great impact on performance and process reliability. WIDIA™ has performed significant research work and optimised edge preparation to improve your overall machining effectiveness.

4 Large standard portfolio.

Standard edge preparation — the optimum combination of T-land angle, T-land width, and hone size — is paramount in achieving maximum performance. WIDIA™ has developed three standard edge configurations, including wiper inserts.



β —T-Land Angle

• Light machining edge prep E.	E: Honed cutting edge
• Medium machining edge prep S01015.	S01015: W x ß = 0,10mm x 15°
• Heavy machining edge prep S01025.	S01025: W x ß = 0,10mm x 25°

These edge preps are available in common styles, sizes, and nose radii in both positive and negative geometries.

5 CB1 chipbreaker in positive and negative geometries, solving chipbreaking and chip control issues.

Chipbreaker — when machining case-hardened steel with a hard outer skin and a tough and softer core, a chipbreaker provides a great advantage. The CB1 chipbreaker is a proven solution to effectively breaking chips. Long chips can form bird nests, causing machine malfunctions, increasing scrap-rates, and reducing the overall equipment effectiveness.

Available as a custom solution product.

Insert without Chipbreaker

- Long chips.
- Bird-nest formation.

Insert with Chipbreaker

- Chips are broken.

Grade Numbering System — Ceramics

CW	2	0	15
Brand	Cutting Material Group		Application Range
CW = WIDIA™	**2** = CM Mixed (black) ceramic **3** = CR Whisker reinforced ceramic **5** = CN Silicon nitride ceramic	**0** = Stationary cutting edges (turning, parting, threading) **1** = First successor **2** = Semi-standard rotating cutting edges **3** = Semi-standard general applications **5** = Rotating cutting edges (milling, drilling, reaming)	**05** = fine finishing **10** = finishing **15** =, **20** =, **25** = medium to roughing **25** =, **30** =, **35** = roughing **35** =, **40** =, **45** =, **50** = heaviest roughing

Grade Numbering System — PcBN and PCD

W	B	H	30	P
Brand	Cutting Material Group	Material Range	Application Range	Coating

W — Brand

WIDIA™

B — Cutting Material Group

- **B** = CBN
- **D** = PCD

H — Material Range

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials
U	Universal Machining

30 — Application Range

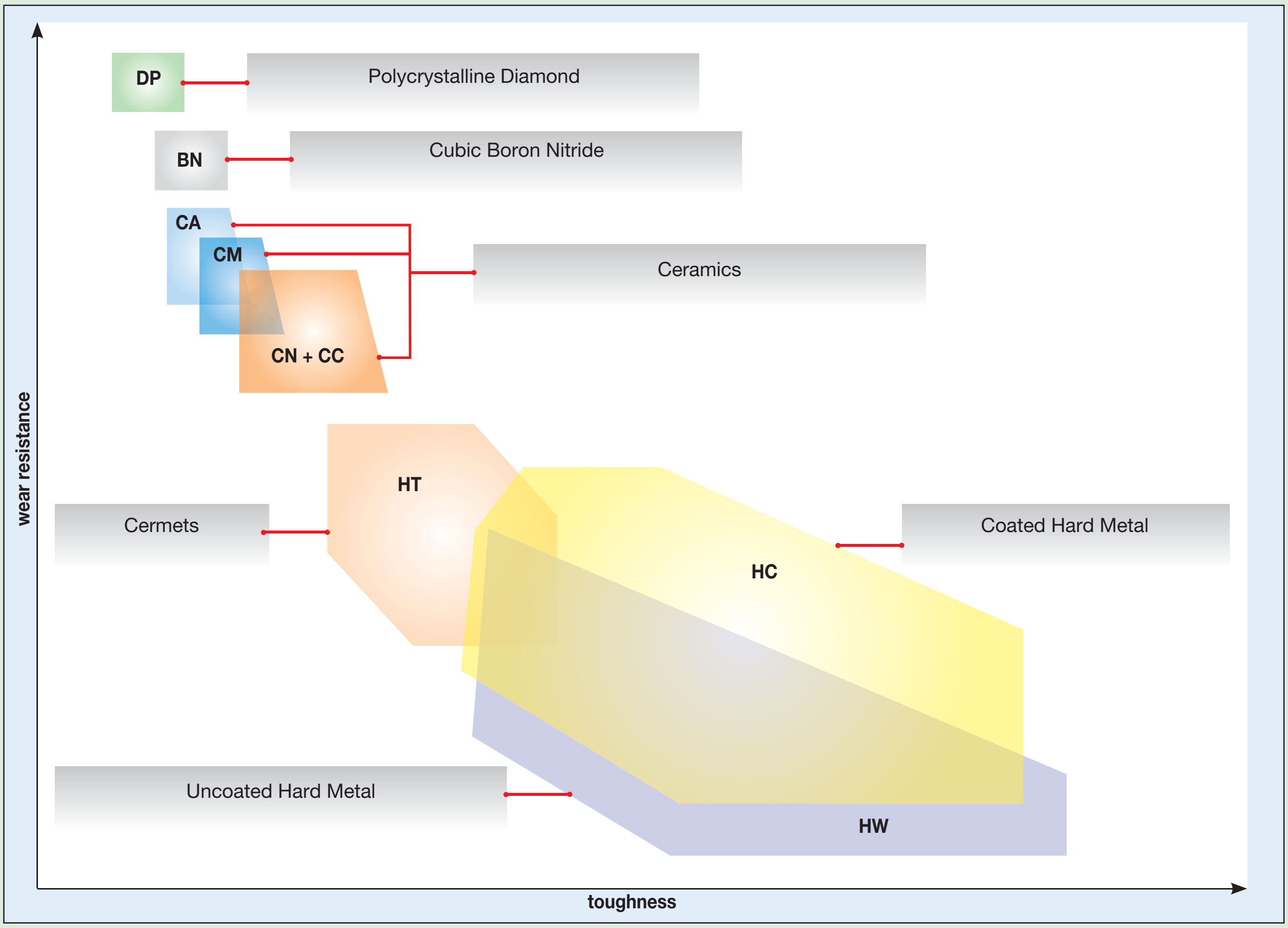
05	=	fine finishing
10	=	finishing
15	=	medium to roughing
20	=	
25	=	
30	=	roughing
35	=	
40	=	heaviest roughing
45	=	
50	=	

P — Coating

- **U** = Uncoated
- **C** = CVD Coated
- **P** = PVD Coated

The cutting tool materials are classified by the combination of their hardness and wear resistance characteristics.

The extended standard DIN ISO 513 also includes ceramic cutting materials and the superhard polycrystalline materials, boron nitride and diamond, resulting in additional identification symbols for these cutting material groups.

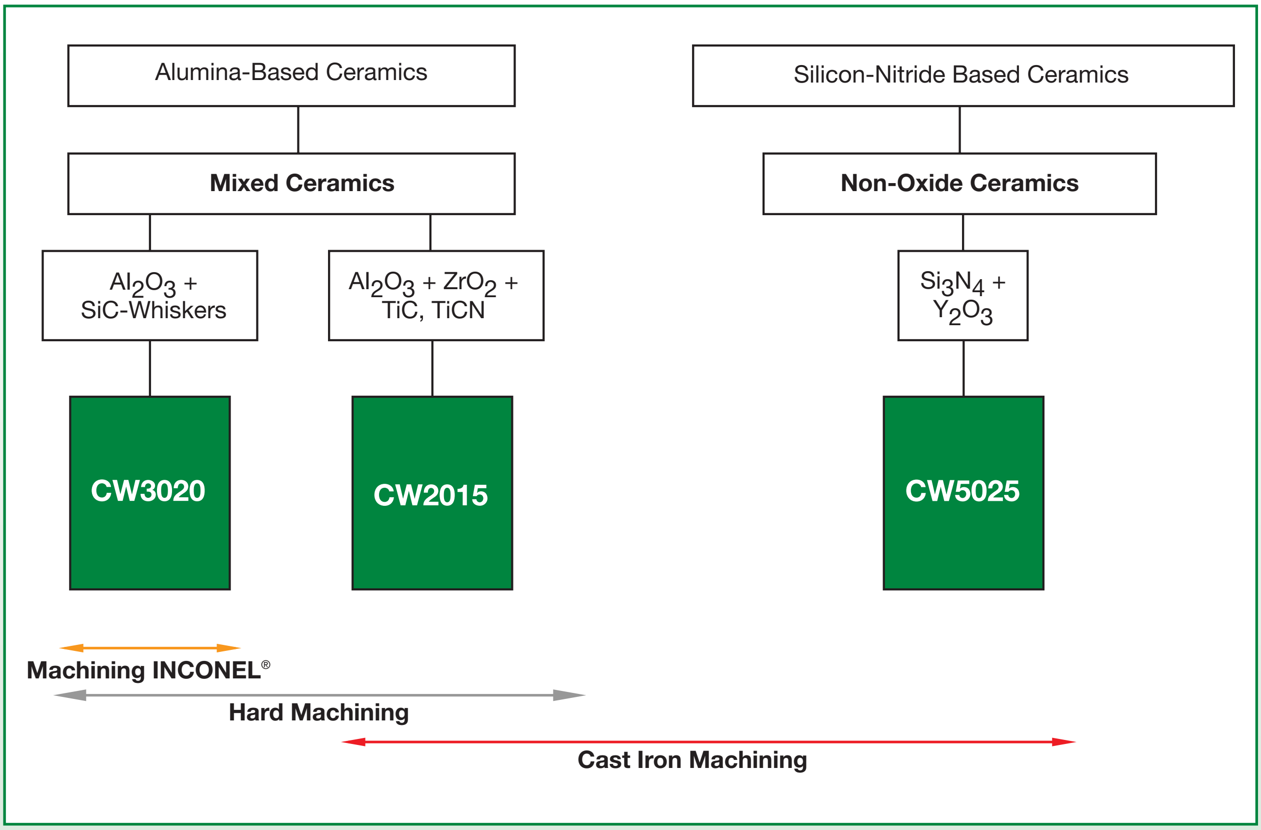


main group	sub-group (symbol)	feature
hard metal	HW	Uncoated WC-base hard metal
	HT	Uncoated TiC/TiN-base hard metal (cermets)
	HC	Coated hard metal
ceramics	CA	Al_2O_3-base oxide ceramics
	CM	Composite ceramics Al_2O_3 + metal carbide
	CN	Si_3N_4-base nitride ceramics
	CC	Coated ceramics
cubic boron nitride	BL	Cubic boron nitride (CBN) with low CBN content
	BH	Cubic boron nitride (CBN) with high CBN content
diamond	DP	Polycrystalline diamond (PCD)

Ceramic Inserts for Hard Turning, Turning in Cast Iron Materials, and Turning in High-Temp Alloys

- Ceramics offer greater wear resistance and toughness.
- Ceramics can be used in high-speed, continuous, and lightly interrupted turning applications in cast iron materials.
- Ceramics can be used for high-speed applications in high-temp alloys.

Ceramic Turning Grades



CW2015™

- Aluminia and titanium carbo-nitride.
- High hardness and wear resistance.
- TiCN increases strength and hardness.
- Black in colour.

CW3020™

- Aluminia + SiC whisker.
- High hardness and wear resistance.
- Whisker ceramic with elongated crystals and very high strength.
- Grey-green colour.

CW5025™

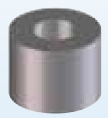
- Pure silicon-nitride composition.
- Used in high-speed turning applications.
- Designed for use in grey cast iron and lower tensile ductile irons.

PcBN Grades for Hard Turning, Powder Metal, and Grey Cast Iron Machining

- PVD-coated grades available.
- Complete range of CBN grades for continuous to heavily interrupted turning.
- Industry-leading grades for grey cast iron machining.
- Full line of grades for hard turning.
- For best performance: solid, full-top, and tipped inserts are available.

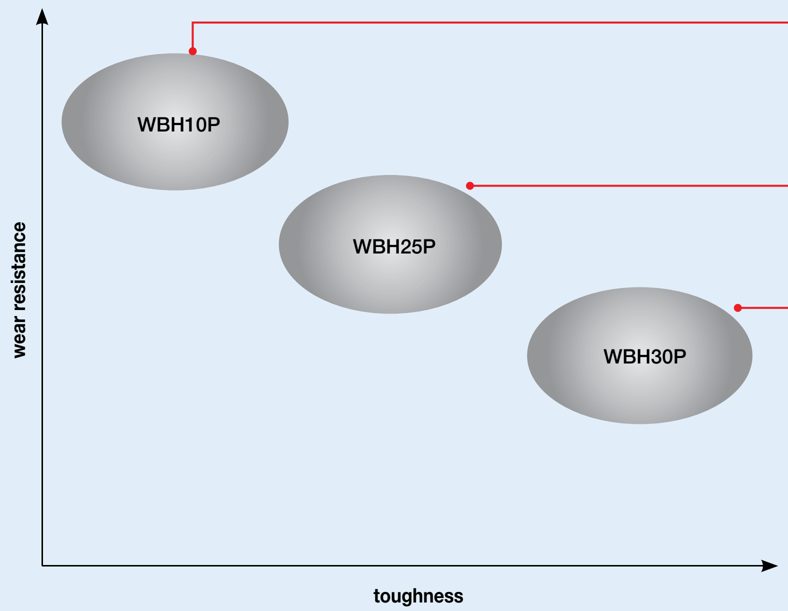
Hard Turning Grades

Low-Content CBN Grades for Fine Finishing in Continuous Cutting



Medium-Content CBN Grades for Continuous to Interrupted Cutting

High-Content CBN Grades for Heavily Interrupted Cuts

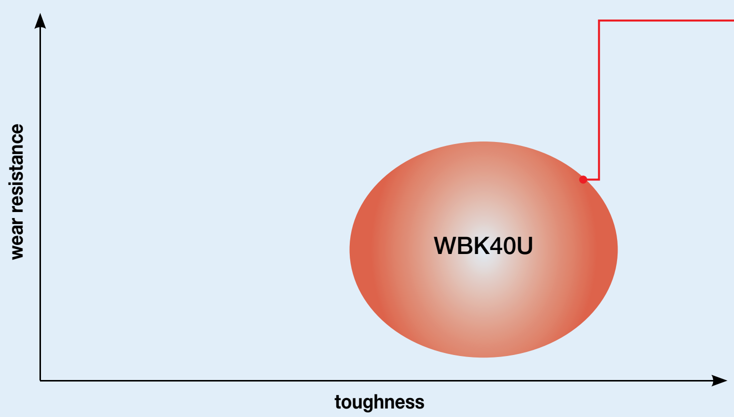


WBH10P™
- PVD-coated low-content grade.
- Coating provides thermal barrier to reduce crater wear.
- High temperature resistant ceramic binder improves high-speed capability.

WBH25P™
- PVD-coated medium-content grade.
- Coating provides thermal barrier to reduce crater wear.
- Withstands moderate interruptions.

WBH30P™
- PVD-coated high-content grade.
- Superior abrasion-resistance.
- Withstands heaviest interruptions.

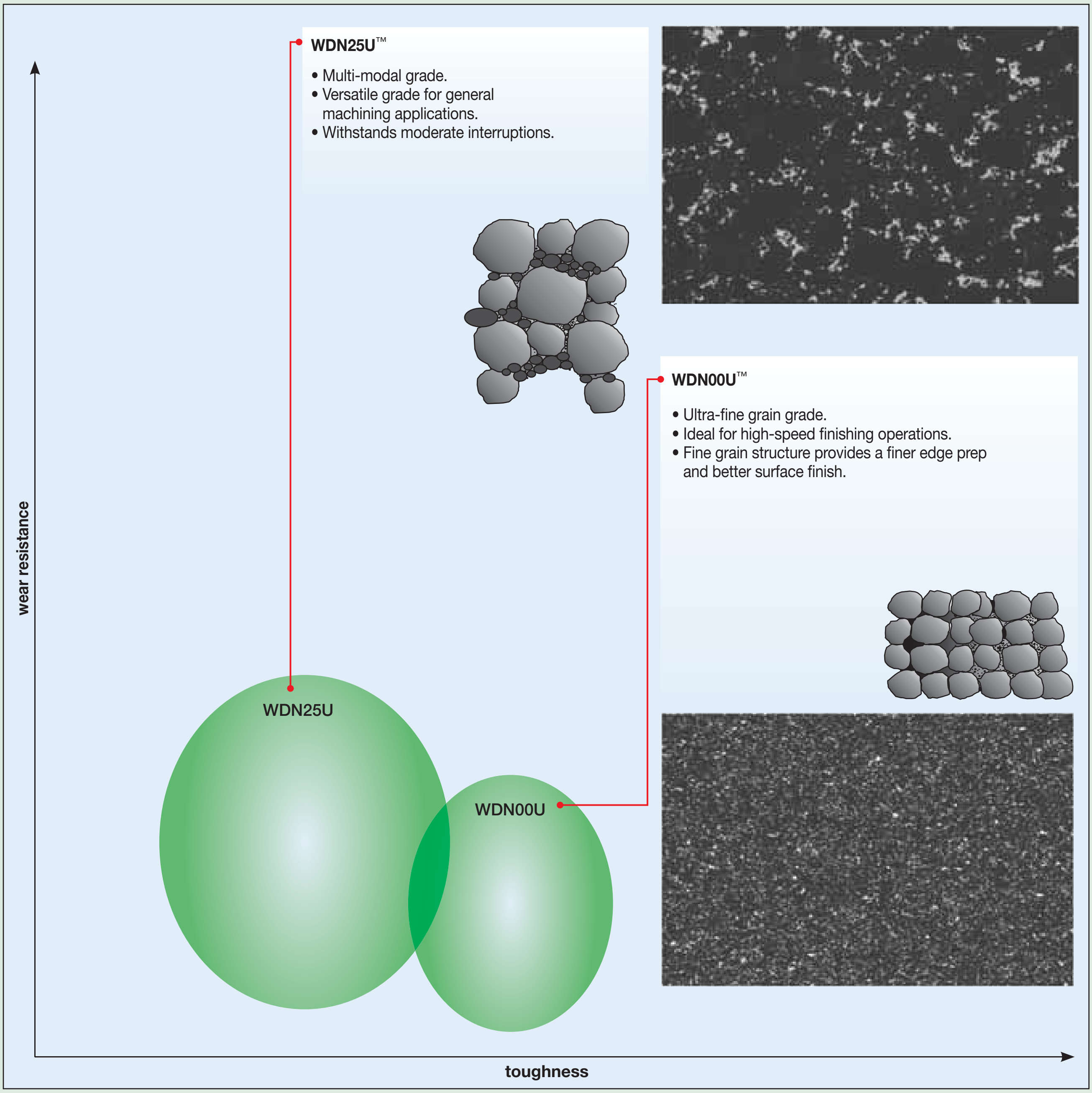
Grey Cast Iron Grades



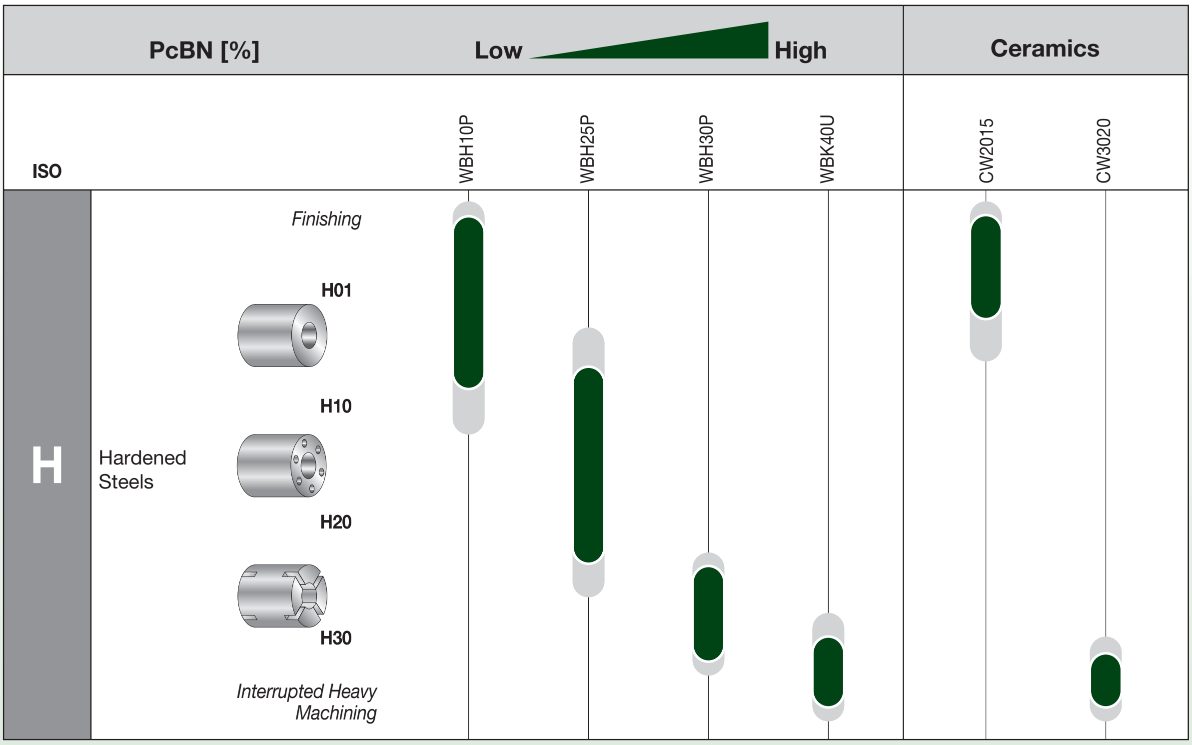
WBK40U™
- Uncoated high-content grade, solid inserts only.
- Superior abrasion-resistance enables high material removal rates.
- Withstands heaviest interruptions.

PCD Grades for Turning Non-Ferrous Materials

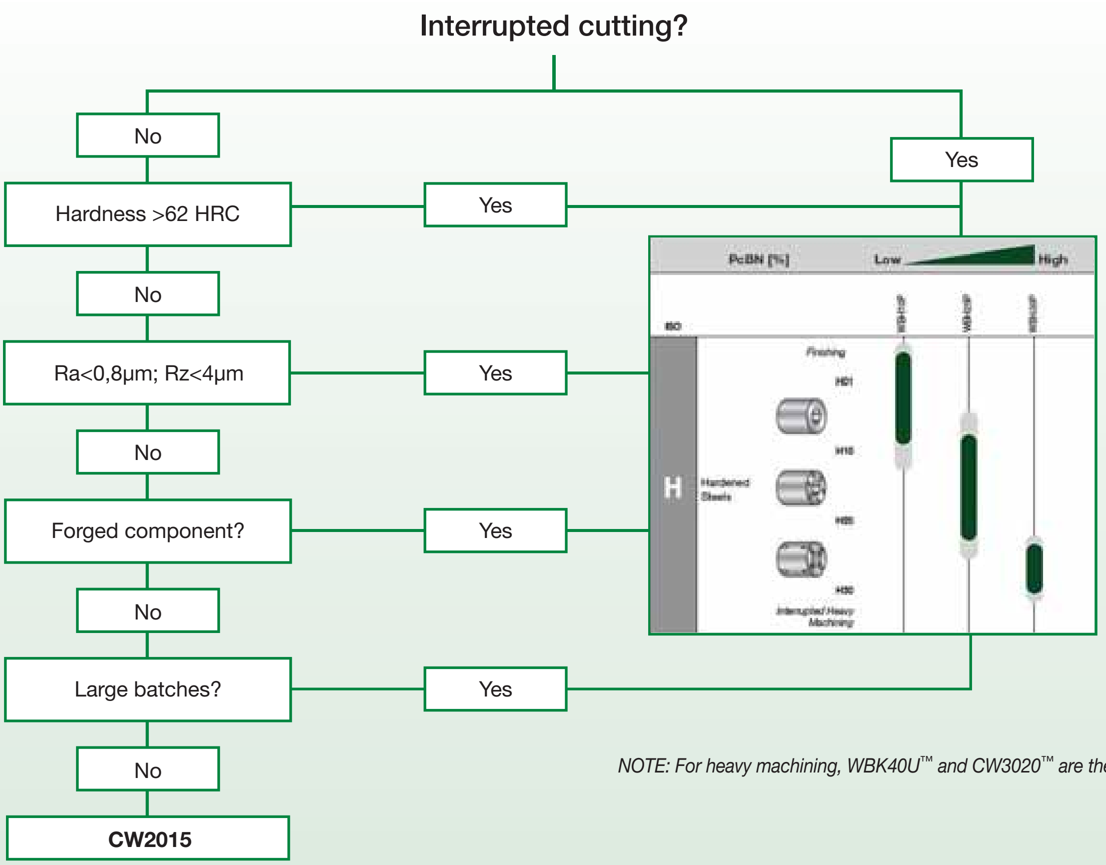
- Two PCD grades — WDN25U and WDN00U — cover a wide range of applications.
- New grades provide outstanding performance to increase productivity and cut manufacturing costs.
- High abrasion and chipping resistance.
- Used in machining aluminium alloys with low- and high-silicon content, copper alloys, ceramics, and plastics.
- Suitable for machining highly abrasive materials such as titanium and Metal Matrix Composites (MMC).



Advanced Materials for Hard Turning

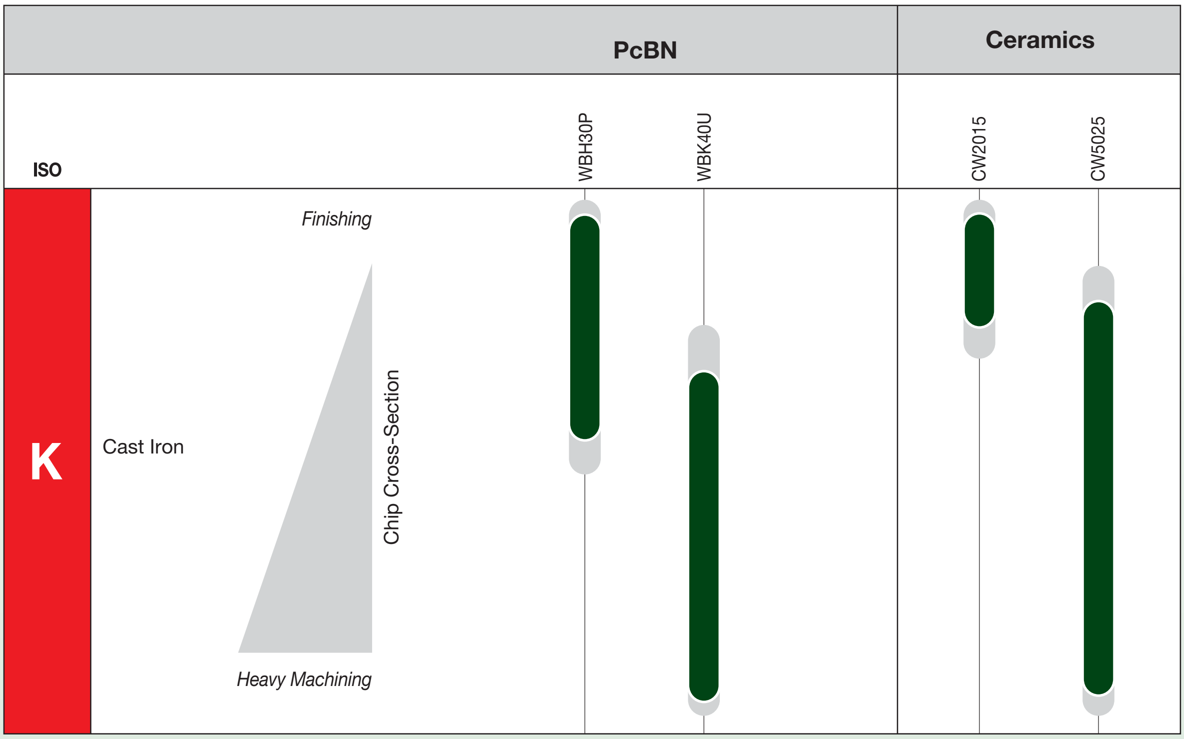


Hard Turning Grade Selection

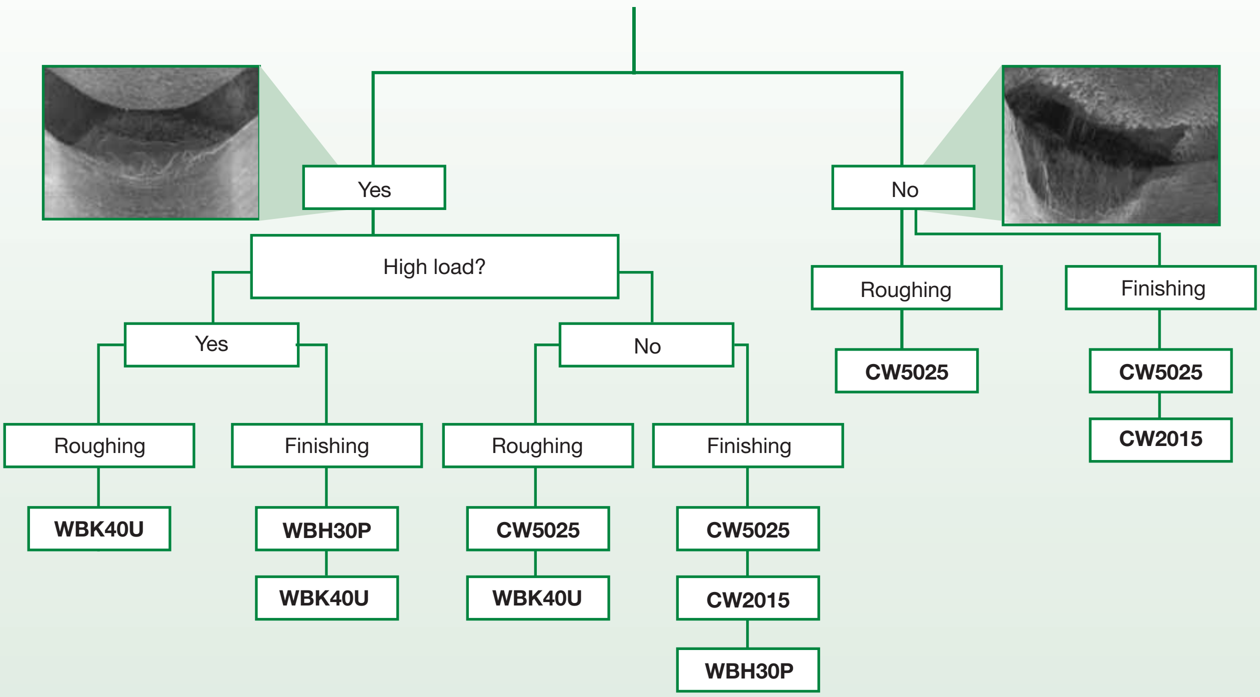


NOTE: For heavy machining, WBK40U™ and CW3020™ are the ideal choices.

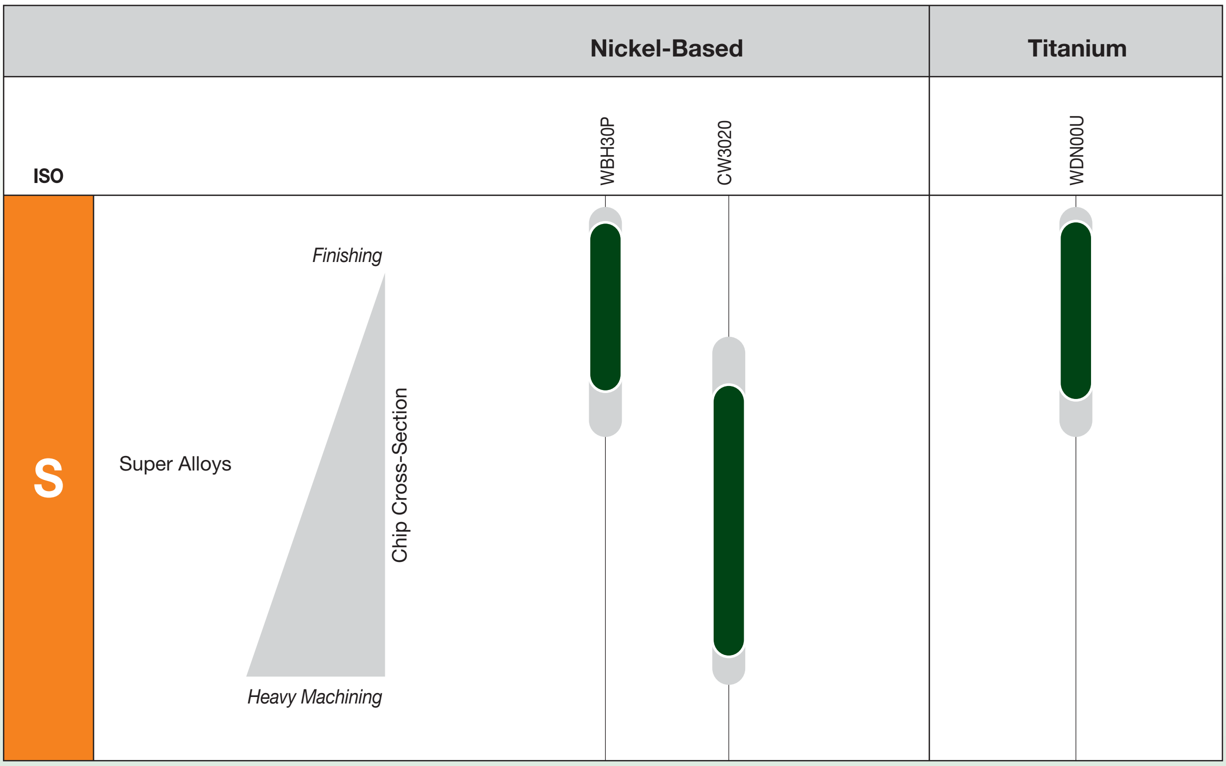
Advanced Materials for Cast Iron Machining



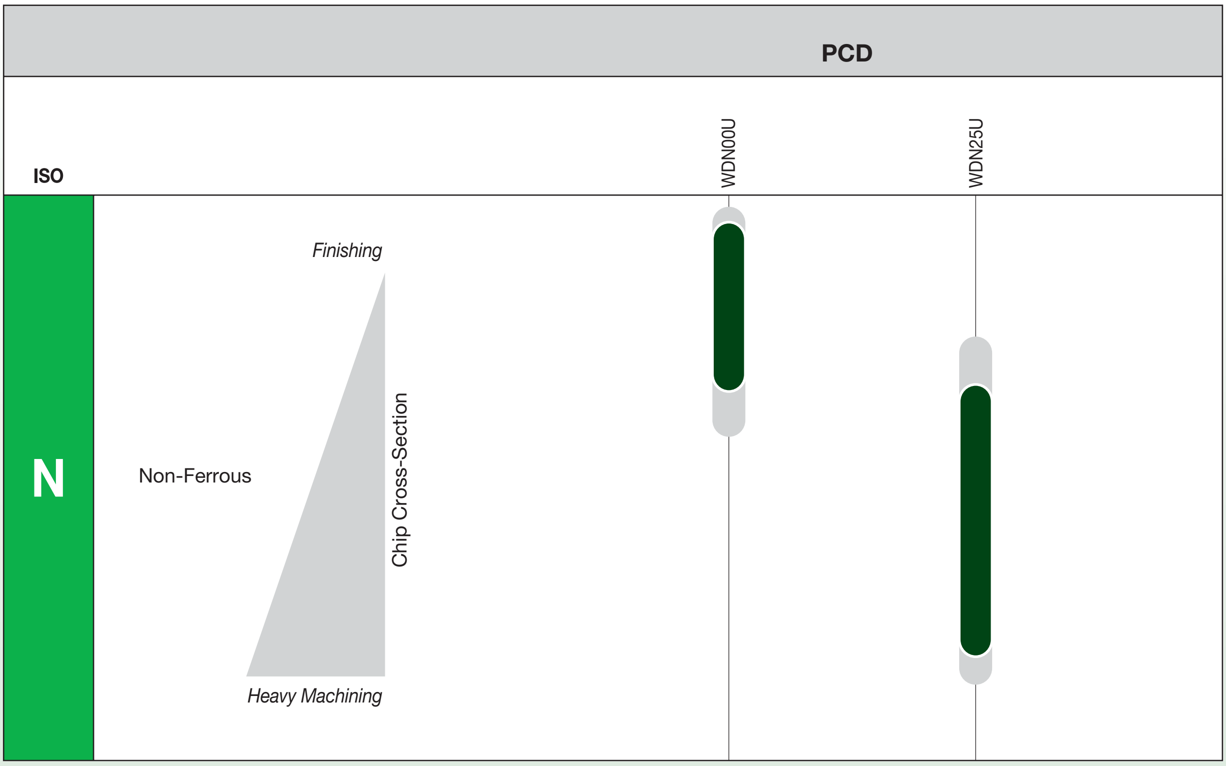
Cast Iron Machining Grade Selection

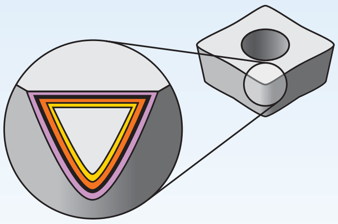


Advanced Materials for High-Temperature Machining



Advanced Materials for Non-Ferrous Machining

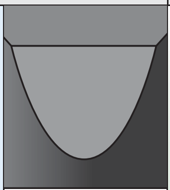
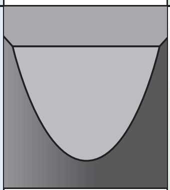
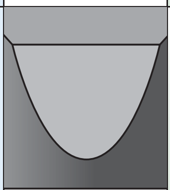
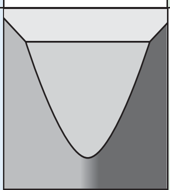
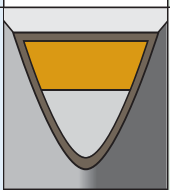


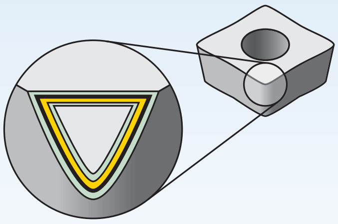


Reduce cycle times. High speed and feed capability. Long tool life. New multi-layer coating provides better wear resistance.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟷ toughness

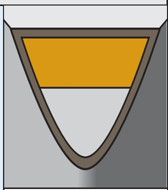
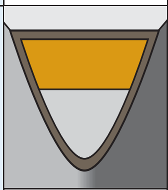
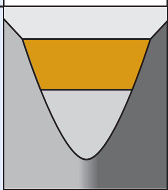
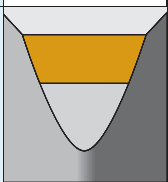
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
CW2015	 CM-H10	Mixed (black) ceramic. Matrix Al_2O_3 and TiCN. Good toughness properties combined with good wear resistance. Semi-finishing and finishing. For hardened iron base materials and grey cast iron (finishing).	K	■	■							
			H	■	■	■						
CW5025	 CN-K15	Silicon-nitride ceramic. Extraordinary toughness properties. Roughing, also in heavily interrupted cuts. Capable of high-performance turning. To be used with or without coolant. For grey cast iron.	K		■	■	■					
CW3020	 C4	Whisker ceramic with a matrix of Al_2O_3 + SiCw. The SiC whiskers embedded in the micro-structure give this ceramic excellent toughness for cutting high-temp alloys and cast materials with high Brinell hardness.	S			■	■	■				
			H			■	■	■	■	■	■	
WBK40U	 BN-K40	A high CBN content, solid CBN insert with multiple cutting edges. Applied in roughing to finishing of fully pearlitic grey cast iron, chilled irons, high-chrome alloyed steels, sintered powdered metals, and heavy cuts in hardened steels (>45 HRC). Use for finishing chilled and fully pearlitic cast iron. Solid inserts offer better security and shock-resistance than tipped inserts, while also enabling deeper depth-of-cut capability.	K						■	■	■	
			H	■	■	■						
WBH10P	 BN-H10	A low content CBN grade with a PVD-TiAlN coating for added wear resistance. Designed for precision machining of hardened steels (>45 HRC); the harder the steel the better. PVD coating offers improved wear resistance and excellent surface finish capability. Effectively applied on bearing steels, hot and cold work tool steels, high-speed steels, die steels, case-hardened steels, carburised and nitrided irons, and some hard coatings.	H	■	■	■						



Reduce cycle times. High speed and feed capability. Long tool life. New multi-layer coating provides better wear resistance.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

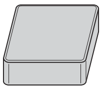
wear resistance ← → toughness

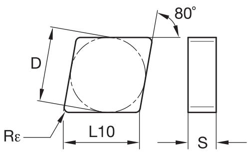
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WBH25P	 BN-H25	A PVD-TiAlN coating over a low content, CBN tip brazed onto a carbide insert. Designed for roughing to finishing of hardened steels (>45 HRC). Use on bearing steel, hot and cold work tool steels, high-speed steels, die steels, case-hardened steels, carburised and nitrided irons, and some hard coatings.	P									
			M									
			K									
			N									
			S									
			H				■	■	■			
WBH30P	 BN-H30	A PVD-TiAlN coating over a low content, CBN tip brazed onto a carbide insert. Designed for roughing to finishing in interrupted cuts on hardened steels (>45 HRC). Applied on grey cast iron, chilled irons, high-chrome alloyed steels, high-temp alloys, and sintered powdered metals.	P									
			M									
			K	■	■	■						
			N									
			S		■	■						
			H					■	■	■		
WDN00U*	 DP-N10	An ultra-fine grained polycrystalline diamond (PCD) tip brazed onto a carbide substrate. Designed for general purpose turning of primarily non-ferrous materials. Applied over a wide range of continuous to interrupted cuts where superior surface finish is needed. Use on low- to medium-silicon content aluminium alloys, non-metallics, copper, brass, and zinc-based alloys. The ultra-fine grained diamond particle size enables superior surface finishes while ensuring the best mechanical shock resistance of any PCD cutting tool.	P									
			M									
			K									
			N	■	■	■						
			S	■								
			H									
WDN25U	 DP-N25	A multi-modal PCD grade with a range of grain sizes brazed onto a carbide substrate. Engineered for extreme abrasion resistance and good edge strength for demanding applications. An ideal choice for high-silicon aluminium alloys, bi-metallic (AL/GCI) materials, MMC, carbon-fibre reinforced plastics, and other abrasive non-metallic materials.	P									
			M									
			K									
			N		■	■	■					
			S									
			H									

*Grade available as Custom Solution only.

Material Group		Cutting Speed — vc m/min								
		CW2015			CW3020			CW5025		
		min	Start	max	min	Start	max	min	Start	max
ap [mm]		0,5		4,0	0,5		4,0	1,0		8,0
f [mm/rev]		0,2		0,4	0,1		5,0	0,2		0,6
P	0	–	**–**	–	–	**–**	–	–	**–**	–
	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–
	5	–	**–**	–	–	**–**	–	–	**–**	–
	6	–	**–**	–	–	**–**	–	–	**–**	–
M	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
K	1	250	**475**	725	–	**–**	–	250	**760**	1000
	2	300	**550**	800	–	**–**	–	275	**365**	490
	3	250	**400**	600	–	**–**	–	275	**335**	440
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	–	–	–	**–**	–	–	**–**	–
	5	–	**–**	–	–	**–**	–	–	**–**	–
	6	–	**–**	–	–	**–**	–	–	**–**	–
	7	–	**–**	–	–	**–**	–	–	**–**	–
	8	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	170	**200**	375	–	**–**	–
	2	–	**–**	–	170	**200**	375	–	**–**	–
	3	–	**–**	–	190	**250**	375	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–
H	1	60	**100**	140	45	**85**	125	–	**–**	–
	2	60	**100**	140	45	**85**	125	–	**–**	–
	3	60	**100**	140	45	**85**	125	–	**–**	–
	4	60	**100**	140	45	**85**	125	–	**–**	–

		Cutting Speed — vc m/min																	
Material Group		WBH10P			WBH25P			WBH30P			WBK40U			WDN00U			WDN25U		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
ap [mm]		0,10		0,50	0,10		0,50	0,08		0,40	0,10		1,50	0,20		2,00	0,20		2,00
f [mm/rev]		0,06		0,25	0,05		0,20	0,05		0,20	0,08		0,20	0,10		0,30	0,10		0,25
P	0/1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
M	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
K	1	–	–	–	–	–	–	400	**600**	800	650	**800**	1200	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	500	**765**	2500	500	**765**	2500
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	350	**580**	1000
	3	–	–	–	–	–	–	–	–	–	–	–	–	250	**520**	1000	250	**520**	1000
	4	–	–	–	–	–	–	–	–	–	–	–	–	250	**400**	750	250	**400**	750
	5	–	–	–	–	–	–	–	–	–	–	–	–	550	**760**	1000	550	**760**	1000
	6	–	–	–	–	–	–	–	–	–	–	–	–	400	**460**	850	400	**365**	750
	7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	120	**160**	200	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	120	**160**	200	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	120	**160**	200	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	100	**180**	320	–	–	–
H	1	80	**170**	260	80	**160**	230	60	**120**	220	60	**120**	220	–	–	–	–	–	–
	2	80	**170**	260	80	**160**	230	60	**120**	220	60	**120**	220	–	–	–	–	–	–
	3	80	**170**	260	80	**160**	230	60	**120**	220	60	**120**	220	–	–	–	–	–	–
	4	80	**170**	260	80	**160**	230	60	**120**	220	60	**120**	220	–	–	–	–	–	–



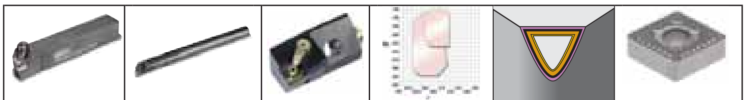


● first choice
○ alternate choice

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

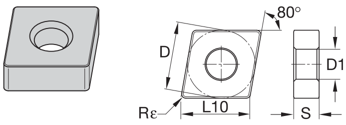
■ CNGN/CNG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGN120404T02020	12,70	12,90	4,76	0,4	—	2952551	-	-
CNGN120408T01020	12,70	12,90	4,76	0,8	—	-	3869578	-
CNGN120408T02020	12,70	12,90	4,76	0,8	—	2952552	-	2952082
CNGN120412T01020	12,70	12,90	4,76	1,2	—	-	3869579	-
CNGN120412T02020	12,70	12,90	4,76	1,2	—	2952603	-	2952113
CNGN120416T01020	12,70	12,90	4,76	1,6	—	-	3869580	-
CNGN120416T02020	12,70	12,90	4,76	1,6	—	2952604	-	2952114
CNGN120712T01020	12,70	12,90	7,94	1,2	—	-	3869581	-
CNGN120712T02020	12,70	12,90	7,94	1,2	—	2952605	-	2952115
CNGN120716T01020	12,70	12,90	7,94	1,6	—	-	3869582	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

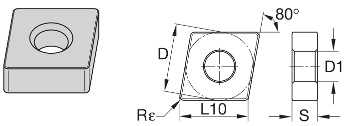


● first choice
○ alternate choice

		CW2015	CW3020	CW5025
P				
M				
K		●		●
N				
S			●	
H		●		

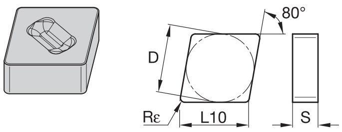
CNGA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGA120404T02020	12,70	12,90	4,76	0,4	5,16	2952526	-	-
CNGA120408T02020	12,70	12,90	4,76	0,8	5,16	2952527	-	2952159
CNGA120412T02020	12,70	12,90	4,76	1,2	5,16	2952528	-	2952161
CNGA120416T02020	12,70	12,90	4,76	1,6	5,16	-	-	2952173
CNGA160612T02020	15,88	16,12	6,35	1,2	6,35	2952529	-	2952174
CNGA160616T02020	15,88	16,12	6,35	1,6	6,35	-	-	2952175
CNGA190612T02020	19,05	19,34	6,35	1,2	7,93	2952530	-	2952176
CNGA190616T02020	19,05	19,34	6,35	1,6	7,93	2952531	-	-



CNGA-FW

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGA120408T01020FW	12,70	12,90	4,76	0,8	5,16	-	-	2952158
CNGA120412T01020FW	12,70	12,90	4,76	1,2	5,16	-	-	2952160
CNGA120416T01020FW	12,70	12,90	4,76	1,6	5,16	-	-	2952162



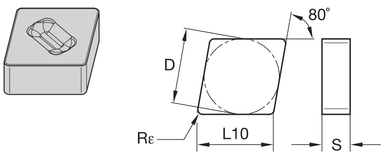
● first choice
○ alternate choice

		CW2015	CW3020	CW5025
P				
M				
K		●		●
N				
S			●	
H		●		

Inserts

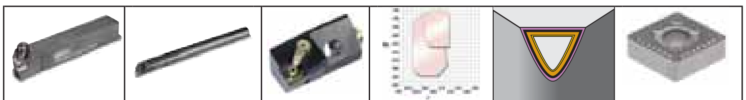
■ CNGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGX120708T02020	12,70	12,90	7,94	0,8	–	I	I	2952117
CNGX120712T02020	12,70	12,90	7,94	1,2	–	I	I	2952119
CNGX160716T02020	15,88	16,12	7,94	1,6	–	I	I	2952121

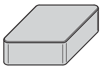


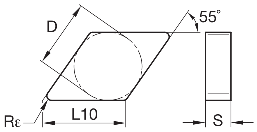
■ CNGX-FW

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGX120712T01020FW	12,70	12,90	7,94	1,2	–	I	I	2952118



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



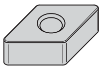
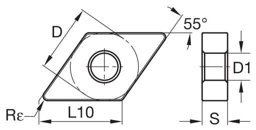


● first choice
○ alternate choice

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

DNGN/DNG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNGN150704T02020	12,70	15,50	7,94	0,4	–	2952607	–	–
DNGN150708T01020	12,70	15,50	7,94	0,8	–	–	3869743	–
DNGN150708T02020	12,70	15,50	7,94	0,8	–	2952608	–	–
DNGN150712T02020	12,70	15,50	7,94	1,2	–	2952609	–	–
DNGN150716T01020	12,70	15,50	7,94	1,6	–	–	3869745	–

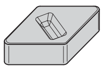
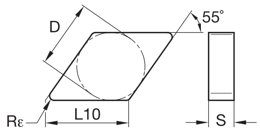



● first choice
○ alternate choice

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

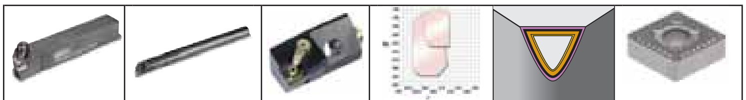
DNGA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNGA150404T02020	12,70	15,50	4,76	0,4	5,16	2952532		
DNGA150408T02020	12,70	15,50	4,76	0,8	5,16	2952533		
DNGA150412T02020	12,70	15,50	4,76	1,2	5,16	2952534		2952184
DNGA150604T02020	12,70	15,50	6,35	0,4	5,16	2952535		
DNGA150608T02020	12,70	15,50	6,35	0,8	5,16	2952536		
DNGA150612T02020	12,70	15,50	6,35	1,2	5,16	2952537		2952185

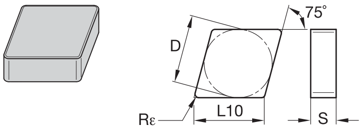
DNGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNGX120712T02020	10,00	12,21	7,94	1,2	–			2952124
DNGX120716T02020	10,00	12,21	7,94	1,6	–			2952125
DNGX150708T02020	12,70	15,50	7,94	0,8	–			2952126
DNGX150712T02020	12,70	15,50	7,94	1,2	–			2952127
DNGX150716T02020	12,70	15,50	7,94	1,6	–			2952128



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

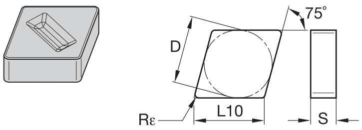


● first choice
○ alternate choice

		CW2015	CW3020	CW5025
P				
M				
K		●		●
N				
S			●	
H		●		

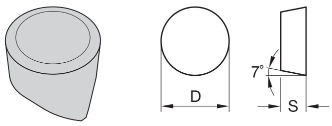
ENGN/ENG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
ENGN130704T02020	12,70	13,15	7,94	0,4	–	2952611	–	–
ENGN130708T02020	12,70	13,15	7,94	0,8	–	2952612	–	–
ENGN130712T02020	12,70	13,15	7,94	1,2	–	2952613	–	–
ENGN130716T02020	12,70	13,15	7,94	1,6	–	2952614	–	–



ENGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
ENGX130716T02020	12,70	13,15	7,94	1,6	–	–	–	2952130

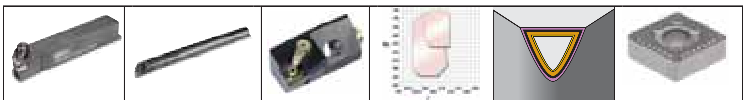


● first choice
○ alternate choice

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

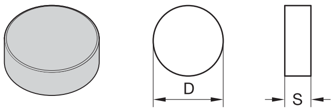
RCGX/RCGV

ISO catalogue number	D	S	CW2015	CW3020	CW5025
RCGX060400T01020	6,35	4,76	-	3869746	-
RCGX090700T02020	9,53	7,92	2952694	-	-
RCGX090700T07015	9,53	7,92	2952695	-	-
RCGX090700T01020	9,53	7,94	2952693	3869747	-
RCGX120700T01020	12,70	7,92	-	3869748	-
RCGX120700T02020	12,70	7,92	2952697	-	-
RCGX120700T20015	12,70	7,92	2952698	-	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

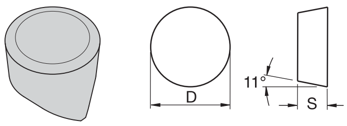


● first choice
○ alternate choice

		CW2015	CW3020	CW5025
P				
M				
K		●		●
N				
S			●	
H		●		

RNGN/RNG

ISO catalogue number	D	S	CW2015	CW3020	CW5025
RNGN090300T01020	9,53	3,18	-	3869749	-
RNGN090400T02020	9,53	4,76	2952615	-	-
RNGN120400T01020	12,70	4,76	-	3869750	-
RNGN120400T02020	12,70	4,76	2952616	-	2952131
RNGN120700T01020	12,70	7,94	-	3869751	-
RNGN120700T02020	12,70	7,94	2952617	-	-
RNGN120700T10015	12,70	7,94	2952618	-	-
RNGN120700T20015	12,70	7,94	2952619	-	-
RNGN150700T02020	15,88	7,94	2952620	-	2952133

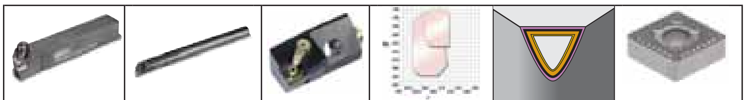


● first choice
○ alternate choice

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

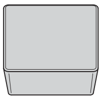
■ RPGV

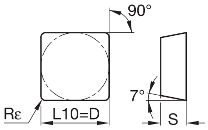
ISO catalogue number	D	S	CW2015	CW3020	CW5025
RPGX060400T01020	6,35	4,78	-	3869753	-
RPGX090700T01020	9,53	7,92	-	3869754	-
RPGX120700T01020	12,70	7,94	-	3869755	-



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



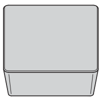


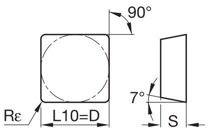
● first choice
○ alternate choice

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

SCGN/SCG

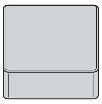
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SCGN090412T00520	9,53	9,53	4,76	1,2	–	ı	ı	2952147

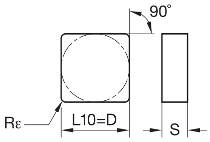




SCUN/SCU

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SCUN120412T00520	12,70	12,70	4,76	1,2	–	2952699	ı	ı





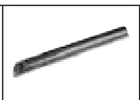
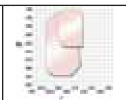
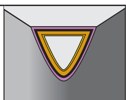
● first choice
○ alternate choice

		CW2015	CW3020	CW5025
P				
M				
K		●		●
N				
S			●	
H		●		

■ SNGN/SNG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGN090308T02020	9,53	9,53	3,18	0,8	–	2952748	–	–
SNGN090412T00515	9,53	9,53	4,76	1,2	–	2952749	–	–
SNGN120408T00520	12,70	12,70	4,76	0,8	–	2952750	–	–
SNGN120408T02020	12,70	12,70	4,76	0,8	–	2952751	–	2952135
SNGN120412T01020	12,70	12,70	4,76	1,2	–	–	3869756	–
SNGN120412T02020	12,70	12,70	4,76	1,2	–	2952752	–	2952136
SNGN120416T01020	12,70	12,70	4,76	1,6	–	–	3869757	–
SNGN120416T02020	12,70	12,70	4,76	1,6	–	–	–	2952137
SNGN120704T02020	12,70	12,70	7,94	0,4	–	2952824	–	–
SNGN120708T02020	12,70	12,70	7,94	0,8	–	2952825	–	–
SNGN120712T00520	12,70	12,70	7,94	1,2	–	2953339	–	–
SNGN120712T01020	12,70	12,70	7,94	1,2	–	–	3869758	–

(continued)

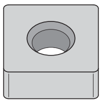
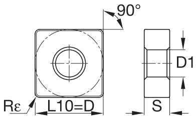
					
C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

(SNGN/SNG — continued)

● first choice
○ alternate choice

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGN120712T02020	12,70	12,70	7,94	1,2	—	2952826	–	2952138
SNGN120716T00520	12,70	12,70	7,94	1,6	—	2953340	–	–
SNGN120716T01020	12,70	12,70	7,94	1,6	—	–	3869759	–
SNGN120716T02020	12,70	12,70	7,94	1,6	—	–	–	2952139
SNGN120720T02020	12,70	12,70	7,94	2,0	—	2952828	–	–
SNGN120720T10015	12,70	12,70	7,94	2,0	—	2952829	–	–
SNGN150712T02020	15,88	15,88	7,94	1,2	—	2952830	–	–
SNGN150716T02020	15,88	15,88	7,94	1,6	—	2952831	–	–
SNGN190720K20015	19,05	19,05	7,94	2,0	—	2952832	–	–
SNGN190720T20015	19,05	19,05	7,94	2,0	—	2952833	–	–

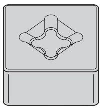
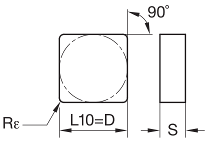



● first choice
○ alternate choice

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

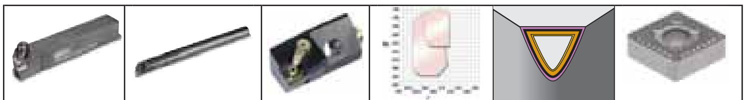
SNGA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGA120408T02020	12,70	12,70	4,76	0,8	5,16	2952538	–	2952187
SNGA120412T02020	12,70	12,70	4,76	1,2	5,16	2952539	–	2952188
SNGA120416T02020	12,70	12,70	4,76	1,6	5,16	2952540	–	2952189
SNGA150612T02020	15,88	15,88	6,35	1,2	6,35	–	–	2952190
SNGA150616T02020	15,88	15,88	6,35	1,6	6,35	–	–	2952191

SNGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGX120708T02020	12,70	12,70	7,94	0,8	–	–	–	2952140
SNGX150716T02020	15,88	15,88	7,94	1,6	–	–	–	2952144

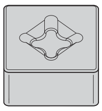


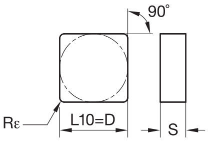
C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

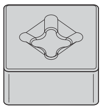
● first choice
○ alternate choice

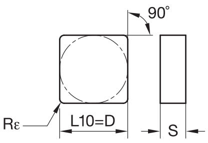




SNGX-FW

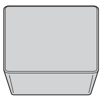
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGX120712T01020FW	12,70	12,70	7,94	1,2	–	ı	ı	2952141





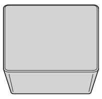
SNMX

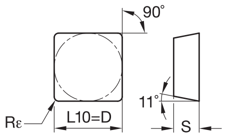
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNMX120712T02020	12,70	12,70	7,94	1,2	–	ı	ı	2952069
SNMX120716T02020	12,70	12,70	7,94	1,6	–	ı	ı	2952070
SNMX150716T02020	15,88	15,88	7,94	1,6	–	ı	ı	2952071



SPGN-T/SPG-T

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SPGN090308T01020	9,53	9,53	3,18	0,8	–	2952700	ı	ı
SPGN120304T01020	12,70	12,70	3,18	0,4	–	2952701	ı	ı
SPGN120308T01020	12,70	12,70	3,18	0,8	–	2952702	ı	ı





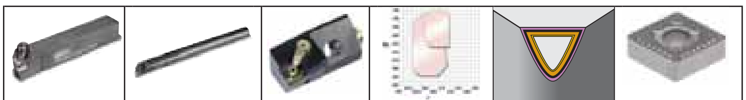
● first choice
○ alternate choice

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

Inserts

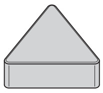
SPUN-T

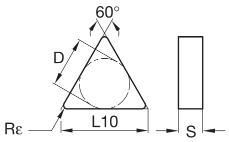
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SPUN120304T00520	12,70	12,70	3,18	0,4	–	2952703	–	–
SPUN120308T00520	12,70	12,70	3,18	0,8	–	2952704	–	–
SPUN120312T00520	12,70	12,70	3,18	1,2	–	2952705	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



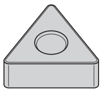


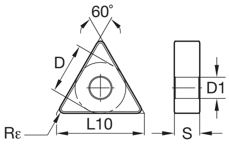
● first choice
○ alternate choice

	CW2015	CW3020	CW5025
P			
M			
K	●		●
N			
S		●	
H	●		

TNGN/TNG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
TNGN160404T02020	9,53	16,50	4,76	0,4	–	2952835	–	–
TNGN160408T01020	9,53	16,50	4,76	0,8	–	–	3869761	–
TNGN160408T02020	9,53	16,50	4,76	0,8	–	2952836	–	2952072
TNGN160412T02020	9,53	16,50	4,76	1,2	–	2952837	–	2952153
TNGN160416T02020	9,53	16,50	4,76	1,6	–	2952838	–	–
TNGN160708T02020	9,53	16,50	7,94	0,8	–	2952839	–	–
TNGN160712T02020	9,53	16,50	7,94	1,2	–	2952840	–	–
TNGN220408T02020	12,70	22,00	4,76	0,8	–	2952841	–	–
TNGN220416T02020	12,70	22,00	4,76	1,6	–	–	–	2952154



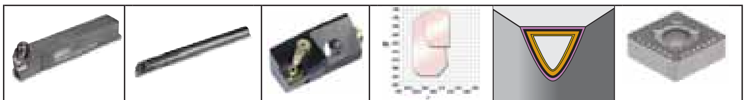


● first choice
○ alternate choice

		CW2015	CW3020	CW5025
P				
M				
K		●		●
N				
S			●	
H		●		

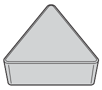
TNGA

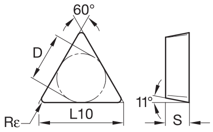
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
TNGA160408T02020	9,53	16,50	4,76	0,8	3,81	2952541	-	2952195
TNGA160412T02020	9,53	16,50	4,76	1,2	3,81	2952542	-	2952196
TNGA160416T02020	9,53	16,50	4,76	1,6	3,81	2952543	-	2952197
TNGA220408T02020	12,70	22,00	4,76	0,8	5,16	2952544	-	-



C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts



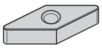
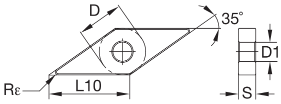


● first choice
○ alternate choice

		CW2015	CW3020	CW5025
P				
M				
K		●		●
N				
S			●	
H		●		

TPG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
TPGN110304T01020	6,35	11,00	3,18	0,4	–	2952706	–	–
TPGN110308T01020	6,35	11,00	3,18	0,8	–	2952707	–	–
TPGN110312T01020	6,35	11,00	3,18	1,2	–	2952708	–	–
TPGN160304T00520	9,53	16,50	3,18	0,4	–	2952709	–	–
TPGN160304T01020	9,53	16,50	3,18	0,4	–	2952710	–	–
TPGN160308T00520	9,53	16,50	3,18	0,8	–	2952711	–	–
TPGN160308T01020	9,53	16,50	3,18	0,8	–	2952712	–	–
TPGN160308T02020	9,53	16,50	3,18	0,8	–	–	–	2952155
TPGN160312T01020	9,53	16,50	3,18	1,2	–	2952713	–	–
TPGN160312T02020	9,53	16,50	3,18	1,2	–	–	–	2952156

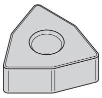
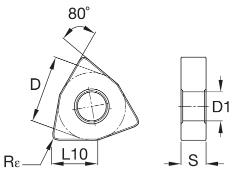



● first choice
○ alternate choice

		CW2015	CW3020	CW5025
P				
M				
K		●		●
N				
S			●	
H		●		

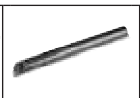
VNGA

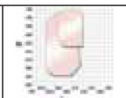
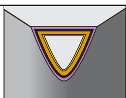
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
VNGA160404T02020	9,53	16,61	4,76	0,4	3,81	2952545	–	–
VNGA160408T02020	9,53	16,61	4,76	0,8	3,81	2952546	–	2952198
VNGA160412T02020	9,53	16,61	4,76	1,2	3,81	2952547	–	–
VNGA220408T02020	12,70	22,14	4,76	0,8	5,16	2952548	–	–

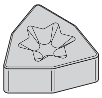
WNGA

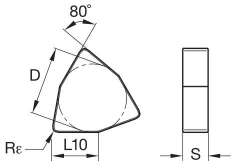
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
WNGA080408T02020	12,70	8,69	4,76	0,8	5,16	–	–	2952199
WNGA080412T02020	12,70	8,69	4,76	1,2	5,16	–	–	2952200
WNGA080416T02020	12,70	8,69	4,76	1,6	5,16	–	–	2952201


C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105



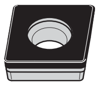


● first choice
○ alternate choice

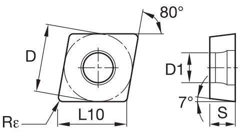
		CW2015	CW3020	CW5025
P				
M				
K		●		●
N				
S			●	
H		●		

WNGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
WNGX080712T02020	12,70	8,69	7,94	1,2	–	–	–	2952157



(C)

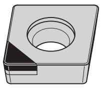


● first choice
○ alternate choice

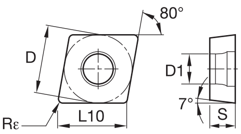
		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

CCGW-C

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CCGW060202EC	6,35	6,45	2,38	0,2	2,80	-	3883561	-	-	-	-
CCGW060202S01015C	6,35	6,45	2,38	0,2	2,80	3883505	-	-	-	-	-
CCGW060204S01015C	6,35	6,45	2,38	0,4	2,80	3883506	3883573	-	-	-	-
CCGW09T304S01015C	9,53	9,67	3,97	0,4	4,40	-	3883575	-	-	-	-
CCGW09T308S01015C	9,53	9,67	3,97	0,8	4,40	-	3883577	-	-	-	-

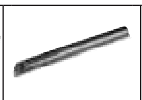


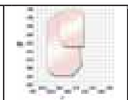
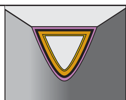
(FST)



CCGW-FST

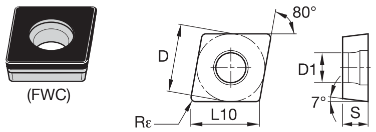
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CCGW060204FST	6,35	6,45	2,38	0,4	2,80	-	-	-	-	5885722	3898746
CCGW09T304FST	9,53	9,67	3,97	0,4	4,40	-	-	-	-	5885723	3898749
CCGW09T308FST	9,53	9,67	3,97	0,8	4,40	-	-	-	-	5885724	3898750


C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105

Inserts

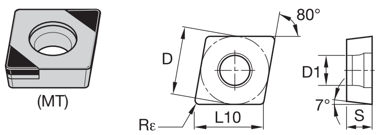


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

■ CCGW-FWC

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CCGW060202EFWC	6,35	6,45	2,38	0,2	2,80	-	3883560	-	-	-	-
CCGW060204EFWC	6,35	6,45	2,38	0,4	2,80	-	3883562	-	-	-	-
CCGW09T304EFWC	9,53	9,67	3,97	0,4	4,40	-	3883574	-	-	-	-
CCGW09T308EFWC	9,53	9,67	3,97	0,8	4,40	-	3883576	-	-	-	-

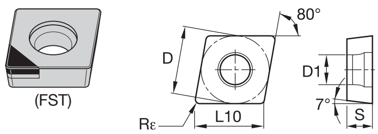


■ CCGW-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CCGW09T304S01015MT	9,52	9,67	3,99	0,4	4,40	3883507	-	-	-	-	-
CCGW09T308S01015MT	9,52	9,67	3,99	0,8	4,40	3883508	-	6018004	-	-	-

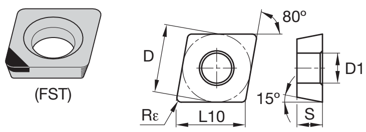
	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P						
M						
K			●	●		
N					●	●
S			●		●	
H	●	●	●	●		

● first choice
○ alternate choice



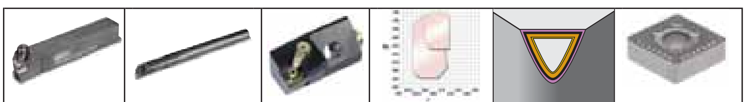
CCMW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CCMW060204FST	6,35	6,45	2,38	0,4	2,80	–	–	–	–	–	3883135
CCMW060208FST	6,35	6,45	2,38	0,8	2,80	–	–	–	–	–	3883133
CCMW09T304FST	9,53	9,67	3,97	0,4	4,40	–	–	–	–	–	3883134
CCMW09T308FST	9,53	9,67	3,97	0,8	4,40	–	–	–	–	–	3883136



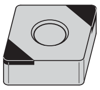
CDHB-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CDHBS4T002FST	3,97	4,03	1,02	0,1	2,13	–	–	–	–	–	3898745
CDHBS4T004FST	3,97	4,03	1,02	0,2	2,13	–	–	–	–	–	3898744

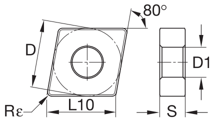


C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts



(EMT)

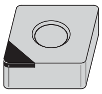


● first choice
○ alternate choice

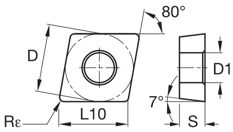
		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

CNGA-EMT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNGA120408EMT	12,70	12,90	4,76	0,8	5,16	-	3883363	-	-	-	-
CNGA120412EMT	12,70	12,90	4,76	1,2	5,16	-	3883364	-	-	-	-

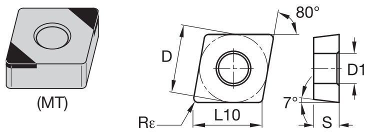


(FST)



CNGA-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNGA120404FST	12,70	12,90	4,76	0,4	5,16	-	-	-	-	5885725	3898726
CNGA120408FST	12,70	12,90	4,76	0,8	5,16	-	-	-	-	5885726	3898727



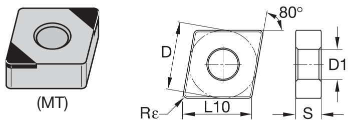
● first choice
○ alternate choice

P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

Inserts

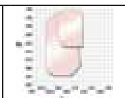
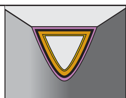
■ CNGA-FW/MW MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNGA120404EFWMT	12,70	12,90	4,76	0,4	5,15	–	3883356	–	–	–	–
CNGA120408EFWMT	12,70	12,90	4,76	0,8	5,16	–	3883912	–	–	–	–
CNGA120408S01025FWMT	12,70	12,90	4,78	0,8	5,16	3883523	–	–	–	–	–

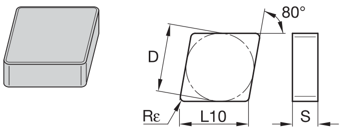


■ CNGA-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNGA120404S01025MT	12,70	12,90	4,78	0,4	5,16	3883509	3883885	6018006	–	–	–
CNGA120408S01025MT	12,70	12,90	4,78	0,8	5,16	3883510	3883886	6018008	–	–	–
CNGA120412S01020MT	12,70	12,90	4,78	1,2	5,16	–	–	6018009	–	–	–
CNGA120412S01025MT	12,70	12,90	4,78	1,2	5,16	3883511	3883887	6018010	–	–	–

					
C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts

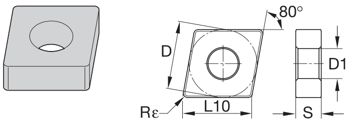


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

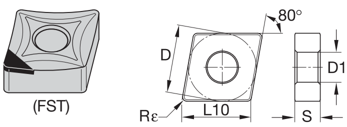
CNMN

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNMN090312S02020	9,53	9,67	3,18	1,2	—	ı	ı	ı	3883278	ı	ı
CNMN120408S02020	12,70	12,90	4,76	0,8	—	ı	ı	ı	3883279	ı	ı
CNMN120412S02020	12,70	12,90	4,76	1,2	—	ı	ı	ı	3883280	ı	ı



CNMA

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNMA120408S02020	12,70	12,90	4,76	0,8	5,16	ı	ı	ı	3883281	ı	ı
CNMA120412S02020	12,70	12,90	4,76	1,2	5,16	ı	ı	ı	3883282	ı	ı

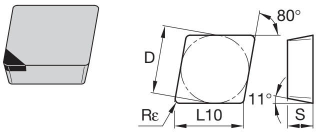


CNMS-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNMS120408FST	12,70	12,90	4,76	0,8	5,16	ı	ı	ı	ı	ı	3898729

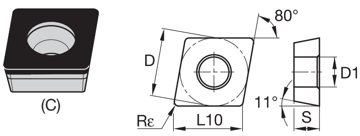
		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

● first choice
○ alternate choice



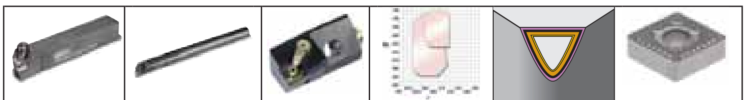
CPGN

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPGN120304F	12,70	12,90	3,18	0,4	—	–	–	–	–	–	3898717
CPGN120308F	12,70	12,90	3,18	0,8	—	–	–	–	–	–	3898718



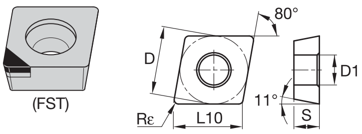
CPGW-C

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPGW060202EC	6,35	6,45	2,38	0,2	2,80	–	3883578	–	–	–	–
CPGW060202S01015C	6,35	6,45	2,38	0,2	2,80	3883524	–	6018081	–	–	–
CPGW060204S01015C	6,35	6,45	2,38	0,4	2,80	3883525	3883579	6018082	–	–	–
CPGW060208S01015C	6,35	6,45	2,38	0,8	2,80	–	3883580	–	–	–	–
CPGW09T304S01015C	9,53	9,67	3,97	0,4	4,40	–	3883581	–	–	–	–
CPGW09T308S01015C	9,53	9,67	3,97	0,8	4,40	–	3883584	–	–	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

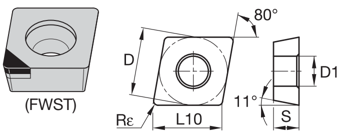


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

CPGW-FST

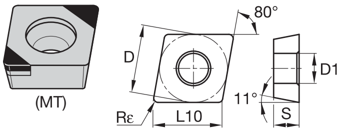
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPGW060202FST	6,35	6,45	2,38	0,2	2,80	–	–	–	–	–	3898751
CPGW060204FST	6,35	6,45	2,38	0,4	2,80	–	–	–	–	–	3898752
CPGW060208FST	6,35	6,45	2,38	0,8	2,80	–	–	–	–	–	3898753
CPGW09T304FST	9,53	9,67	3,97	0,4	4,40	–	–	–	–	–	3898754
CPGW09T308FST	9,53	9,67	3,97	0,8	4,40	–	–	–	–	–	3898755
CPGW120404FST	12,70	12,90	4,76	0,4	5,50	–	–	–	–	–	3898756
CPGW120408FST	12,70	12,90	4,76	0,8	5,50	–	–	–	–	–	3898757



CPGW-FWST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPGW060204FWST	6,35	6,45	2,38	0,4	2,80	–	–	–	–	5885758	3898758
CPGW09T308FWST	9,53	9,67	3,97	0,8	4,40	–	–	–	–	5885759	3898759
CPGW120408FWST	12,70	12,90	4,76	0,8	5,50	–	–	–	–	5885760	3898760

Inserts

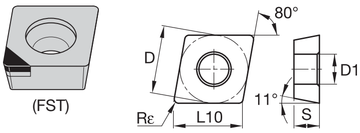


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

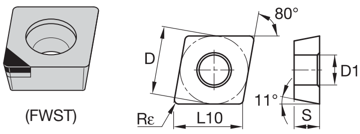
CPGW-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPGW09T304S01015MT	9,53	9,67	3,99	0,4	4,40	3883526	-	6018084	-	-	-
CPGW09T308S01015MT	9,53	9,67	3,99	0,8	4,40	3883527	-	6018085	-	-	-



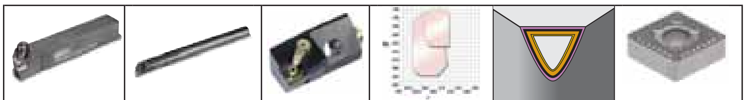
CPMW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPMW050204FST	5,56	5,65	2,38	0,4	2,50	-	-	-	-	-	3883139
CPMW060204FST	6,35	6,45	2,38	0,4	2,80	-	-	-	-	-	3883137



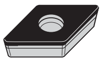
CPMW-FWST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPMW09T304FWST	9,53	9,67	3,97	0,4	4,40	-	-	-	-	-	3883138



C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts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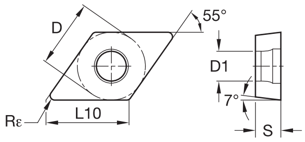
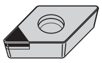


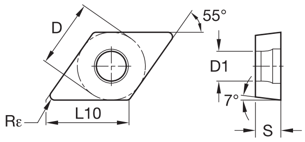
● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

DCGW-C

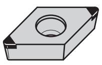
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DCGW070202EC	6,35	7,75	2,38	0,2	2,80	–	3883585	–	–	–	–
DCGW070202S01015C	6,35	7,75	2,38	0,2	2,80	3883528	–	–	–	–	–
DCGW070204S01015C	6,35	7,75	2,38	0,4	2,80	3883529	3883586	–	–	–	–


(FST)



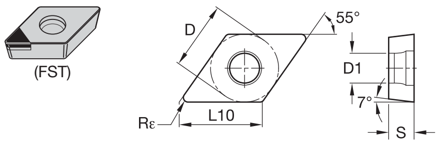
DCGW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DCGW070204FST	6,35	7,75	2,38	0,4	2,80	–	–	–	–	–	3898761
DCGW11T304FST	9,53	11,63	3,97	0,4	4,40	–	–	–	–	–	3898762


(MT)

DCGW-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DCGW11T304S01015MT	9,52	11,63	3,99	0,4	4,40	3883530	–	–	–	–	–
DCGW11T308S01015MT	9,52	11,63	3,99	0,8	4,40	3883531	–	–	–	–	–

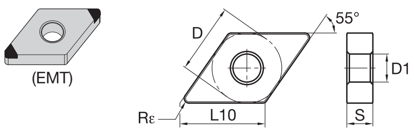


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

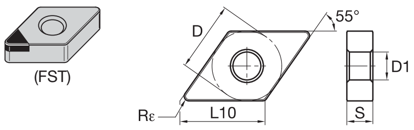
DCMW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DCMW070204FST	6,35	7,75	2,38	0,4	2,80	ı	ı	ı	ı	ı	3883142
DCMW11T304FST	9,53	11,63	3,97	0,4	4,40	ı	ı	ı	ı	ı	3883122
DCMW11T308FST	9,53	11,63	3,97	0,8	4,40	ı	ı	ı	ı	ı	3883143



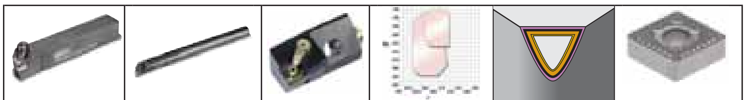
DNGA-EMT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNGA150408EMT	12,70	15,50	4,76	0,8	5,16	ı	3883365	ı	ı	ı	ı
DNGA150412EMT	12,70	15,50	4,76	1,2	5,16	ı	3883327	ı	ı	ı	ı



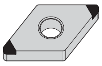
DNGA-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNGA150404FST	12,70	15,50	4,76	0,4	5,16	ı	ı	ı	ı	5885774	3898730
DNGA150408FST	12,70	15,50	4,76	0,8	5,16	ı	ı	ı	ı	5885775	3898731

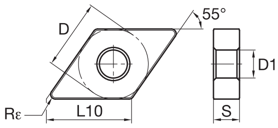


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts



(FWMT)

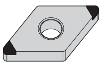


● first choice
○ alternate choice

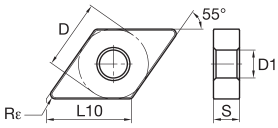
		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

■ DNGA-FWMT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNGA150404EFWMT	12,70	15,50	4,76	0,4	5,16	–	3883358	–	–	–	–
DNGA150408EFWMT	12,70	15,50	4,76	0,8	5,16	–	3883359	–	–	–	–
DNGA150412EFWMT	12,70	15,50	4,76	1,2	5,16	–	3883360	–	–	–	–

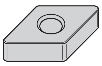


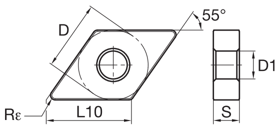
(MT)



■ DNGA-MT

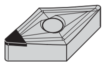
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNGA150404S01025MT	12,70	15,50	4,78	0,4	5,16	3883532	3883888	6018090	–	–	–
DNGA150408S01025MT	12,70	15,50	4,78	0,8	5,16	3883533	3883889	–	–	–	–

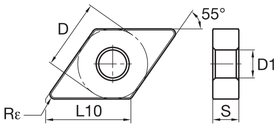




■ DNMA

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNMA110408S02020	9,53	11,63	4,76	0,8	3,81	–	–	–	3883313	–	–


(FST)

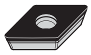


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

DNMS-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNMS150404FST	12,70	15,50	4,76	0,4	5,16	ı	ı	ı	ı	5885776	3898732
DNMS150408FST	12,70	15,50	4,76	0,8	5,16	ı	ı	ı	ı	5885777	3898733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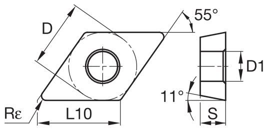
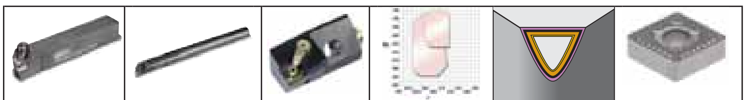


DPGW-C

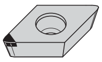
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DPGW070202EC	6,35	7,75	2,38	0,2	2,80	ı	3883582	ı	ı	ı	ı
DPGW070204S01015C	6,35	7,75	2,38	0,4	2,80	ı	3883583	ı	ı	ı	ı
DPGW070208S01015C	6,35	7,75	2,38	0,8	2,80	ı	3883587	ı	ı	ı	ı

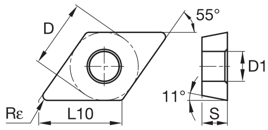


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

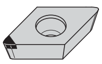
● first choice
○ alternate choice

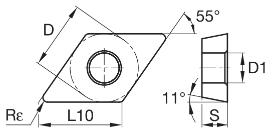

(FST)



■ DPGW-FST

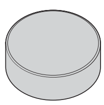
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DPGW070202FST	6,35	7,75	2,38	0,2	2,80	ı	ı	ı	ı	5885778	3898763
DPGW070204FST	6,35	7,75	2,38	0,4	2,80	ı	ı	ı	ı	5885779	3898764
DPGW11T304FST	9,53	11,63	3,97	0,4	4,40	ı	ı	ı	ı	5885780	3898765

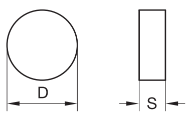

(FWST)



■ DPGW-FWST

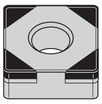
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DPGW070204FWST	6,35	7,75	2,38	0,2	2,80	ı	ı	ı	ı	5885792	3898766
DPGW11T304FWST	9,53	11,63	3,97	0,2	4,40	ı	ı	ı	ı	5885791	3898767

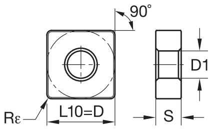




■ RNM

ISO catalogue number	D	S	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
RNMN090300S02020	9,53	3,18	ı	ı	ı	3883315	ı	ı
RNMN120300S02020	12,70	3,18	ı	ı	ı	3883316	ı	ı
RNMN120400S02020	12,70	4,76	ı	ı	ı	3883317	ı	ı


(MT)

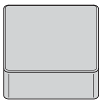


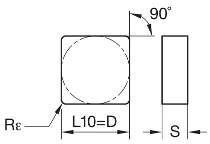
● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

■ SNGA-MT

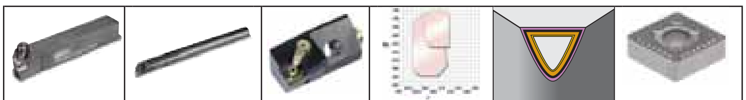
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
SNGA120404S01025MT	12,70	12,70	4,78	0,4	5,16	-	3883915	-	-	-	-
SNGA120408S01025MT	12,70	12,70	4,78	0,8	5,16	-	3883328	-	-	-	-
SNGA120412S01025MT	12,70	12,70	4,78	1,2	5,16	-	3883891	-	-	-	-





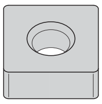
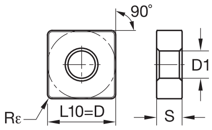
■ SNM

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
SNMN090316S02020	9,53	9,53	3,18	1,6	–	-	-	-	3883320	-	-
SNMN120416T02020	12,70	12,70	4,76	1,6	–	-	-	-	3883324	-	-



C2–C49	C50–C81	C86–C129	B8–B25	B26–B28	B30–B105

Inserts

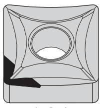
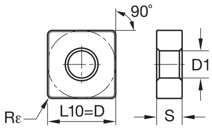



● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

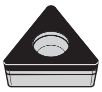
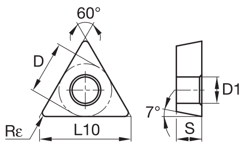
SNMA

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
SNMA120408S02020	12,70	12,70	4,76	0,8	5,16				3883325		
SNMA120412S02020	12,70	12,70	4,76	1,2	5,16				3883326		


(FST)


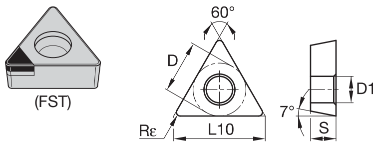
SNMS-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
SNMS120408FST	12,70	12,70	4,76	0,8	5,16						3898742
SNMS120412FST	12,70	12,70	4,76	1,2	5,16						3898743


(C)


TCGW-C

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TCGW110202EC	6,35	11,00	2,38	0,2	2,80		3883588				
TCGW110204S01015C	6,35	11,00	2,38	0,4	2,80		3883589				

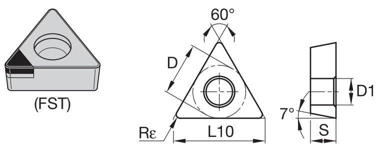


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

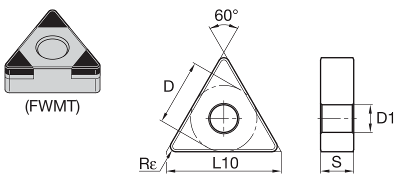
TCGW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TCGW110204FST	6,35	11,00	2,38	0,4	2,80	ı	ı	ı	ı	ı	3898768
TCGW16T304FST	9,53	16,50	3,97	0,4	4,40	ı	ı	ı	ı	ı	3898769



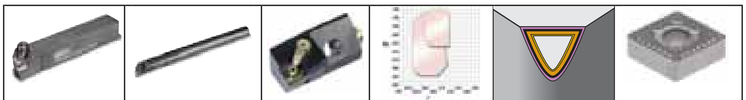
TCMW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TCMW110204FST	6,35	11,00	2,38	0,4	2,80	ı	ı	ı	ı	ı	3883144

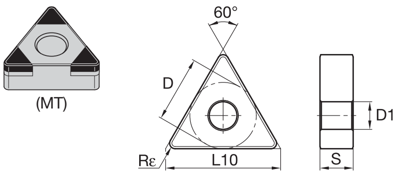


TNGA-FWMT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TNGA160408EFWMT	9,53	16,50	4,76	0,8	3,81	ı	3883361	ı	ı	ı	ı
TNGA160412EFWMT	9,53	16,50	4,76	1,2	3,81	ı	3883362	ı	ı	ı	ı



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

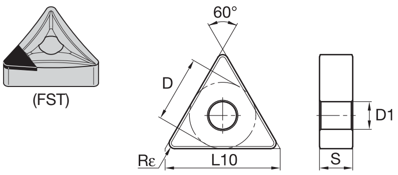


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

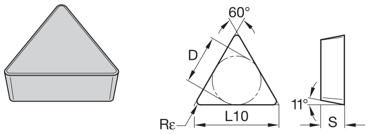
TNGA-MT

ISO catalogue number	D	L10	S	R_ε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TNGA160404S01025MT	9,53	16,50	4,78	0,4	3,81	–	3883329	–	–	–	–
TNGA160408S01025MT	9,53	16,50	4,78	0,8	3,81	–	3883892	–	–	–	–
TNGA160412S01025MT	9,53	16,50	4,78	1,2	3,81	–	3883893	–	–	–	–



TNMS-FST

ISO catalogue number	D	L10	S	R_ε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TNMS160404FST	9,53	16,50	4,76	0,4	3,81	–	–	–	–	–	3898734
TNMS160408FST	9,53	16,50	4,76	0,8	3,81	–	–	–	–	–	3898735

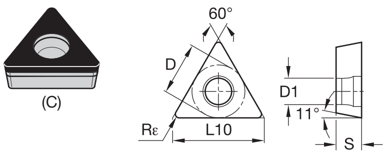


● first choice
○ alternate choice

	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P						
M						
K			●	●		
N					●	●
S			●		●	
H	●	●	●	●		

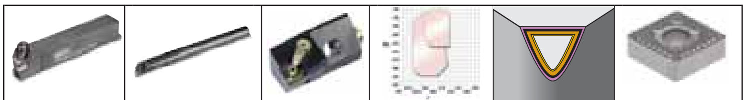
TPGN

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TPGN110304F	6,35	11,00	3,18	0,4	—	–	–	–	–	–	3898719
TPGN110308F	6,35	11,00	3,18	0,8	—	–	–	–	–	–	3898720
TPGN160304F	9,53	16,50	3,18	0,4	—	–	–	–	–	–	3898721
TPGN160308F	9,53	16,50	3,18	0,8	—	–	–	–	–	–	3898722
TPGN220408F	12,70	22,00	4,76	0,8	—	–	–	–	–	–	3898725

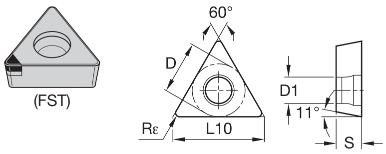


TPGW-C

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TPGW110202EC	6,35	11,00	2,38	0,2	2,80	–	3883590	–	–	–	–
TPGW110204S01015C	6,35	11,00	2,38	0,4	2,80	3883534	3883591	6018092	–	–	–
TPGW110208S01015C	6,35	11,00	2,38	0,8	2,80	3883535	3883592	6018093	–	–	–



C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

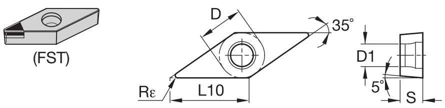


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

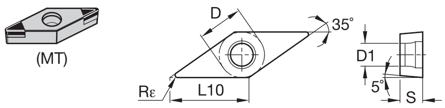
TPGW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TPGW110204FST	6,35	11,00	2,38	0,4	2,80	'	'	'	'	'	3898770
TPGW110208FST	6,35	11,00	2,38	0,8	2,80	'	'	'	'	'	3898771
TPGW16T304FST	9,53	16,50	3,97	0,4	4,40	'	'	'	'	'	3898772
TPGW16T308FST	9,53	16,50	3,97	0,8	4,40	'	'	'	'	'	3898773



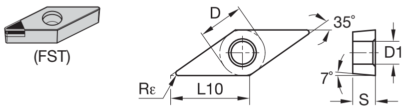
VBGW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VBGW110304FST	6,35	11,07	3,18	0,4	2,80	'	'	'	'	'	3898774
VBGW160404FST	9,53	16,61	4,76	0,4	4,40	'	'	'	'	'	3898775



VBGW-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VBGW160408S01015MT	9,52	16,61	4,78	0,8	4,40	3883537	'	6018095	'	'	'
VBGW160404S01015MT	9,53	16,61	4,78	0,4	4,40	3883536	'	6018094	'	'	'

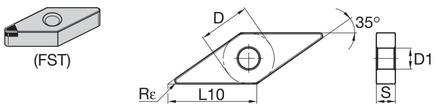


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

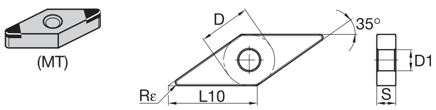
VCMW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VCMW110304FST	6,35	11,07	3,18	0,4	2,80	–	–	–	–	–	3883147



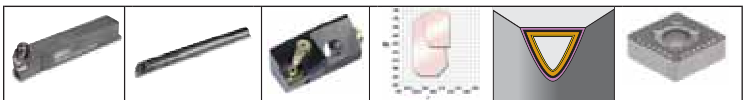
VNGA-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VNGA160404FST	9,53	16,61	4,76	0,4	3,81	–	–	–	–	–	3898736
VNGA160408FST	9,53	16,61	4,76	0,8	3,81	–	–	–	–	–	3898737

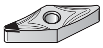
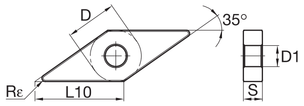


VNGA-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VNGA160404S01025MT	9,53	16,61	4,78	0,4	3,81	3883538	3883894	6018096	–	–	–
VNGA160408S01025MT	9,53	16,61	4,78	0,8	3,81	3883539	3883896	6018097	–	–	–


C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

Inserts

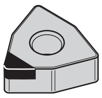
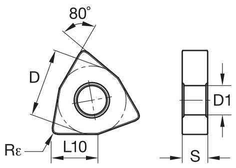

(FST)


● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

VNMS-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VNMS160404FST	9,53	16,61	4,76	0,4	3,81	I	I	I	I	I	3898738
VNMS160408FST	9,53	16,61	4,76	0,8	3,81	I	I	I	I	I	3898739


(FST)


WNGA-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
WNGA080404FST	12,70	8,69	4,76	0,4	5,16	I	I	I	I	I	3898740
WNGA080408FST	12,70	8,69	4,76	0,8	5,16	I	I	I	I	I	3898741

Victory™ -UR Geometry

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

-UR geometry offers a roughing solution for high-temp materials.

Available in WS10PT™ and WS25PT™, the -UR geometry provides smooth chip forming and improved coolant flow for increased tool life. This positive geometry, with its unique chipbreaker without inflection points, reduces cutting forces and improves depth-of-cut (DOC) notching resistance, while still providing superior edge stability.

To learn more, contact your local Authorised Distributor or visit **widia.com.**

WIDIA™
VICTORY

Turning • Tools for External Turning and Internal Boring

Modern machining operations performed on CNC machine tools and flexible production facilities require high-performance tools that provide straightforward design and application versatility. WIDIA™ offers an extensive range of toolholders for external turning to meet even the most exacting production demands across a broad spectrum of workpiece shapes and sizes.

Tools for External Turning

Whatever your operation requirements — from light finishing cuts at very high cutting speeds to heavy roughing applications — there is a WIDIA solution to meet your needs. The complete programme includes toolholders for pin-, screw-, or clamp-type holding.

D-Style Clamping

- Used for negative style inserts.
- Clamp assembly contains clamp, screw, and retaining ring.
- Quick insert indexing.
- Ensures insert repeatability and seating.
- Reduced chatter and extended tool life.

P-Style Clamping

- Lever-type clamping system for negative indexable inserts.
- No interference to chip flow.
- Fast insert changes.

P-style available in metric sizes only.

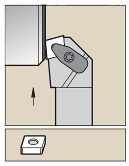
S-Style Clamping

- Screw clamping system for positive indexable inserts.
- Compact design for high reliability and cost efficiency.
- Carbide shim for additional tool protection.

C-Style Clamping

- Height-adjustable clamp permits use of additional chipbreakers.
- Universal clamping system for positive and negative flat top inserts.
- Robust engineering makes it easy to handle.
- Carbide shim for extra tool protection.

Each unique clamping system offers product options to fill your specific toolholder needs. Find the illustration that fits your application and navigate to the corresponding page to get the correct solution.



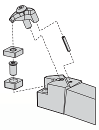
DCKN — Product Name

Application Illustration

Page: C8 — Page Number

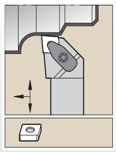
D-Style Clamping

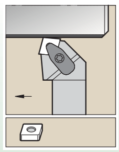
D



One-piece clamp assembly holder for use with negative style inserts. An extremely rigid clamping system. The tool is protected by a carbide shim.


DCKN 75° Page: **C8**


DCLN 95° Page: **C9**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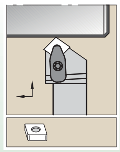
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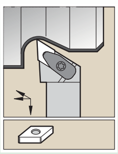
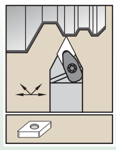
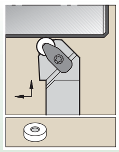
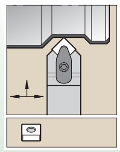
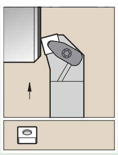
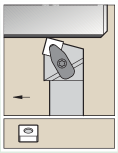

DDJN 93° Page: **C11**

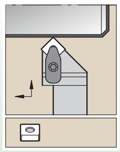

DDNN 63° Page: **C11**

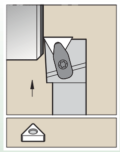

DRGN Page: **C12**

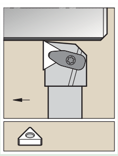

DSDN 45° Page: **C12**

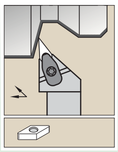

DSKN 75° Page: **C13**

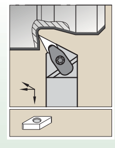

DSRN 75° Page: **C14**

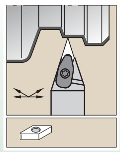

DSSN 45° Page: **C15**

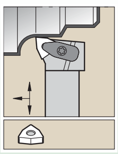

DTFN 90° Page: **C16**


DTGN 90° Page: **C16**


DVJN 93° Page: **C17**

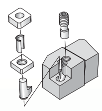

DVON 117,5° Page: **C18**


DVVN 72,5° Page: **C18**

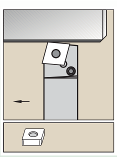

DWLN 95° Page: **C19**

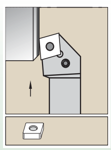
P-Style Clamping

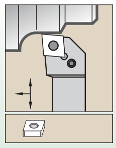
P

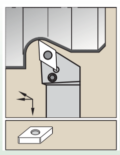


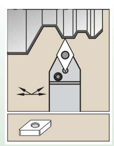
Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20mm in diameter. Inserts with one- and two-side chip control geometries have positive rakes from 6° to 18°. Advantages of this system are fast insert changes and no interference with chip flow.

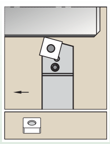

PCBN 75° Page: **C20**

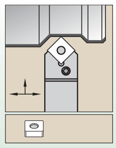

PCKN 75° Page: **C21**

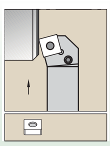

PCLN 95° Page: **C22**

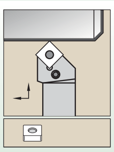

PDJN 93° Page: **C23**

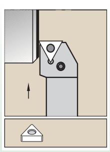

PDNN 62,5° Page: **C24**

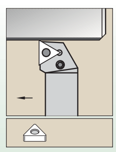

PSBN 75° Page: **C25**

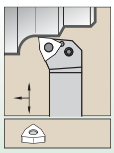

PSDN 45° Page: **C26**


PSKN 75° Page: **C26**


PSSN 45° Page: **C27**

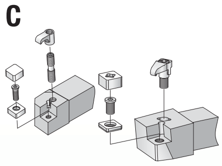

PTFN 90° Page: **C28**


PTGN 90° Page: **C29**

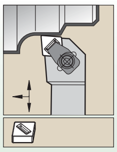

PWLN 95° Page: **C30**

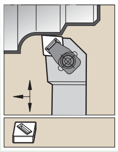
C-Style Clamping

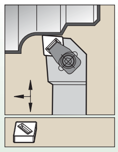
C

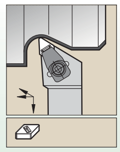


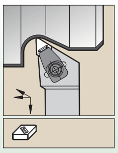
Top clamping system for negative and positive indexable inserts to DIN 4968. This universal clamping system is robust and easy to handle. Some height-adjustable clamps enable the use of additional chipbreakers. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of 16mm and insert iCs greater than 6,35mm.

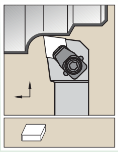

CCLN-MX
95°
Page:
C31

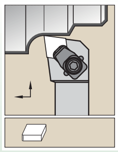

CCLN-MN
95°
Page:
C31

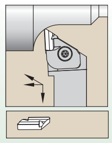

CCLN-MF
95°
Page:
C32

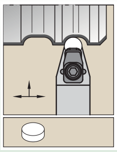

CDJN-MX
93°
Page:
C32

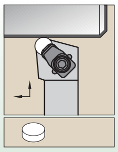

CDJN-MN
93°
Page:
C33

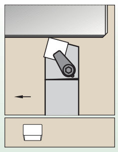

CELN-MF
97,5°
Page:
C33

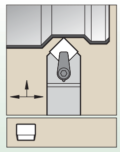

CELN-MN
97,5°
Page:
C34

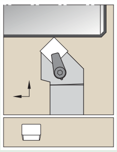

CKJN
Page:
C34

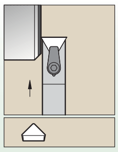

CRDN-MN
Page:
C35

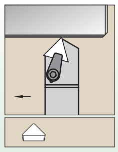

CRSN-MN
Page:
C35

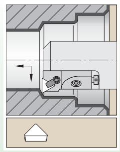

CSBP
75°
Page:
C36

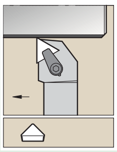

CSDP
45°
Page:
C36

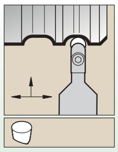

CSSP
45°
Page:
C37

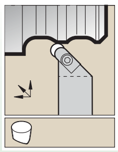

CTCP
90°
Page:
C37


CTDP
45°
Page:
C38


CTFP
90°
Page:
C38


CTGP
90°
Page:
C39

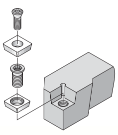

CRDP*
Page:
C40


CRGP*
Page:
C41

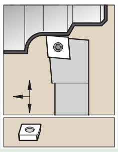
Exact Clamping System not shown.

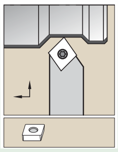
S-Style Clamping

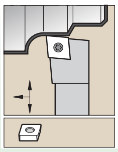
S

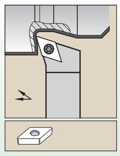


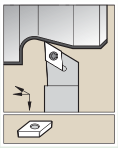
Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967. Compact design using a minimum of spare parts for high reliability and cost efficiency. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of 16mm and insert iCs from 9,52mm are secured by means of a threaded bushing.

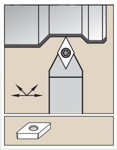

SCLC
95°
Page:
C42

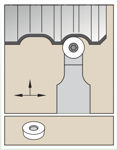

SCDP
45°
Page:
C42

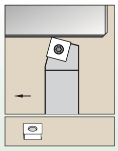

SCLP
95°
Page:
C43

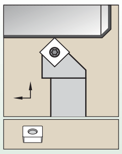

SDHC
107,5°
Page:
C43

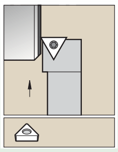

SDJC
93°
Page:
C44

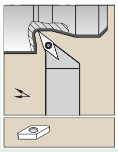

SDNC
62,5°
Page:
C45

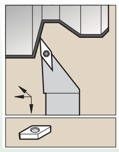

SRDC
Page:
C45

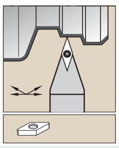

SSBC
75°
Page:
C46


SSSC
45°
Page:
C47


STFC
90°
Page:
C48

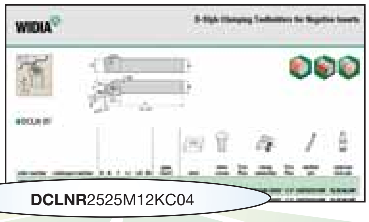

SVHB
107,5°
Page:
C48


SVJB
93°
Page:
C49


SVVB
72,5°
Page:
C49

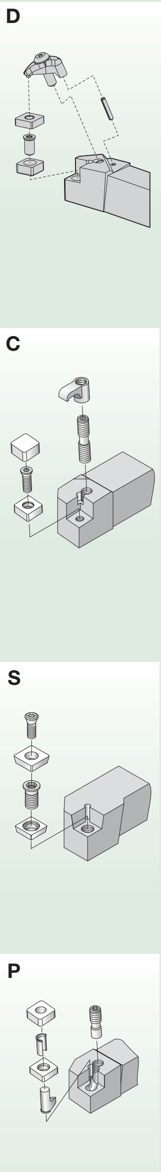
How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.

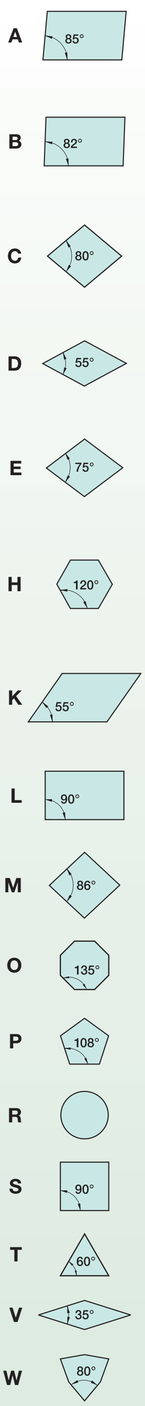


DCLNR2525M12KC04

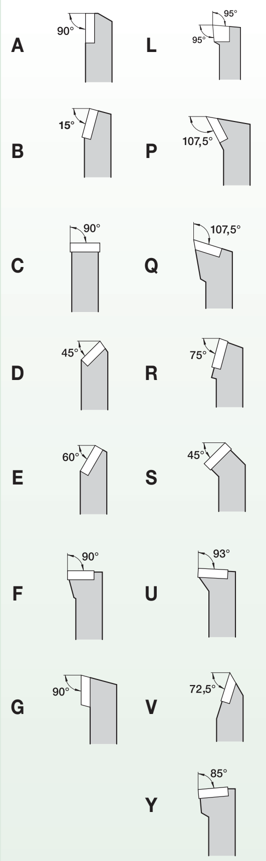
D — Insert Holding Method



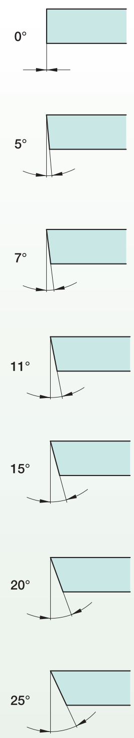
C — Insert Shape



L — Tool Style or Lead Angle



N — Insert Clearance Angle



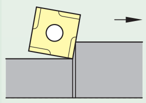
R — Hand of Tool

R = Right hand

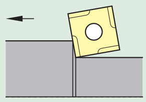
L = Left hand

N = Neutral

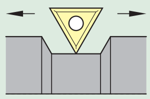
R



L



N



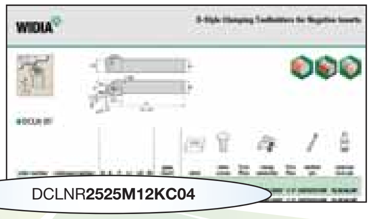
Additional Information

C = Deep pocket for ceramic insert

S = Single pocket locating wall

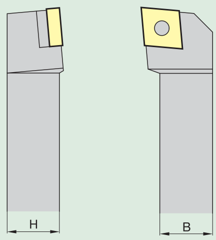
F = Straight shank, no offset

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



DCLNR**2525M12KC04**

25 25 — Shank Dimensions



The seventh and eighth position shall be a significant two-digit number that indicates the holder cross section.

- If the dimension for the width "B" or the height "H" is represented by a one-digit number, a 0 (zero) will be used in front of it.

  Example: 8,0mm = 08

M — Tool Length

L1	ISO
32	A
40	B
50	C
60	D
70	E
80	F
90	G
100	H
110	J
125	K
140	L
150	M
160	N
170	P
180	Q
200	R
250	S
300	T
350	U
400	V
450	W
500	Y
Special Design	X

12 — Insert Size

KC — Additional Information

KC = D-Style Clamping

04 — Insert Thickness (optional)

04 = 4,76mm

06 = 6,35mm

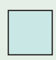
Cutting Edge Length L10

H Hexagon 120°

O Octagon 135°

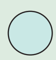
P Pentagon 108°

S Square 90°



T Triangular 60°

R Round –

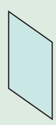


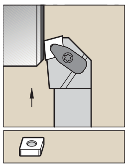
C Rhomboid 80°
D 55°
E 75°
M 86°
V 35°

W Trigon 80° with enlarged corner angles

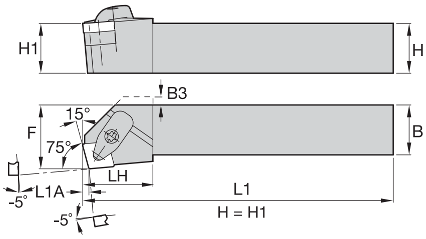
L Rectangular 90°

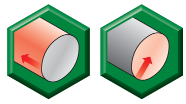
A Parallelogram 85°
B 82°
K 55°



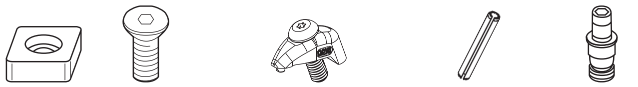


See pages B30–B46
for inserts.



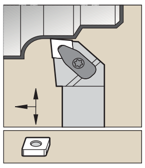


DCKN 75°

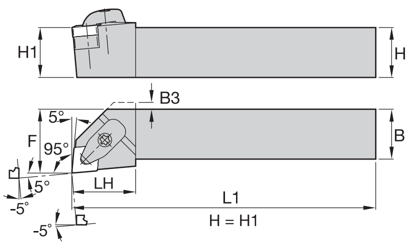


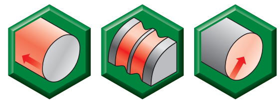
order number	catalogue number	H	B	F	L1	LH	L1A	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand																
5697856	DCKNR2020K12KC04	20	20	25,0	125	32,0	3,1	6,0	CN..120408	ICSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5697857	DCKNR2525M12KC04	25	25	32,0	150	32,0	3,1	—	CN..120408	ICSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697858	DCKNR3225P12KC04	32	25	32,0	170	32,0	3,1	—	CN..120408	ICSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697859	DCKNR3232P16KC06	32	32	40,0	170	32,0	3,8	—	CN..160612	ICSN543	KMSP515IP	15 IP	CM209R ASSY	15 IP	SSP025016M	KLM58L15IP
5697880	DCKNR3232P19KC06	32	32	40,0	170	38,0	4,6	—	CN..190612	ICSN643	KMSP625IP	25 IP	CM210R ASSY	25 IP	SSP025016M	KLM68L25IP
left hand																
5697853	DCKNL2020K12KC04	20	20	25,0	125	32,0	3,1	6,0	CN..120408	ICSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5697854	DCKNL2525M12KC04	25	25	32,0	150	32,0	3,1	—	CN..120408	ICSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697855	DCKNL3225P12KC04	32	25	32,0	170	32,0	3,1	—	CN..120408	ICSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP

WIDIA

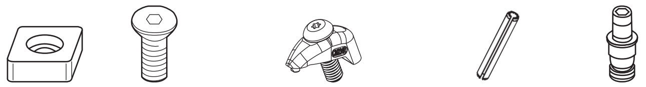


See pages B30–B46 for inserts.

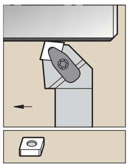




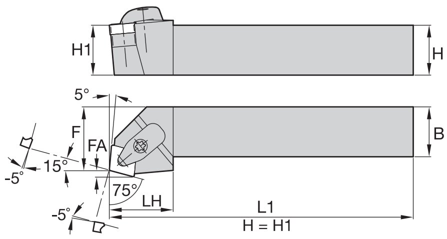
■ DCLN 95°

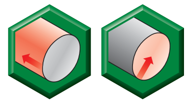


order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5697890	**DCLNR1616H09KC03**	16	16	20,0	100	30,0	6,0	CN..090308	**ICSN332**	**KMSP39IP**	9 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5697891	**DCLNR2020K09KC03**	20	20	25,0	125	30,0	2,0	CN..090308	**ICSN332**	**KMSP39IP**	9 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5697892	**DCLNR2020K12KC04**	20	20	25,0	125	32,0	4,0	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697893	**DCLNR2525M12KC04**	25	25	32,0	150	32,0	–	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697894	**DCLNR2525M16KC06**	25	25	32,0	150	33,0	–	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697895	**DCLNR3232P16KC06**	32	32	40,0	170	33,0	–	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697896	**DCLNR3232P19KC06**	32	32	40,0	170	40,0	–	CN..190612	**ICSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5697897	**DCLNR4040S19KC06**	40	40	50,0	250	40,0	–	CN..190612	**ICSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5697898	**DCLNR4040S25KC09**	40	40	50,0	250	51,0	–	CN..250924	**ICSN846**	**KMSP825IP**	25 IP	**CM236R ASSY**	25 IP	**SSP025018M**	**KLM81025IP**
left hand															
5697881	**DCLNL1616H09KC03**	16	16	20,0	100	30,0	6,0	CN..090308	**ICSN332**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5697882	**DCLNL2020K09KC03**	20	20	25,0	125	30,0	2,0	CN..090308	**ICSN332**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5697883	**DCLNL2020K12KC04**	20	20	25,0	125	32,0	4,0	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697884	**DCLNL2525M12KC04**	25	25	32,0	150	32,0	–	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697885	**DCLNL2525M16KC06**	25	25	32,0	150	33,0	–	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697886	**DCLNL3232P16KC06**	32	32	40,0	170	33,0	–	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697887	**DCLNL3232P19KC06**	32	32	40,0	170	40,0	–	CN..190612	**ICSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5697888	**DCLNL4040S19KC06**	40	40	50,0	250	40,0	–	CN..190612	**ICSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5697889	**DCLNL4040S25KC09**	40	40	50,0	250	51,0	–	CN..250924	**ICSN846**	**KMSP825IP**	25 IP	**CM236R ASSY**	25 IP	**SSP025018M**	**KLM81025IP**



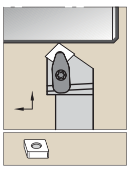
See pages B30–B46 for inserts.



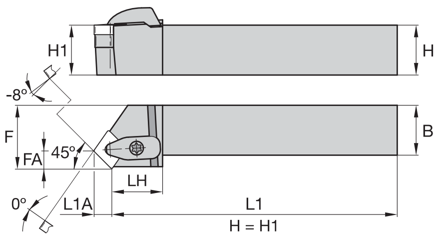


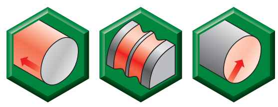
DCRN 75°

order number	catalogue number	H	B	F	L1	LH	FA	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5697903	DCRNR2020K12KC04	20	20	25,0	125	32,0	3,3	CN..120408	ICSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5697904	DCRNR2525M12KC04	25	25	32,0	150	32,0	3,3	CN..120408	ICSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697905	DCRNR3225P12KC04	32	25	32,0	170	32,0	3,3	CN..120408	ICSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697906	DCRNR3232P16KC06	32	32	40,0	170	38,0	4,1	CN..160612	ICSN543	KMSP515IP	15 IP	CM209R ASSY	15 IP	SSP025016M	KLM58L15IP
5697907	DCRNR3232P19KC06	32	32	40,0	170	38,0	4,9	CN..190612	ICSN643	KMSP625IP	25 IP	CM210R ASSY	25 IP	SSP025016M	KLM68L25IP
left hand															
5697899	DCRNL2020K12KC04	20	20	25,0	125	32,0	3,3	CN..120408	ICSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5697900	DCRNL2525M12KC04	25	25	32,0	150	32,0	3,3	CN..120408	ICSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697901	DCRNL3225P12KC04	32	25	32,0	170	32,0	3,3	CN..120408	ICSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697902	DCRNL3232P16KC06	32	32	40,0	170	38,0	4,1	CN..160612	ICSN543	KMSP515IP	15 IP	CM209R ASSY	15 IP	SSP025016M	KLM58L15IP



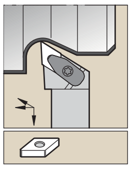
See pages B30–B46 for inserts.



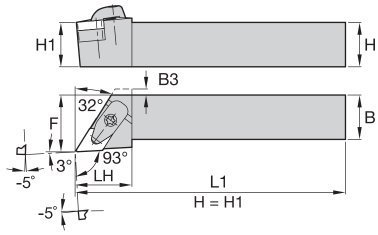


DCSN 45°

order number	catalogue number	H	B	F	L1	LH	FA	L1A	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand																
5697911	DCSNR2020K12KC04	20	20	25,0	125	35,0	8,2	8,5	CN..120408	ICSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5697913	DCSNR2525M12KC04	25	25	32,0	150	35,0	8,2	8,5	CN..120408	ICSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
left hand																
5697908	DCSNL2020K12KC04	20	20	25,0	125	35,0	8,2	8,5	CN..120408	ICSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5697909	DCSNL2525M12KC04	25	25	32,0	150	35,0	8,2	8,5	CN..120408	ICSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP

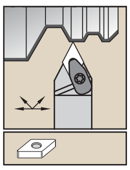


See pages B47–B64 for inserts.

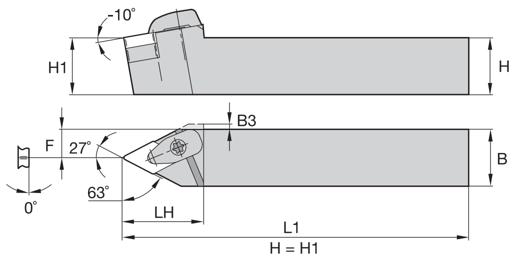


DDJN 93°

order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5697924	DDJNR2020K11KC04	20	20	25,0	125	30,0	2,0	DN..110408	IDSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5697926	DDJNR2020K15KC06	20	20	25,0	125	32,0	4,0	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697928	DDJNR2525M11KC04	25	25	32,0	150	30,0	—	DN..110408	IDSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5697930	DDJNR2525M15KC06	25	25	32,0	150	32,0	—	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697932	DDJNR3225P15KC06	32	25	32,0	170	32,0	—	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5564336	DDJNR3232P15KC06	32	32	40,0	170	32,0	—	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
left hand															
5697915	DDJNL2020K11KC04	20	20	25,0	125	30,0	2,0	DN..110408	IDSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5697916	DDJNL2020K15KC06	20	20	25,0	125	32,0	4,0	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697918	DDJNL2525M11KC04	25	25	32,0	150	30,0	—	DN..110408	IDSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5697920	DDJNL2525M15KC06	25	25	32,0	150	32,0	—	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697922	DDJNL3225P15KC06	32	25	32,0	170	32,0	—	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5564335	DDJNL3232P15KC06	32	32	40,0	171	32,0	—	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP

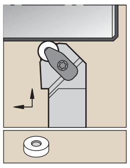


See pages B47–B64 for inserts.

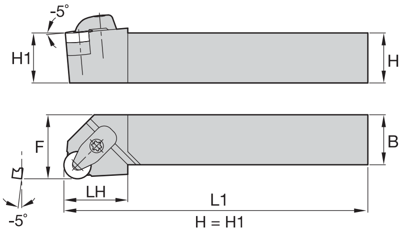


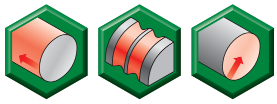
DDNN 63°

order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5697940	DDNNR2020K15KC06	20	20	10,0	125	40,0	2,5	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697942	DDNNR2525M15KC06	25	25	13,0	150	40,0	—	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
left hand															
5697934	DDNNL2020K15KC06	20	20	10,0	125	40,0	2,5	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697936	DDNNL2525M15KC06	25	25	13,0	150	40,0	—	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697938	DDNNL3225P15KC06	32	25	13,0	170	40,0	—	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP

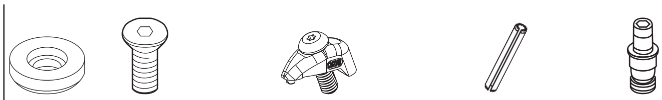


See pages B65–B67
for inserts.

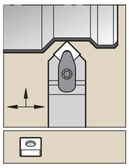




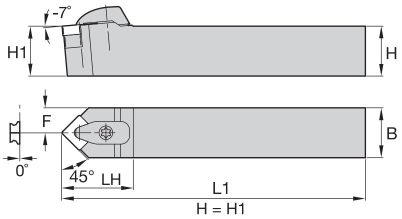
■ DRGN

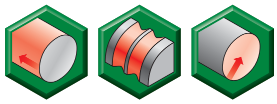


order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand														
5697948	DRGNR2525M12KC04	25	25	32,0	150	32,0	RN..120400	IRSN44	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697950	DRGNR3225P12KC04	32	25	32,0	170	32,0	RN..120400	IRSN44	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697952	DRGNR4040S25KC09	40	40	50,0	250	48,0	RN..250900	IRSN84	KMSP825IP	25 IP	–	25 IP	SSP025018M	KLM81025IP
left hand														
5697944	DRGNL3225P12KC04	32	25	32,0	170	32,0	RN..120400	IRSN44	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697946	DRGNL4040S25KC09	40	40	50,0	250	48,0	RN..250900	IRSN84	KMSP825IP	25 IP	CM236R ASSY	25 IP	SSP025018M	KLM81025IP

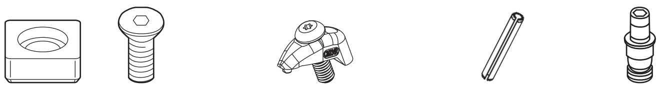


See pages B68–B80
for inserts.

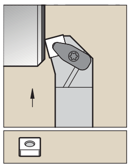




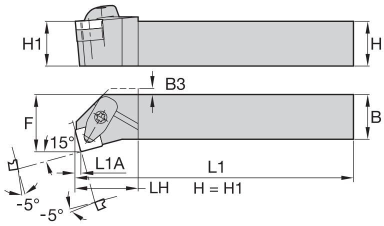
■ DSDN 45°

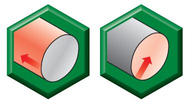


order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
5697954	DSDNN2020K12KC04	20	20	10,0	125	36,0	SN..120408	ISSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5697955	DSDNN2525M12KC04	25	25	12,0	150	36,0	SN..120408	ISSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697957	DSDNN2525M15KC06	25	25	12,0	150	42,0	SN..150612	ISSN543	KMSP515IP	15 IP	CM209R ASSY	15 IP	SSP025016M	KLM58L15IP
5697959	DSDNN3225P12KC04	32	25	12,0	170	36,0	SN..120408	ISSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697961	DSDNN3232P19KC06	32	32	15,5	170	44,0	SN..190612	ISSN643	KMSP625IP	25 IP	CM210R ASSY	25 IP	SSP025016M	KLM68L25IP
5697963	DSDNN4040S25KC09	40	40	19,5	250	59,0	SN..250924	ISSN846	KMSP825IP	40 IP	CM236R ASSY	25 IP	SSP025018M	KLM81025IP

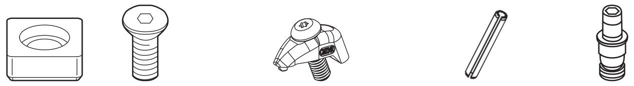


See pages B68–B80 for inserts.

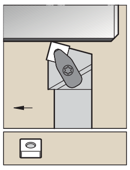




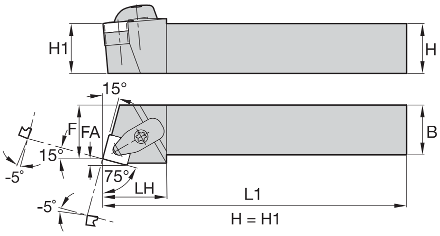
DSKN 75°

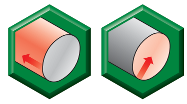


order number	catalogue number	H	B	F	L1	LH	L1A	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand																
5696685	**DSKNR2020K12KC04**	20	20	25,0	125	32,0	3,1	8,0	SN..120408	**ISSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696686	**DSKNR2525M12KC04**	25	25	32,0	150	32,0	3,1	4,0	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696687	**DSKNR3225P12KC04**	32	25	32,0	170	32,0	3,1	—	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696688	**DSKNR3232P15KC06**	32	32	40,0	170	32,0	3,8	—	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696689	**DSKNR3232P19KC06**	32	32	40,0	170	38,0	4,6	—	SN..190612	**ISSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
left hand																
5696682	**DSKNL2525M12KC04**	25	25	32,0	150	32,0	3,1	4,0	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696683	**DSKNL3225P12KC04**	32	25	32,0	170	32,0	3,1	—	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696684	**DSKNL3232P15KC06**	32	32	40,0	170	32,0	3,8	—	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**



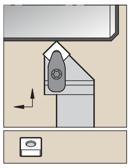
See pages B68–B80
for inserts.



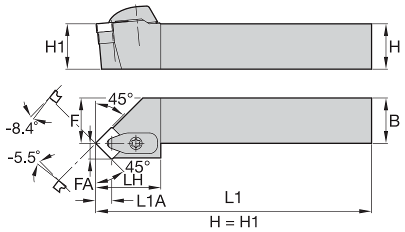


DSRN 75°

order number	catalogue number	H	B	F	L1	LH	FA	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5696703	**DSRNR2020K12KC04**	20	20	22,0	125	32,0	3,3	SN..120408	**ISSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696704	**DSRNR2525M12KC04**	25	25	27,0	150	32,0	3,3	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696705	**DSRNR3232P15KC06**	32	32	35,0	170	38,0	4,0	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696706	**DSRNR3232P19KC06**	32	32	35,0	170	42,0	4,8	SN..190612	**ISSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5696707	**DSRNR4040S25KC09**	40	40	43,0	250	52,0	6,1	SN..250924	**ISSN846**	**KMSP825IP**	25 IP	**CM236R ASSY**	25 IP	**SSP025018M**	**KLM81025IP**
left hand															
5696700	**DSRNL2525M12KC04**	25	25	27,0	150	32,0	3,3	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696701	**DSRNL3232P15KC06**	32	32	35,0	170	38,0	4,0	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696702	**DSRNL4040S25KC09**	40	40	43,0	250	52,0	6,1	SN..250924	**ISSN846**	**KMSP825IP**	25 IP	**CM236R ASSY**	25 IP	**SSP025018M**	**KLM81025IP**

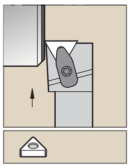


See pages B68–B80 for inserts.

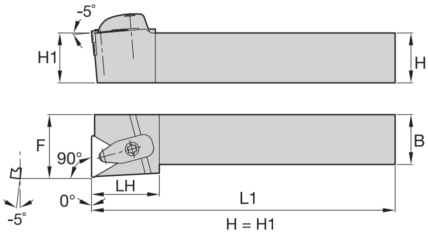


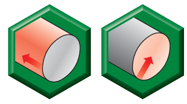
DSSN 45°

order number	catalogue number	H	B	F	L1	LH	FA	L1A	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand																
5696713	**DSSNR2020K12KC04**	20	20	25,0	125	36,0	8,4	8,7	SN..120408	**ISSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696714	**DSSNR2525M12KC04**	25	25	32,0	150	36,0	8,4	8,7	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696715	**DSSNR2525M15KC06**	25	25	32,0	150	42,0	10,5	10,7	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696716	**DSSNR3225P12KC04**	32	25	32,0	170	35,4	8,4	8,7	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696717	**DSSNR3232P15KC06**	32	32	40,0	170	40,3	10,5	10,7	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696718	**DSSNR3232P19KC06**	32	32	40,0	170	44,0	12,7	10,7	SN..190612	**ISSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
left hand																
5696708	**DSSNL2020K12KC04**	20	20	25,0	125	36,0	8,4	8,7	SN..120408	**ISSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696709	**DSSNL2525M12KC04**	25	25	32,0	150	36,0	8,4	8,7	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696710	**DSSNL3225P12KC04**	32	25	32,0	170	35,4	8,4	8,7	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696711	**DSSNL3232P15KC06**	32	32	40,0	170	40,3	10,5	10,7	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696712	**DSSNL3232P19KC06**	32	32	40,0	170	44,0	12,7	10,7	SN..190612	**ISSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**

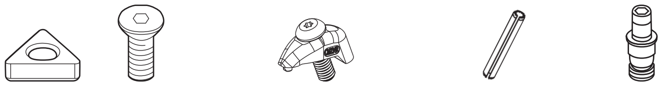


See pages B81–B93 for inserts.

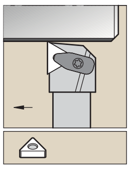




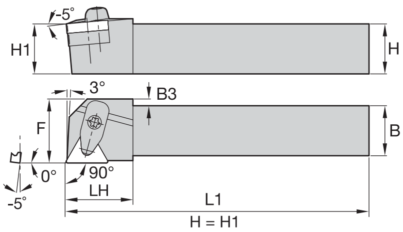
■ DTFN 90°

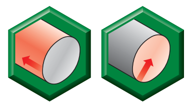


order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand														
5696724	DTFNR2020K16KC04	20	20	25,0	125	32,0	TN..160408	ITSN323	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696725	DTFNR2525M16KC04	25	25	32,0	150	32,0	TN..160408	ITSN323	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696726	DTFNR3232P27KC06	32	32	40,0	170	38,0	TN..270612	ITSN534	KMSP515IP	15 IP	CM209R ASSY	15 IP	SSP025016M	KLM5815IP
left hand														
5696719	DTFNL2020K16KC04	20	20	25,0	125	32,0	TN..160408	ITSN323	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696720	DTFNL2525M16KC04	25	25	32,0	150	32,0	TN..160408	ITSN323	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696721	DTFNL2525M22KC04	25	25	32,0	150	34,0	TN..220408	ITSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5696722	DTFNL3225P16KC04	32	25	32,0	170	32,0	TN..160408	ITSN323	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696723	DTFNL3225P22KC04	32	25	32,0	170	34,0	TN..220408	ITSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP

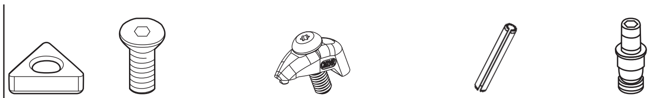


See pages B81–B93 for inserts.

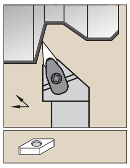




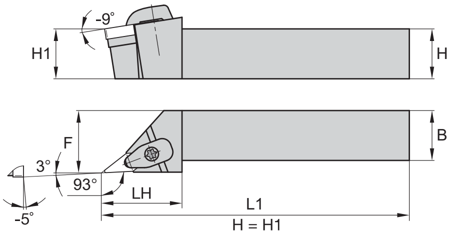
■ DTGN 90°

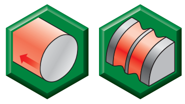


order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5696729	DTGNR2020K16KC04	20	20	25,0	125	25,0	6,5	TN..160408	ITSN323	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696730	DTGNR2525M16KC04	25	25	32,0	150	25,0	–	TN..160408	ITSN323	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696731	DTGNR2525M22KC04	25	25	32,0	150	32,0	3,0	TN..220408	ITSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
left hand															
5696727	DTGNL2020K16KC04	20	20	25,0	125	25,0	6,5	TN..160408	ITSN323	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696728	DTGNL2525M16KC04	25	25	32,0	150	25,0	–	TN..160408	ITSN323	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP

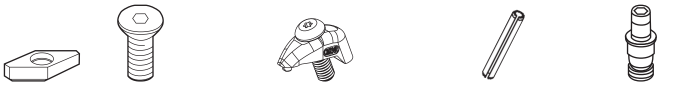


See pages B94–B99 for inserts.

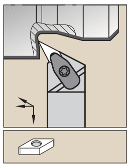




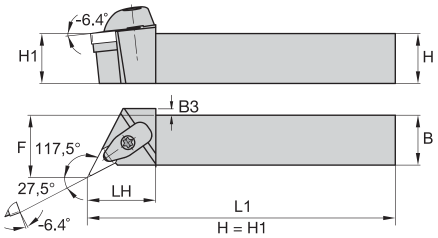
DVJN 93°

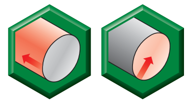


order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand														
5696737	**DVJNR2020K16KC04**	20	20	25,0	125	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696738	**DVJNR2525M16KC04**	25	25	32,0	150	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696739	**DVJNR2525M22KC04**	25	25	32,0	150	55,0	VN..220408	**IVSN432**	**KMSP415IP**	15 IP	**CM235R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696740	**DVJNR3225P16KC04**	32	25	32,0	170	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696741	**DVJNR3225P22KC04**	32	25	32,0	170	55,0	VN..220408	**IVSN432**	**KMSP415IP**	15 IP	**CM235R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
left hand														
5696732	**DVJNL2020K16KC04**	20	20	25,0	125	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696733	**DVJNL2525M16KC04**	25	25	32,0	150	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696734	**DVJNL2525M22KC04**	25	25	32,0	150	55,0	VN..220408	**IVSN432**	**KMSP415IP**	15 IP	**CM235R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696735	**DVJNL3225P16KC04**	32	25	32,0	170	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696736	**DVJNL3225P22KC04**	32	25	32,0	170	55,0	VN..220408	**IVSN432**	**KMSP415IP**	15 IP	**CM235R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**

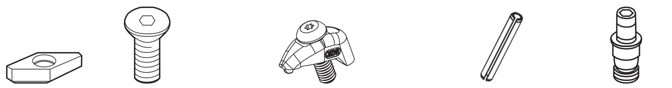


See pages B94–B99 for inserts.

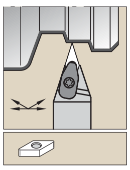




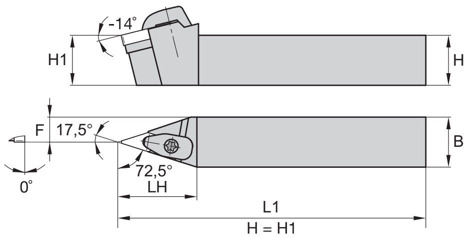
■ DVON 117,5°



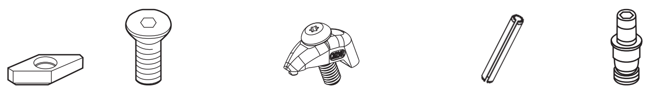
order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5696745	DVONR2020K16KC04	20	20	27,0	125	38,0	5,0	VN..160408	IVSN322	KMSP315IP	15 IP	CM215R ASSY	15 IP	SSP025016M	KLM34L9IP
5696746	DVONR2525M16KC04	25	25	32,0	150	38,0	—	VN..160408	IVSN322	KMSP315IP	15 IP	CM215R ASSY	15 IP	SSP025016M	KLM34L9IP
5696747	DVONR3225P16KC04	32	25	32,0	170	38,0	—	VN..160408	IVSN322	KMSP315IP	15 IP	CM215R ASSY	15 IP	SSP025016M	KLM34L9IP
left hand															
5696742	DVONL2020K16KC04	20	20	27,0	125	38,0	5,0	VN..160408	IVSN322	KMSP315IP	15 IP	CM215R ASSY	15 IP	SSP025016M	KLM34L9IP
5696743	DVONL2525M16KC04	25	25	32,0	150	38,0	—	VN..160408	IVSN322	KMSP315IP	15 IP	CM215R ASSY	15 IP	SSP025016M	KLM34L9IP
5696744	DVONL3225P16KC04	32	25	32,0	170	38,0	—	VN..160408	IVSN322	KMSP315IP	15 IP	CM215R ASSY	15 IP	SSP025016M	KLM34L9IP



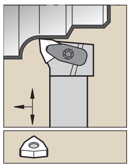
See pages B94–B99 for inserts.



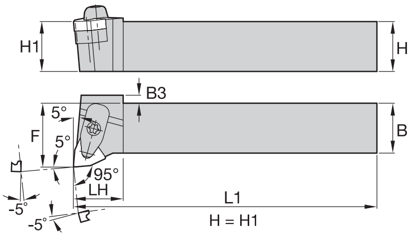
■ DVVN 72,5°

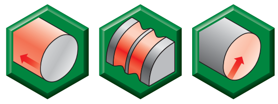


order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
5696748	DVVNN2020K16KC04	20	20	9,5	125	48,0	VN..160408	IVSN322	KMSP315IP	15 IP	CM215R ASSY	15 IP	SSP025016M	KLM34L9IP
5696749	DVVNN2525M16KC04	25	25	12,0	150	48,0	VN..160408	IVSN322	KMSP315IP	15 IP	CM215R ASSY	15 IP	SSP025016M	KLM34L9IP
5696750	DVVNN3225P16KC04	32	25	12,0	170	48,0	VN..160408	IVSN322	KMSP315IP	15 IP	CM215R ASSY	15 IP	SSP025016M	KLM34L9IP

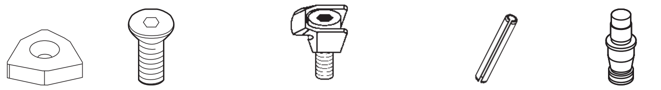


See pages B99–B105 for inserts.

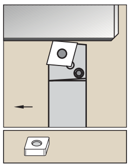




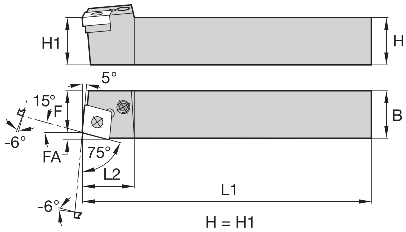
■ DWLN 95°

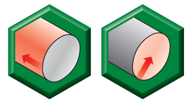


order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5696757	**DWLNR2020K06KC04**	20	20	25,0	125	31,0	—	WN..060408	**IWSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696758	**DWLNR2020K08KC04**	20	20	25,0	125	33,0	—	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696759	**DWLNR2525M06KC04**	25	25	32,0	150	25,0	—	WN..060408	**IWSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696760	**DWLNR2525M08KC04**	25	25	32,0	150	25,0	4,0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696761	**DWLNR3225P08KC04**	32	25	32,0	170	25,0	4,0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696762	**DWLNR3232P08KC04**	32	32	40,0	170	25,0	—	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
left hand															
5696751	**DWLNL2020K06KC04**	20	20	25,0	125	31,0	—	WN..060408	**IWSN322**	**KMSP39IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696752	**DWLNL2020K08KC04**	20	20	25,0	125	33,0	—	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696753	**DWLNL2525M06KC04**	25	25	32,0	150	25,0	—	WN..060408	**IWSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696754	**DWLNL2525M08KC04**	25	25	32,0	150	25,0	4,0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696755	**DWLNL3225P08KC04**	32	25	32,0	170	25,0	4,0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696756	**DWLNL3232P08KC04**	32	32	40,0	170	25,0	—	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**

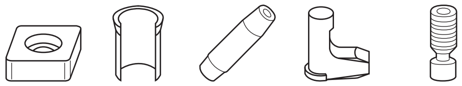


See pages B30–B46 for inserts.

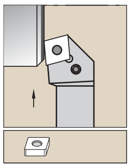




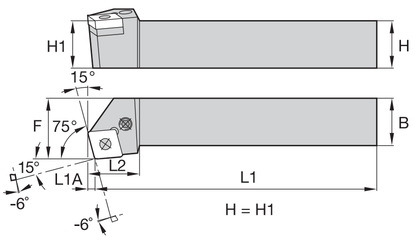
PCBN 75°

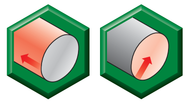


order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3878361	PCBNR2020K12	20	20	17,0	125	26,0	3,1	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878356	PCBNR2525M12	25	25	22,0	150	26,0	3,1	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878366	PCBNR2525M16	25	25	22,0	150	26,0	4,2	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878367	PCBNR3225P16	32	25	22,0	170	28,0	4,2	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878363	PCBNR3232P16	32	32	27,0	170	38,0	4,2	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878358	PCBNR3232P19	32	32	27,0	170	40,0	4,6	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
3878364	PCBNR4040S19	40	40	35,0	250	38,0	4,6	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
left hand														
3878360	PCBNL2020K12	20	20	17,0	125	26,0	3,1	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878354	PCBNL2525M12	25	25	22,0	150	26,0	3,1	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878365	PCBNL2525M16	25	25	22,0	150	26,0	4,2	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878359	PCBNL3225P16	32	25	22,0	170	28,0	4,2	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878355	PCBNL3232P16	32	32	27,0	170	38,0	4,2	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878357	PCBNL3232P19	32	32	27,0	170	40,0	4,6	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
3878362	PCBNL4040S19	40	40	35,0	250	38,0	4,6	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP

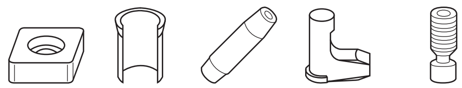


See pages B30–B46 for inserts.

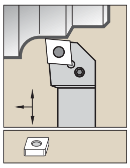




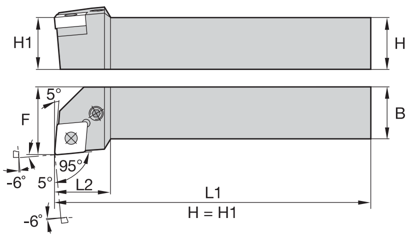
PCKN 75°

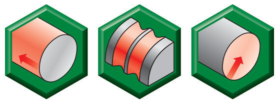


order number	catalogue number	H	B	F	L1	L2	L1A	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3878372	PCKNR2020K12	20	20	25,0	125	23,0	3,1	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878370	PCKNR2525M12	25	25	32,0	150	23,0	3,1	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878374	PCKNR2525M16	25	25	32,0	150	30,0	3,8	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878375	PCKNR3225P16	32	25	32,0	170	30,0	3,8	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3899889	PCKNR3232P16	32	32	40,0	170	38,0	3,8	CN..160612	512.117	513.025	515.022	511.025	514.125	–
3878371	PCKNR3232P19	32	32	40,0	170	40,0	4,6	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
3879707	PCKNR4040S19	40	40	50,0	250	36,0	4,6	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
left hand														
3878373	PCKNL2020K12	20	20	25,0	125	23,0	3,1	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878369	PCKNL2525M12	25	25	32,0	150	23,0	3,1	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878377	PCKNL2525M16	25	25	32,0	150	30,0	3,8	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878376	PCKNL3225P16	32	25	32,0	170	30,0	3,8	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3899888	PCKNL3232P16	32	32	40,0	170	38,0	3,8	CN..160612	512.117	513.025	515.022	511.025	514.125	–
3878368	PCKNL3232P19	32	32	40,0	170	40,0	4,6	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
3878378	PCKNL4040S19	40	40	50,0	250	36,0	4,6	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP

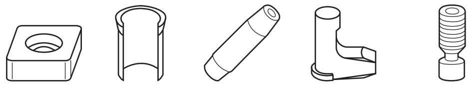


See pages B30–B46 for inserts.

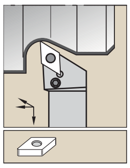




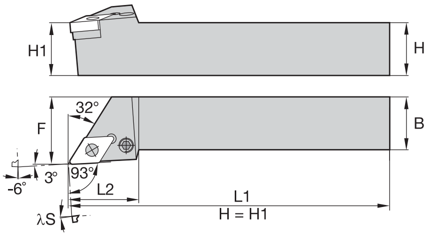
PCLN 95°



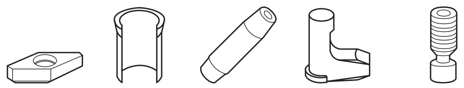
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	lever screw wrench size
right hand													
3900154	PCLNR1616H09	16	16	20,0	100	23,0	CN..090308	512.111	513.019	515.018	511.018	514.018	2.5 mm
3878400	PCLNR1616H12	16	16	20,0	100	26,0	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878422	PCLNR2020K12	20	20	25,0	125	26,0	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878419	PCLNR2525M12	25	25	32,0	150	26,0	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878401	PCLNR2525M16	25	25	32,0	150	28,0	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878402	PCLNR3225P12	32	25	32,0	170	26,0	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878421	PCLNR3225P16	32	25	32,0	170	38,0	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878413	PCLNR3225P19	32	25	32,0	170	38,0	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
3878396	PCLNR3232P16	32	32	40,0	170	36,0	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878414	PCLNR3232P19	32	32	40,0	170	36,0	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
3878417	PCLNR4040S19	40	40	50,0	250	36,0	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
left hand													
3900153	PCLNL1616H09	16	16	20,0	100	23,0	CN..090308	512.111	513.019	515.018	511.018	514.018	2.5 mm
3878379	PCLNL1616H12	16	16	20,0	100	26,0	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878418	PCLNL2020K12	20	20	25,0	125	26,0	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878398	PCLNL2525M12	25	25	32,0	150	26,0	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878380	PCLNL2525M16	25	25	32,0	150	28,0	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878397	PCLNL3225P12	32	25	32,0	170	26,0	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878381	PCLNL3225P19	32	25	32,0	170	38,0	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
3878415	PCLNL3232P16	32	32	40,0	170	36,0	CN..160612	512.117	513.025	515.022	511.025	514.125	15 IP
3878393	PCLNL3232P19	32	32	40,0	170	36,0	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP
3878416	PCLNL4040S19	40	40	50,0	250	36,0	CN..190612	512.123	513.033	515.022	511.033	514.133	25 IP



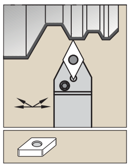
See pages B47–B64 for inserts.



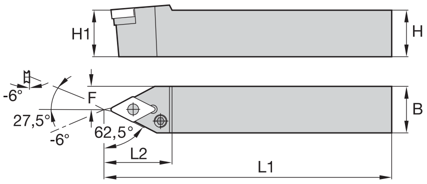
PDJN 93°



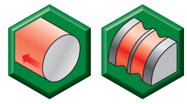
order number	catalogue number	H	B	F	L1	L2	λS°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3878424	**PDJNR1616H11**	16	16	20,0	100	22,0	-6.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3878429	**PDJNR2020K11**	20	20	25,0	125	30,0	-7.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3879318	**PDJNR2020K15**	20	20	25,0	125	36,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879151	**PDJNR2525M11**	25	25	32,0	150	30,0	-7.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3878425	**PDJNR3225P15**	32	25	32,0	170	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879152	**PDJNR3232P15**	32	32	40,0	170	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3878426	**PDJNR4025R15**	40	25	32,0	200	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
left hand														
3879313	**PDJNL1616H11**	16	16	20,0	100	22,0	-6.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3878427	**PDJNL2020K11**	20	20	25,0	125	30,0	-7.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3879317	**PDJNL2020K15**	20	20	25,0	125	36,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3878428	**PDJNL2525M11**	25	25	32,0	150	30,0	-7.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3879314	**PDJNL2525M15**	25	25	32,0	150	—	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15IP
3878423	**PDJNL3225P15**	32	25	32,0	170	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879315	**PDJNL3232P15**	32	32	40,0	170	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879316	**PDJNL4025R15**	40	25	32,0	200	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP



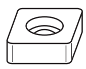
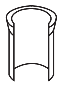
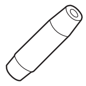
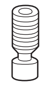
See pages B47–B64 for inserts.

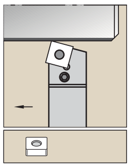


H = H1

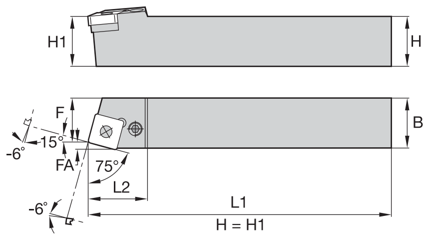


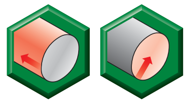
■ PDNN 62,5°

order number	catalogue number	H	B	F	L1	L2	gage insert	 shim	 shim pin	 punch pin	 lever	 lever screw	Torx Plus
right hand													
3879319	**PDNNR2525M15**	25	25	12,5	150	36,0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3900156	**PDNNR3225P15**	32	25	12,5	170	36,0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879322	**PDNNR4025M15**	40	25	12,5	150	36,0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
left hand													
3879320	**PDNNL2525M15**	25	25	12,5	150	36,0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3900155	**PDNNL3225P15**	32	25	12,5	170	36,0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP

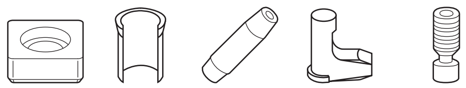


See pages B68–B80 for inserts.

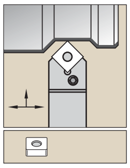




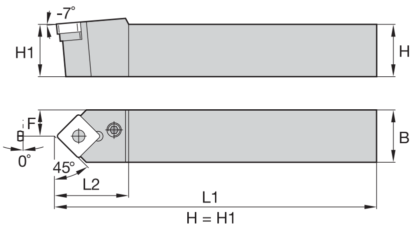
PSBN 75°

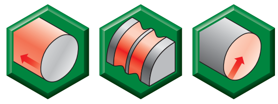


order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3879324	**PSBNR2020K12**	20	20	17,0	125	26,0	3,1	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900158	**PSBNR2525M12**	25	25	22,0	150	26,0	—	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879333	**PSBNR2525M15**	25	25	22,0	150	36,0	3,8	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879330	**PSBNR3232P15**	32	32	27,0	170	33,0	3,8	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879327	**PSBNR3232P19**	32	32	27,0	170	40,0	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879334	**PSBNR4040S19**	40	40	35,0	250	38,0	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879331	**PSBNR4040S25**	40	40	35,0	250	47,0	5,9	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP
left hand														
3879325	**PSBNL2020K12**	20	20	17,0	125	26,0	3,1	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900157	**PSBNL2525M12**	25	25	22,0	150	26,0	—	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879329	**PSBNL2525M15**	25	25	22,0	150	36,0	3,8	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879332	**PSBNL3232P15**	32	32	27,0	170	33,0	3,8	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879328	**PSBNL3232P19**	32	32	27,0	170	40,0	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879323	**PSBNL4040S19**	40	40	35,0	250	38,0	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879326	**PSBNL4040S25**	40	40	35,0	250	47,0	5,9	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP
3900159	**PSBNL5050T25**	50	50	43,0	300	50,0	—	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP

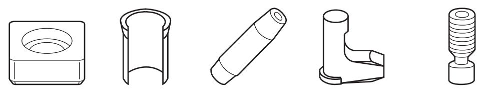


See pages B68–B80 for inserts.

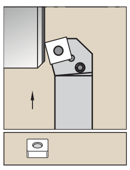




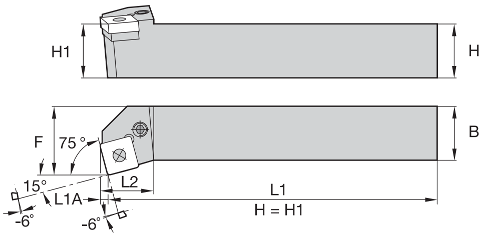
■ PSDN 45°

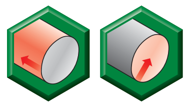


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
3879336	PSDNN1616H09	16	16	8,0	100	20,0	SN..090308	512.053	513.019	515.018	511.018	514.118	10 IP
3879335	PSDNN2020K12	20	20	10,0	125	26,0	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879337	PSDNN2525M12	25	25	12,5	150	26,0	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3900160	PSDNN3225P15	32	25	12,5	170	33,0	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3900161	PSDNN3232P15	32	32	16,0	170	33,0	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879338	PSDNN4040S25	40	40	20,0	250	47,0	SN..250724	512.092	513.038	515.028	511.038	514.138	30 IP

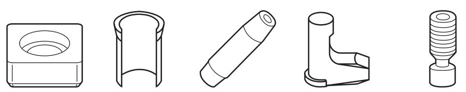


See pages B68–B80 for inserts.

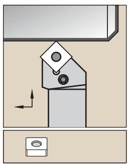




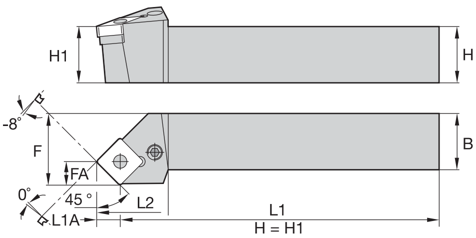
■ PSKN 75°

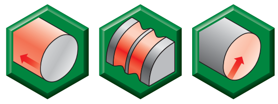


order number	catalogue number	H	B	F	L1	L2	L1A	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3879340	PSKNR2020K12	20	20	25,0	125	23,0	3,1	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879341	PSKNR2525M12	25	25	32,0	150	23,0	3,1	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879708	PSKNR2525M15	25	25	32,0	150	32,0	3,8	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879342	PSKNR3232P19	32	32	40,0	170	37,5	4,6	SN..190612	512.083	513.033	515.022	511.033	514.133	25 IP
3879710	PSKNR4040S19	40	40	50,0	250	37,5	4,6	SN..190612	512.083	513.033	515.022	511.033	514.133	25 IP
left hand														
3879709	PSKNL1616H09	16	16	20,0	100	20,0	2,2	SN..090308	512.053	513.019	515.018	511.018	514.118	10 IP
3879343	PSKNL2020K12	20	20	25,0	125	23,0	3,1	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879339	PSKNL2525M12	25	25	32,0	150	23,0	3,1	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879344	PSKNL3232P19	32	32	40,0	170	37,5	4,6	SN..190612	512.083	513.033	515.022	511.033	514.133	25 IP
3879345	PSKNL4040S19	40	40	50,0	250	37,5	4,6	SN..190612	512.083	513.033	515.022	511.033	514.133	25 IP

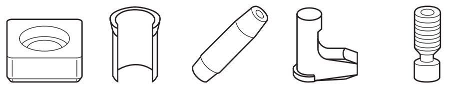


See pages B68–B80 for inserts.

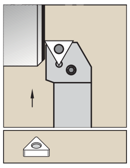




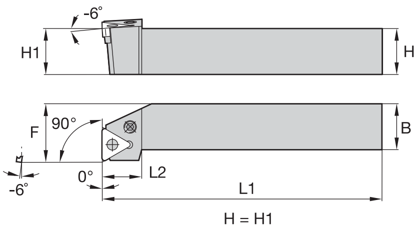
■ PSSN 45°

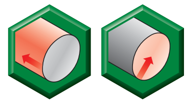


order number	catalogue number	H	B	F	L1	L2	FA	L1A	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand															
3879351	PSSNR1616H09	16	16	20,0	100	23,0	6,1	6,1	SN..090308	512.053	513.019	515.018	511.018	514.118	10 IP
3879359	PSSNR2020K09	20	20	25,0	125	26,0	6,1	6,1	SN..090308	512.053	513.019	515.018	511.018	514.118	10 IP
3879348	PSSNR2020K12	20	20	25,0	125	28,0	8,3	8,3	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879352	PSSNR2525M12	25	25	32,0	150	28,0	8,3	8,3	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879349	PSSNR2525M15	25	25	32,0	150	32,0	10,2	10,2	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879360	PSSNR3225P12	32	25	32,0	170	29,0	8,3	8,3	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879362	PSSNR3225P15	32	25	32,0	170	32,0	10,2	10,2	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879354	PSSNR3232P15	32	32	40,0	170	32,0	10,0	11,5	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879350	PSSNR3232P19	32	32	40,0	170	37,5	12,5	12,5	SN..190612	512.083	513.033	515.022	511.033	514.133	25 IP
3879361	PSSNR4040S19	40	40	50,0	250	37,5	12,5	12,5	SN..190612	512.083	513.033	515.022	511.033	514.133	25 IP
left hand															
3879363	PSSNL1616H09	16	16	20,0	100	23,0	6,1	6,1	SN..090308	512.053	513.019	515.018	511.018	514.118	10 IP
3879844	PSSNL2020K09	20	20	25,0	125	26,0	6,1	6,1	SN..090308	512.053	513.019	515.018	511.018	514.118	10 IP
3879347	PSSNL2020K12	20	20	25,0	125	28,0	8,3	8,3	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879353	PSSNL2525M12	25	25	32,0	150	28,0	8,3	8,3	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879355	PSSNL2525M15	25	25	32,0	150	32,0	10,2	10,2	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879358	PSSNL3225P12	32	25	32,0	170	29,0	8,3	8,3	SN..120408	512.063	513.023	515.018	511.023	–	15 IP
3879843	PSSNL3225P15	32	25	32,0	170	32,0	10,2	10,2	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879712	PSSNL3232P15	32	32	40,0	170	32,0	10,2	10,2	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879356	PSSNL3232P19	32	32	40,0	170	37,5	12,5	12,5	SN..190612	512.083	513.033	515.022	511.033	514.133	25 IP
3879357	PSSNL4040S19	40	40	50,0	250	37,5	12,5	12,5	SN..190612	512.083	513.033	515.022	511.033	514.133	25 IP
3879711	PSSNL4040S25	40	40	50,0	250	50,0	16,0	16,0	SN..250724	512.092	513.038	515.028	511.038	514.138	30 IP

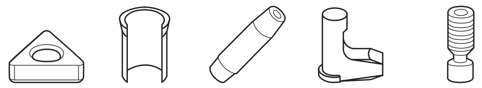


See pages B81–B93 for inserts.

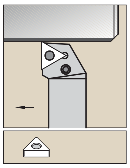




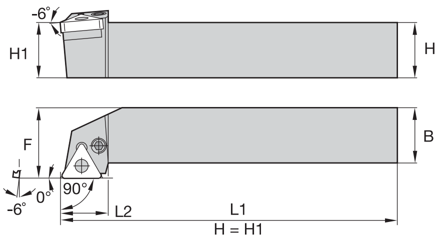
PTFN 90°

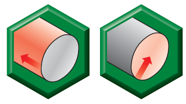


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879369	**PTFNR1616H16**	16	16	20,0	100	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879367	**PTFNR2020K16**	20	20	25,0	125	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879364	**PTFNR2525M16**	25	25	32,0	150	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879372	**PTFNR2525M22**	25	25	32,0	150	26,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879370	**PTFNR3225P22**	32	25	32,0	170	26,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879845	**PTFNR3232P22**	32	32	40,0	170	26,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
left hand													
3879365	**PTFNL1616H16**	16	16	20,0	100	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879366	**PTFNL2020K16**	20	20	25,0	125	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879368	**PTFNL2525M16**	25	25	32,0	150	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP

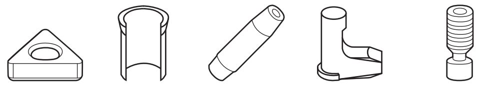


See pages B81–B93 for inserts.

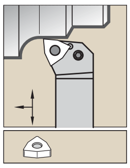




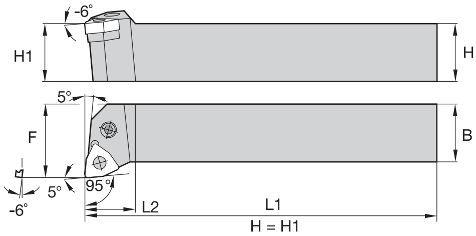
PTGN 90°

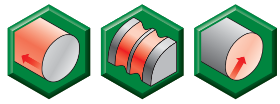


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879385	PTGNR1616H16	16	16	20,0	100	20,0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879389	PTGNR2020K16	20	20	25,0	125	20,0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879390	PTGNR2525M16	25	25	32,0	150	20,0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879387	PTGNR2525M22	25	25	32,0	150	26,0	TN..220408	512.023	513.023	515.018	511.023	514.123	15 IP
3879846	PTGNR3225P22	32	25	32,0	170	28,0	TN..220408	512.023	513.023	515.018	511.023	514.123	15 IP
3879391	PTGNR3232P22	32	32	40,0	170	26,0	TN..220408	512.023	513.023	515.018	511.023	514.123	15 IP
3900163	PTGNR4040T27	40	40	50,0	300	31,0	TN..270612	512.031	513.025	515.022	511.028	514.128	15 IP
left hand													
3879383	PTGNL1616H16	16	16	20,0	100	20,0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879384	PTGNL2020K16	20	20	25,0	125	20,0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879388	PTGNL2525M16	25	25	32,0	150	20,0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879386	PTGNL2525M22	25	25	32,0	150	26,0	TN..220408	512.023	513.023	515.018	511.023	514.123	15 IP
3879392	PTGNL3232P22	32	32	40,0	170	26,0	TN..220408	512.023	513.023	515.018	511.023	514.123	15 IP
3900162	PTGNL4040T27	40	40	50,0	300	31,0	TN..270612	512.031	513.025	515.022	511.028	514.128	15 IP

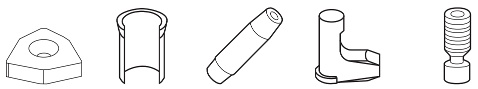


See pages B99–B105 for inserts.

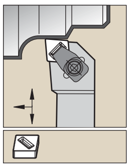




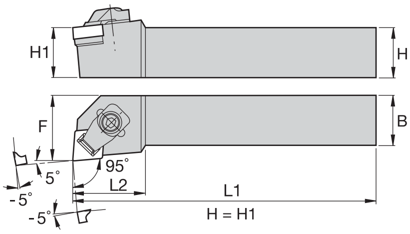
■ PWLN 95°

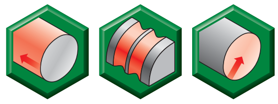


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879405	**PWLNR1616H06**	16	16	20,0	100	14,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879407	**PWLNR2020K06**	20	20	25,0	125	14,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879408	**PWLNR2020K08**	20	20	25,0	125	20,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900167	**PWLNR2525M06**	25	25	32,0	150	20,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879409	**PWLNR2525M08**	25	25	32,0	150	26,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900164	**PWLNR3232P08**	32	32	40,0	170	26,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
left hand													
3879410	**PWLNL1616H06**	16	16	20,0	100	14,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879406	**PWLNL2020K06**	20	20	25,0	125	14,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879403	**PWLNL2020K08**	20	20	25,0	125	20,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900166	**PWLNL2525M06**	25	25	32,0	150	20,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879404	**PWLNL2525M08**	25	25	32,0	150	26,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900165	**PWLNL3232P08**	32	32	40,0	170	26,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP

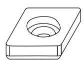
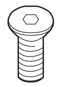
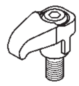


See pages B177–B179 and B197–B205 for inserts.



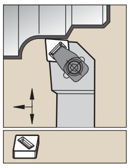


■ CCLN-MX 95°

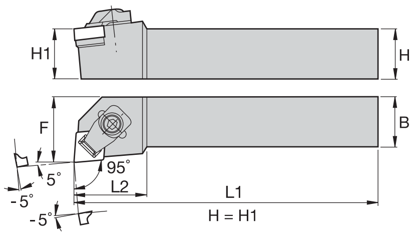




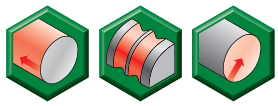
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand												
3032691	**CCLNR2525M12MX7**	25	25	32,0	150	32,0	CN.X120708	**552.221**	**554.252**	2.5 mm	**551.316**	4 mm
3032713	**CCLNR3225P12MX7**	32	25	32,0	170	32,0	CN.X120708	**552.221**	**554.252**	2.5 mm	**551.316**	4 mm
left hand												
3032692	**CCLNL2525M12MX7**	25	25	32,0	150	32,0	CN.X120708	**552.221**	**554.252**	2.5 mm	**551.316**	4 mm

NOTE: MX — clamping version is shown.

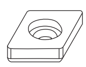
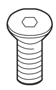
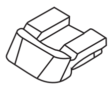
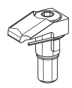


See pages B177–B179 and B197–B205 for inserts.



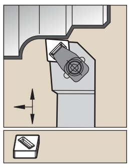


■ CCLN-MN 95°

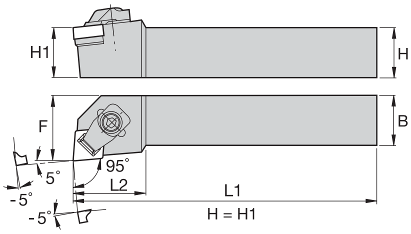





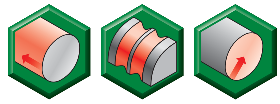
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand													
3032715	**CCLNR2525M12MN4**	25	25	32,0	150	32,0	CN.N120408	**552.220**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3032717	**CCLNR2525M12MN7**	25	25	32,0	150	32,0	CN.N120708	**552.221**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3032719	**CCLNR3225P12MN7**	32	25	32,0	170	32,0	CN.N120708	**552.221**	**554.252**	2.5 mm	–	**551.317**	4 mm
left hand													
3032716	**CCLNL2525M12MN4**	25	25	32,0	150	32,0	CN.N120408	**552.220**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm

NOTE: MX — clamping version is shown.



See pages B177–B179 and B197–B205 for inserts.

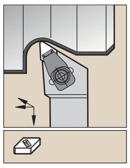




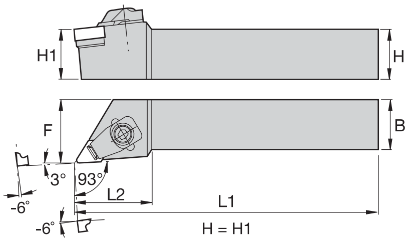
CCLN-MF 95°

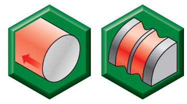
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	chipbreaker	clamp assembly	hex
right hand													
3032723	**CCLNR2525M12MF7**	25	25	32,0	150	32,0	CN.N120708	**552.221**	**554.252**	2.5 mm	**557.125**	**551.317**	4 mm

NOTE: MX — clamping version is shown.

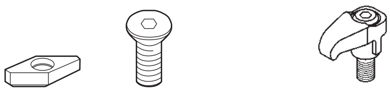


See pages B180–B181 and B206–B216 for inserts.



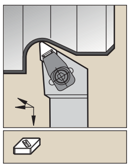


CDJN-MX 93°

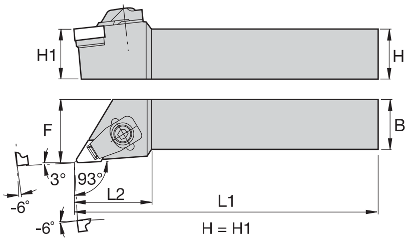


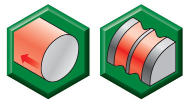
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand												
3032726	**CDJNR2525M15MX7**	25	25	32,0	150	38,0	DN.X150708	**552.228**	**554.252**	2.5 mm	**551.332**	4 mm
left hand												
3032727	**CDJNL2525M15MX7**	25	25	32,0	150	38,0	DN.X150708	**552.228**	**554.252**	2.5 mm	**551.332**	4 mm

NOTE: MX — clamping version is shown.



See pages B180–B181 and B206–B216 for inserts.

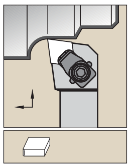




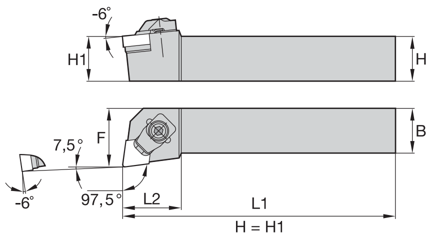
■ CDJN-MN 93°

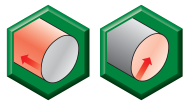
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand													
3032728	**CDJNR2525M15MN7**	25	25	32,0	150	38,0	DN.N150708	**552.228**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3032545	**CDJNR3225P15MN7**	32	25	32,0	170	38,0	DN.N150708	**552.228**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
left hand													
3032544	**CDJNL2525M15MN7**	25	25	32,0	150	38,0	DN.N150708	**552.228**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3032546	**CDJNL3225P15MN7**	32	25	32,0	170	38,0	DN.N150708	**552.228**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm

NOTE: MX — clamping version is shown.



See page B182 for inserts.

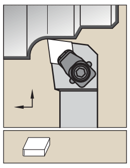




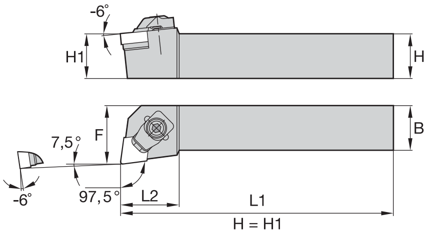
■ CELN-MF 97,5°

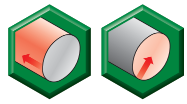
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	chipbreaker	clamp assembly	hex
right hand													
3879700	**CELNR2525M13MF7**	25	25	32,5	153	32,0	EN.N130708	**552.240**	**554.252**	2.5 mm	**557.125**	**551.317**	4 mm
left hand													
3879698	**CELNL2525M13MF7**	25	25	32,5	153	32,0	EN.N130708	**552.240**	**554.252**	2.5 mm	**557.125**	**551.317**	4 mm

NOTE: MN — clamping version is shown.



See page B182 for inserts.

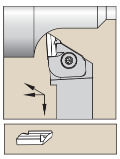


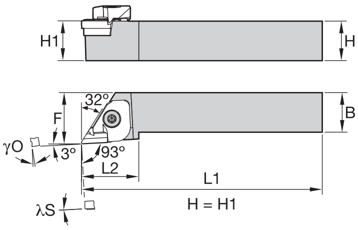


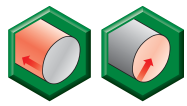
CELN-MN 97,5°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand													
3879701	CELNR2525M13MN7	25	25	32,5	153	32,0	EN.N130708	552.240	554.252	2.5 mm	557.111	551.317	4 mm
left hand													
3879699	CELNL2525M13MN7	25	25	32,5	153	32,0	EN.N130708	552.240	554.252	2.5 mm	557.111	551.317	4 mm

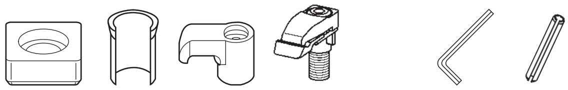
NOTE: MN — clamping version is shown.



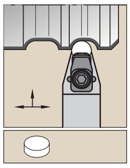




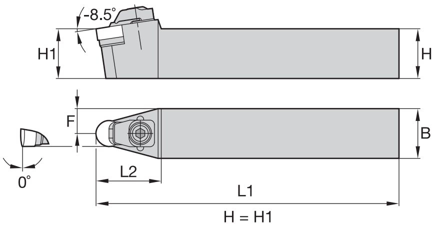
CKJN

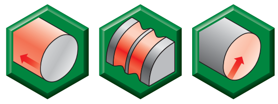


order number	catalogue number	H	B	F	L1	L2	λS°	γO°	gage insert	shim	shim pin	clamp	clamp assembly	hex	hex wrench	pin
right hand																
3870064	CKJNR2525M16	25	25	32,0	150	36,0	0.0	-6.0	KN..160410R	512.100	513.020	551.129	—	4 mm	170.004	513.123
3870065	CKJNR3225P16	32	25	32,0	170	33,0	0.0	-6.0	KN..160410R	512.100	513.020	551.129	—	4 mm	170.004	513.123
left hand																
3870042	CKJNL2525M16	25	25	32,0	150	36,0	0.0	-6.0	KN..160410L	512.101	513.020	—	551.130	4 mm	170.004	513.123
3870063	CKJNL3225P16	32	25	32,0	170	33,0	0.0	-6.0	KN..160410L	512.101	513.020	—	551.130	4 mm	170.004	513.123

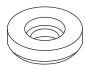
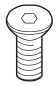
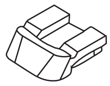
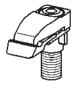


See pages B183–B185 and B210 for inserts.

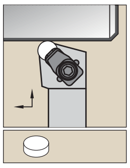




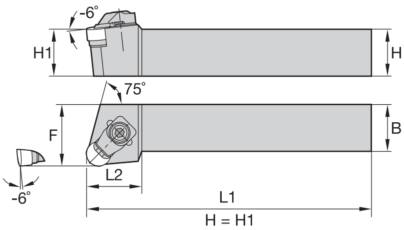
CRDN-MN

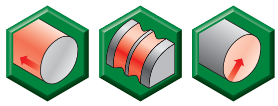
order number	catalogue number	H	B	F	L1	L2	gage insert	shim 	shim screw 	hex	thrust plate 	clamp assembly 	hex
3032549	**CRDNN2525M12MN4**	25	25	12,5	150	30,0	RN.N120400	**552.229**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032551	**CRDNN2525M12MN7**	25	25	12,5	150	30,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032550	**CRDNN3225P12MN4**	32	25	12,5	170	30,0	RN.N120400	**552.229**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032552	**CRDNN3225P12MN7**	32	25	12,5	170	30,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm

NOTE: MN — clamping version is shown.

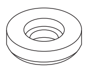
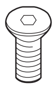
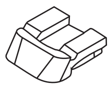
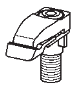


See pages B183–B185 and B210 for inserts.

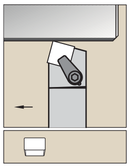




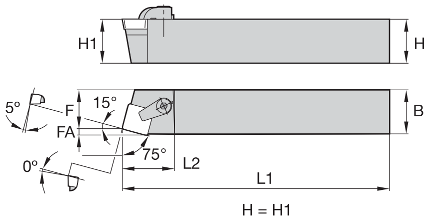
CRSN-MN

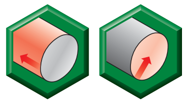
order number	catalogue number	H	B	F	L1	L2	gage insert	shim 	shim screw 	hex	thrust plate 	clamp assembly 	hex
right hand													
3032677	**CRSNR2525M12MN7**	25	25	32,0	150	26,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032675	**CRSNR3225P12MN4**	32	25	32,0	170	26,0	RN.N120400	**552.229**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032679	**CRSNR3225P12MN7**	32	25	32,0	170	26,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
left hand													
3032678	**CRSNL2525M12MN7**	25	25	32,0	150	26,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032676	**CRSNL3225P12MN4**	32	25	32,0	170	26,0	RN.N120400	**552.229**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032680	**CRSNL3225P12MN7**	32	25	32,0	170	26,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm

NOTE: MN — clamping version is shown.



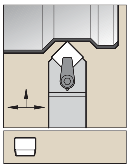
See pages B186–B191 and B211–B212 for inserts.



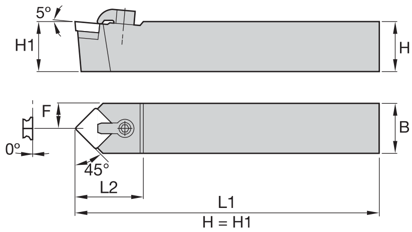


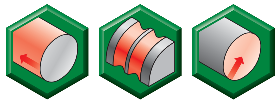
CSBP 75°

order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
right hand														
3870068	**CSBPR2020K12**	20	20	17,0	125	30,0	3,1	SP..120308	**SM840**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870069	**CSBPR2525M12**	25	25	22,0	150	30,0	3,1	SP..120308	**SM840**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
left hand														
3870066	**CSBPL2020K12**	20	20	17,0	125	30,0	3,1	SP..120308	**SM840**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm



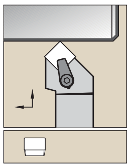
See pages B186–B191 and B211–B212 for inserts.



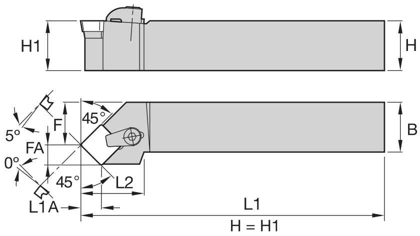


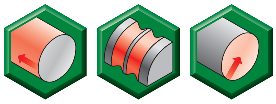
CSDP 45°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
3870070	**CSDPN1616H09**	16	16	8,0	100	25,0	SP..090308	**SM820**	**MS959**	–	**CKM7**	**STCM9**	2.5 mm
3870071	**CSDPN2020K12**	20	20	10,0	125	32,0	SP..120308	**SM840**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870072	**CSDPN2525M12**	25	25	12,5	150	32,0	SP..120308	**SM840**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm



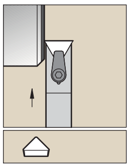
See pages B186–B191 and B211–B212 for inserts.



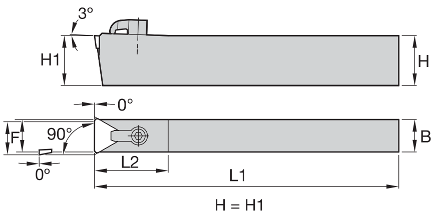


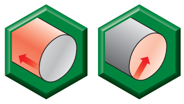
CSSP 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
right hand															
3870074	CSSPR2020K12	20	20	25,0	125	32,0	8,7	8,3	SP..120308	SM840	MS111	2 mm	CKM10	STCM8	4 mm
3870075	CSSPR2525M12	25	25	32,0	150	32,0	8,7	8,3	SP..120308	SM840	MS111	2 mm	CKM9	STCM4	4 mm
left hand															
3870073	CSSPL2525M12	25	25	32,0	150	32,0	8,7	8,3	SP..120308	SM840	MS111	2 mm	CKM9	STCM4	4 mm



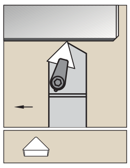
See pages B192–B194 and B212–B216 for inserts.



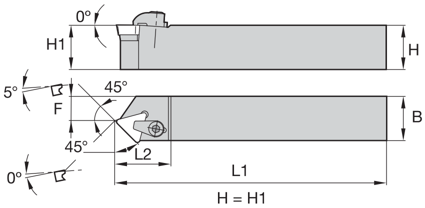


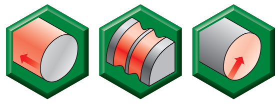
CTCP 90°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
3870080	CTCPN4018R22	40	18	19,2	200	41,0	TP..220408	SM837	MS125	2.5 mm	CKM13	STCM4	4 mm
3870076	CTCPN2510M11	25	10	10,0	150	26,0	TP..110304	SM819	MS960	–	CKM7	STCM5	2.5 mm
3870077	CTCPN2514M16	25	14	14,4	150	28,0	TP..160308	SM841	MS111	2 mm	CKM13	STCM4	4 mm
3870078	CTCPN2518M22	25	18	19,2	150	41,0	TP..220408	SM837	MS125	2.5 mm	CKM13	STCM4	4 mm
3870079	CTCPN2520M22	25	20	20,2	150	41,0	TP..220408	SM837	MS125	2.5 mm	CKM13	STCM4	4 mm

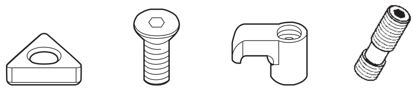


See pages B192–B194 and B212–B216 for inserts.

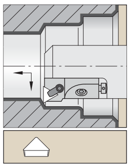




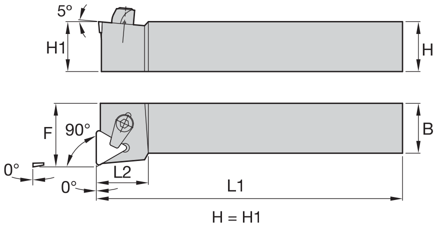
CTDP 45°

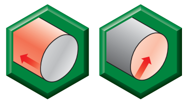


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	clamp	clamp screw	hex
right hand												
3870083	**CTDPR1212F11**	12	12	6,0	80	22,0	TP..110304	**SM819**	**MS960**	**CKM19**	**STCM9**	2.5 mm
left hand												
3870082	**CTDPL1212F11**	12	12	6,0	80	22,0	TP..110304	**SM819**	**MS960**	**CKM19**	**STCM9**	2.5 mm



See pages B192–B194 and B212–B216 for inserts.

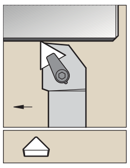


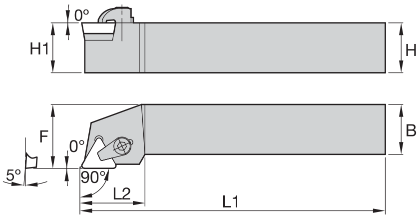


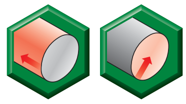
CTFP 90°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
right hand													
3870087	**CTFPR2020K16**	20	20	25,0	125	29,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870088	**CTFPR2525M16**	25	25	32,0	150	29,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm
left hand													
3870086	**CTFPL2525M16**	25	25	32,0	150	29,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm

WIDIA



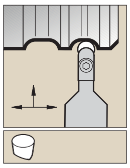




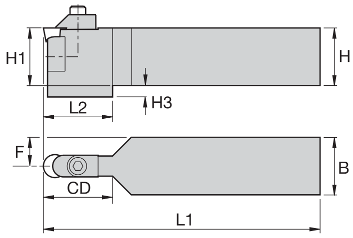
See pages B192–B194 and B212–B216 for inserts.

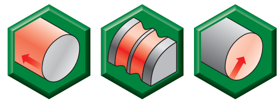
CTGP 90°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
right hand													
3870092	**CTGPR1212F11**	12	12	16,0	80	20,0	TP..110304	**SM819**	**MS960**	–	**CKM19**	**STCM9**	2.5 mm
3870103	**CTGPR1616H11**	16	16	20,0	100	20,0	TP..110304	**SM819**	**MS960**	–	**CKM19**	**STCM9**	2.5 mm
3870104	**CTGPR2020K11**	20	20	25,0	125	20,0	TP..110304	**SM819**	**MS960**	–	**CKM19**	**STCM9**	2.5 mm
3870105	**CTGPR2020K16**	20	20	25,0	125	26,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870106	**CTGPR2525M16**	25	25	32,0	150	26,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm
3870107	**CTGPR2525M22**	25	25	32,0	150	30,0	TP..220408	**SM837**	**MS125**	2.5 mm	**CKM9**	**STCM4**	4 mm
left hand													
3870089	**CTGPL1212F11**	12	12	16,0	80	20,0	TP..110304	**SM819**	**MS960**	–	**CKM19**	**STCM9**	2.5 mm
3870090	**CTGPL2020K16**	20	20	25,0	125	26,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870091	**CTGPL2525M16**	25	25	32,0	150	26,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm

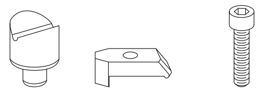


See page B184 for inserts.



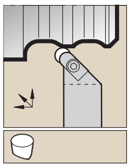


CRDP

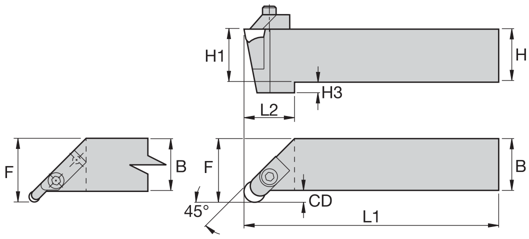


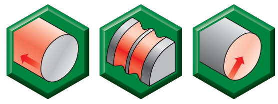
order number	catalogue number	H	B	F	L1	L2	H3	CD	gage insert	nest	clamp	clamp screw	hex
3871510	**CRDPN2525M06V**	25	25	12,5	151	—	—	19,0	R..X060400E	**NST1**	**CM214**	**MS1321**	2.5 mm
3871512	**CRDPN3232P09V**	32	32	16,0	171	—	—	29,0	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871511	**CRDPN2525M09V**	25	25	12,5	151	—	—	29,0	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871514	**CRDPN3232P12V**	32	32	16,0	171	—	—	38,0	R..X120700E	**NST3**	**CM216**	**CS412**	9/64
3871513	**CRDPN2525M12V**	25	25	12,5	151	38,1	6,4	38,0	R..X120700E	**NST3**	**CM216**	**CS412**	9/64

NOTE: CRDP toolholders are able to use RPGX and RCGX insert styles.

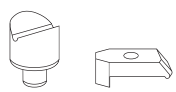


See page B184 for inserts.



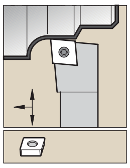


CRGP

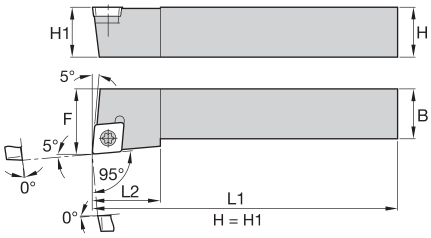


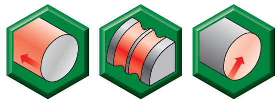
order number	catalogue number	H	B	F	L1	L2	H3	CD	gage insert	nest	clamp	clamp screw	hex
right hand													
3871515	**CRGPR2525M06V**	25	25	32,0	151	—	—	7,3	R..X060400E	**NST1**	**CM214**	**MS1321**	2.5 mm
3871519	**CRGPR3232P09V**	32	32	40,0	171	—	—	8,3	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871517	**CRGPR2525M09V**	25	25	32,0	151	—	—	7,3	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871521	**CRGPR2525M12V**	25	25	32,0	151	27,1	6,4	7,3	R..X120700E	**NST3**	**CM216**	**CS412**	9/64
left hand													
3871516	**CRGPL2525M06V**	25	25	32,0	151	—	—	7,3	R..X060400E	**NST1**	**CM214**	**MS1321**	2.5 mm
3871520	**CRGPL3232P09V**	32	32	40,0	171	—	—	8,3	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871518	**CRGPL2525M09V**	25	25	32,0	151	—	—	7,3	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871524	**CRGPL3232P12V**	32	32	40,0	171	37,1	—	8,3	R..X120700E	**NST3**	**CM216**	**CS412**	9/64
3871522	**CRGPL2525M12V**	25	25	32,0	151	27,1	6,4	7,3	R..X120700E	**NST3**	**CM216**	**CS412**	9/64

NOTE: CRGP toolholders are able to use RPGX and RCGX insert styles.

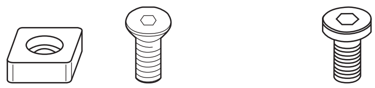


See pages B30–B46 for inserts.

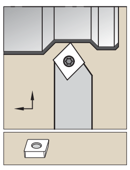




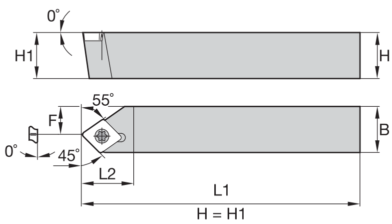
■ SCLC 95°

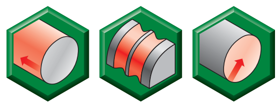


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3900169	**SCLCR1010E06**	10	10	12,0	70	12,0	CC..060204	**–**	**–**	–	**MS1153**	T7
3900172	**SCLCR1212F06**	12	12	16,0	80	12,0	CC..060204	**–**	**–**	–	**MS1153**	T7
3900170	**SCLCR1212F09**	12	12	16,0	80	16,0	CC..09T308	**–**	**–**	–	**MS1155**	T15
3879416	**SCLCR1616H09**	16	16	20,0	100	16,0	CC..09T308	**SKCP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879417	**SCLCR2020K09**	20	20	25,0	125	16,0	CC..09T308	**SKCP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879414	**SCLCR2020K12**	20	20	25,0	125	20,0	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15
3879418	**SCLCR2525M12**	25	25	32,0	150	19,8	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15
left hand												
3900171	**SCLCL1010E06**	10	10	12,0	70	12,0	CC..060204	**–**	**–**	–	**MS1153**	T7
3900173	**SCLCL1212F06**	12	12	16,0	80	12,0	CC..060204	**–**	**–**	–	**MS1153**	T7
3900168	**SCLCL1212F09**	12	12	16,0	80	16,0	CC..09T308	**–**	**–**	–	**MS1155**	T15
3879411	**SCLCL1616H09**	16	16	20,0	100	16,0	CC..09T308	**SKCP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879412	**SCLCL2020K09**	20	20	25,0	125	16,0	CC..09T308	**SKCP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879415	**SCLCL2020K12**	20	20	25,0	125	20,0	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15
3879413	**SCLCL2525M12**	25	25	32,0	150	19,8	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15

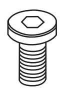


See pages B30–B46 for inserts.

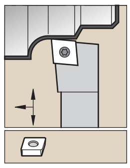




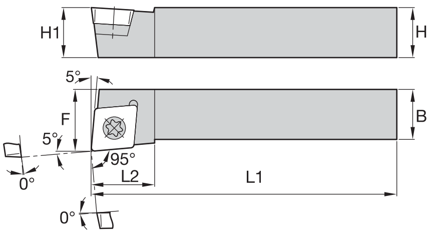
■ SCDP 45°

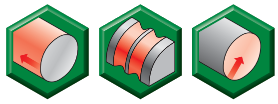


order number	catalogue number	H	B	F	L1	L2	gage insert	insert screw	Torx
right hand									
5094163	**SCDPR1212H06**	12	12	7,0	100	14,0	CP..060203	**MS1153**	T7
left hand									
5094162	**SCDPL1212H06**	12	12	7,0	100	14,0	CP..060203	**MS1153**	T7

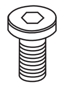


See pages B30–B46 for inserts.

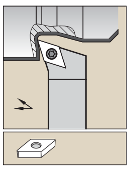




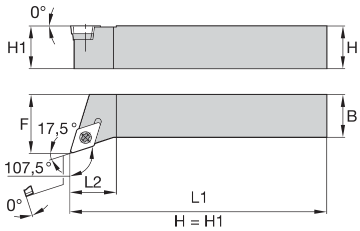
SCLP 95°

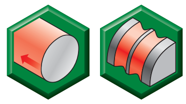


order number	catalogue number	H	B	F	L1	L2	gage insert	insert screw	Torx
right hand									
5094217	**SCLPR1010M06**	10	10	11,0	150	11,4	CP..060203	**MS1153**	T7
5094218	**SCLPR1212M06**	12	12	13,0	150	11,4	CP..060203	**MS1153**	T7
left hand									
5094212	**SCLPL1212M06**	12	12	13,0	150	11,4	CP..060203	**MS1153**	T7

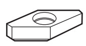
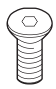
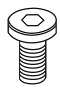


See pages B47–B64 for inserts.



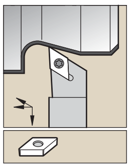


SDHC 107,5°

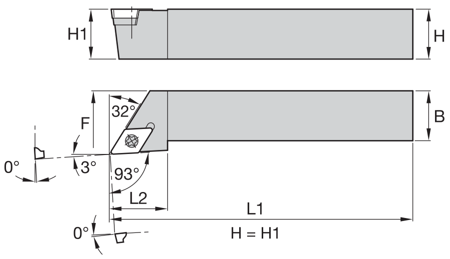




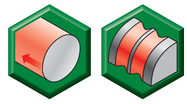
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3879435	**SDHCR1616H11**	16	16	20,0	100	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879437	**SDHCR2020K11**	20	20	25,0	125	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879440	**SDHCR2525M11**	25	25	32,0	150	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879436	**SDHCR2525M15**	25	25	32,0	150	25,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
left hand												
3879433	**SDHCL1616H11**	16	16	20,0	100	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879439	**SDHCL2020K11**	20	20	25,0	125	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879438	**SDHCL2525M11**	25	25	32,0	150	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879434	**SDHCL2525M15**	25	25	32,0	150	25,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15

Tools for External Turning and Internal Boring

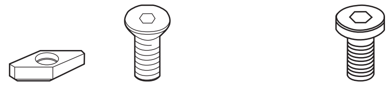


See pages B47–B64 for inserts.



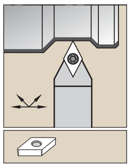


SDJC 93°

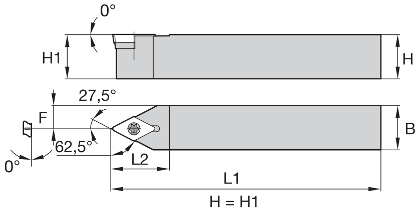


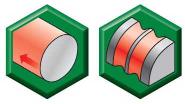
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3879464	**SDJCR1010M07**	10	10	12,0	150	16,0	DC..070204	**–**	**–**	–	**MS1153**	T7
3899890	**SDJCR1212F07**	12	12	16,0	80	16,0	DC..070204	**–**	**–**	–	**MS1153**	T7
3900177	**SDJCR1212F11**	12	12	16,0	80	22,0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3879456	**SDJCR1616H07**	16	16	20,0	100	16,0	DC..070204	**–**	**–**	–	**MS1153**	T7
3879459	**SDJCR1616H11**	16	16	20,0	100	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879458	**SDJCR2020K07**	20	20	25,0	125	16,0	DC..070204	**–**	**–**	–	**MS1153**	T7
3879460	**SDJCR2020K11**	20	20	25,0	125	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879457	**SDJCR2020K15**	20	20	25,0	125	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
3879461	**SDJCR2525M11**	25	25	32,0	150	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879463	**SDJCR2525M15**	25	25	32,0	150	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
3900175	**SDJCR3225P15**	32	25	32,0	170	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
left hand												
3899892	**SDJCL1010E07**	10	10	12,0	70	16,0	DC..070204	**–**	**–**	–	**MS1153**	T7
3899891	**SDJCL1212F07**	12	12	16,0	80	16,0	DC..070204	**–**	**–**	–	**MS1153**	T7
3900176	**SDJCL1212F11**	12	12	16,0	80	22,0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3879441	**SDJCL1616H07**	16	16	20,0	100	16,0	DC..070204	**–**	**–**	–	**MS1153**	T7
2024450	**SDJCL1616H11**	16	16	20,0	100	21,0	DC..11T3..	**–**	**–**	–	**12148038800**	T15
3879454	**SDJCL1616H11**	16	16	20,0	100	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879442	**SDJCL2020K07**	20	20	25,0	125	16,0	DC..070204	**–**	**–**	–	**MS1153**	T7
3879462	**SDJCL2020K11**	20	20	25,0	125	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879848	**SDJCL2020K15**	20	20	25,0	125	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
3879453	**SDJCL2525M11**	25	25	32,0	150	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879455	**SDJCL2525M15**	25	25	32,0	150	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
3900174	**SDJCL3225P15**	32	25	32,0	170	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15

WIDIA



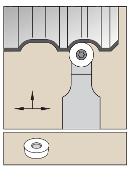
See pages B47–B64 for inserts.



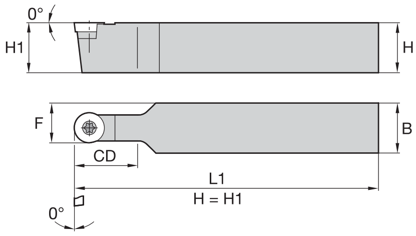


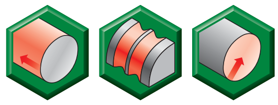
SDNC 62,5°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
left hand												
3879468	SDNCN0808L07	8	8	4,0	140	16,0	DC..070204	–	–	–	MS1153	T7
3879469	SDNCN1010M07	10	10	5,0	150	16,0	DC..070204	–	–	–	MS1153	T7
3900178	SDNCN1212F11	12	12	6,0	80	22,0	DC..11T308	SKDP343	SRS3	3.5 mm	MS1156	T15
3879465	SDNCN1616H11	16	16	8,0	100	22,0	DC..11T308	SKDP343	SRS3	3.5 mm	MS1156	T15
3879467	SDNCN2020K11	20	20	10,0	125	22,0	DC..11T308	SKDP343	SRS3	3.5 mm	MS1156	T15
3879849	SDNCN2525M11	25	25	12,5	150	25,0	DC..11T308	SKDP343	SRS3	3.5 mm	MS1156	T15
3879466	SDNCN2525M15	25	25	12,5	150	28,0	DC..150408	SKDP453	SRS4	4 mm	MS1158	T15
3900179	SDNCN3225P15	32	25	12,5	170	32,5	DC..150408	SKDP453	SRS4	4 mm	MS1158	T15



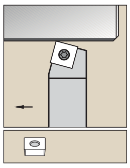
See pages B65–B67 for inserts.



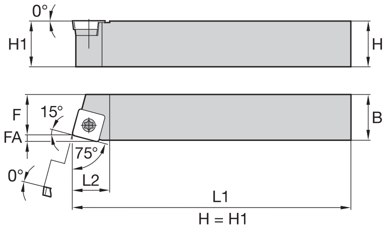


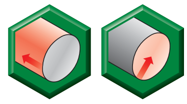
SRDC

order number	catalogue number	H	B	F	L1	CD	gage insert	shim	shim screw	hex	insert screw	Torx
3879735	SRDCN1616H06	16	16	11,0	100	16,0	RC..0602M0	–	–	–	MS1153	T7
3879702	SRDCN1616H08	16	16	12,0	100	16,0	RC..0803M0	–	–	–	MS1154	T9
3900182	SRDCN2020K06	20	20	12,5	125	19,7	RC..0602M0	–	–	–	MS1153	T7
3879733	SRDCN2020K08	20	20	14,0	125	20,0	RC..0803M0	–	–	–	MS1154	T9
3879736	SRDCN2020K10	20	20	15,0	125	20,0	RC..10T3M0	SKRN100300	SRS3	3.5 mm	MS1156	T15
3900183	SRDCN2525M06	25	25	15,0	150	19,7	RC..0602M0	–	–	–	MS1153	T7
3879737	SRDCN2525M08	25	25	16,5	150	25,0	RC..0803M0	–	–	–	MS1154	T9
3879734	SRDCN2525M10	25	25	17,5	150	25,0	RC..10T3M0	SKRN100300	SRS3	3.5 mm	MS1156	T15
3879738	SRDCN2525M12	25	25	18,5	150	25,0	RC..1204M0	SKRN1203M0	SRS3	3.5 mm	MS1156	T15
3900181	SRDCN3225P12	32	25	8,0	170	28,0	RC..1204M0	SKRN1203M0	SRS3	3.5 mm	MS1156	T15
3900180	SRDCN3225P16	32	25	20,0	170	35,0	RC..1605M0	SKRN160400	SRS5	5 mm	MS1160	T20

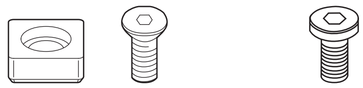


See pages B68–B80 for inserts.

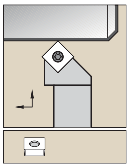




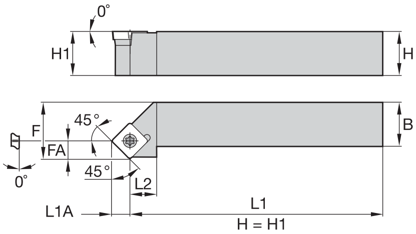
SSBC 75°

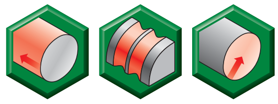


order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim screw	hex	insert screw	Torx
right hand													
3879850	**SSBCR1616H09**	16	16	13,0	100	16,0	2,2	SC..096308	**SKSP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879741	**SSBCR2020K12**	20	20	17,0	125	21,0	3,1	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
3879740	**SSBCR2525M12**	25	25	22,0	150	21,0	3,1	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
left hand													
3879739	**SSBCL1616H09**	16	16	13,0	100	16,0	2,2	SC..09T308	**SKSP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879852	**SSBCL2020K12**	20	20	17,0	125	21,0	3,1	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
3879851	**SSBCL2525M12**	25	25	22,0	150	21,0	3,1	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15

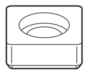
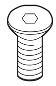
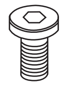


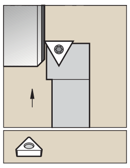
See pages B68–B80 for inserts.



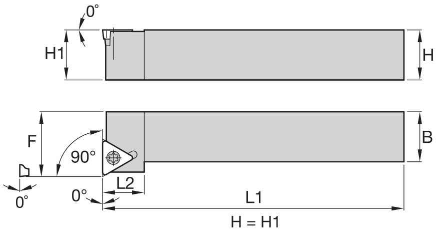


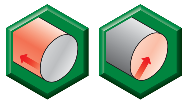
■ SSSC 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	gage insert	 shim	 shim screw	hex	 insert screw	Torx
right hand														
3879747	**SSSCR1616H09**	16	16	20,0	100	18,0	6,1	6,1	SC..09T308	**SKSP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879746	**SSSCR2020K12**	20	20	25,0	125	25,0	8,3	8,3	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
3879744	**SSSCR2525M12**	25	25	32,0	150	25,0	8,3	8,3	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
left hand														
3879745	**SSSCL1616H09**	16	16	20,0	100	18,0	6,1	6,1	SC..09T308	**SKSP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879743	**SSSCL2020K12**	20	20	25,0	125	25,0	8,3	8,3	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
3879742	**SSSCL2525M12**	25	25	32,0	150	25,0	8,3	8,3	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15



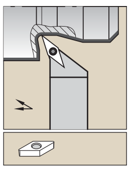
See pages B81–B93 for inserts.



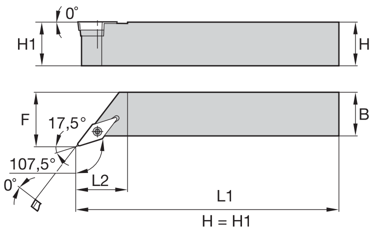


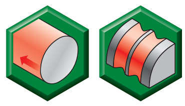
STFC 90°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3900184	**STFCR1212F11**	12	12	16,0	80	13,0	TC..110204	**–**	**–**	–	**MS1153**	T7
3879763	**STFCR2020K16**	20	20	25,0	125	20,0	TC..16T308	**SKTP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879750	**STFCR2525M16**	25	25	32,0	150	20,0	TC..16T308	**SKTP343**	**SRS3**	3.5 mm	**MS1156**	T15
left hand												
3879751	**STFCL1616H16**	16	16	20,0	100	20,0	TC..16T308	**SKTP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879748	**STFCL2020K16**	20	20	25,0	125	20,0	TC..16T308	**SKTP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879752	**STFCL2525M16**	25	25	32,0	150	20,0	TC..16T308	**SKTP343**	**SRS3**	3.5 mm	**MS1156**	T15



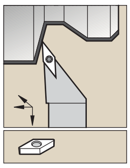
See pages B94–B99 for inserts.



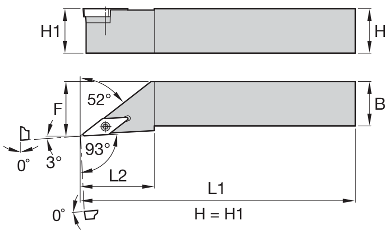


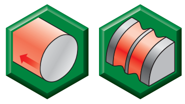
SVHB 107,5°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3879767	**SVHBR2020K16**	20	20	25,0	125	28,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879765	**SVHBR2525M16**	25	25	32,0	150	28,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879853	**SVHBR3225P16**	32	25	32,0	170	25,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
left hand												
3879764	**SVHBL2020K16**	20	20	25,0	125	28,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879766	**SVHBL2525M16**	25	25	32,0	150	28,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879768	**SVHBL3225P16**	32	25	32,0	170	25,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15

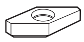
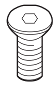
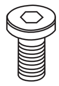


See pages B94–B99 for inserts.

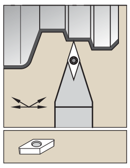




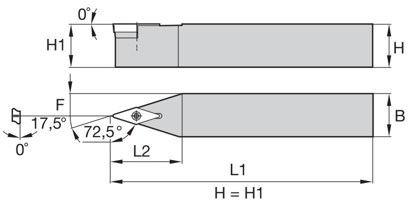
SVJB 93°

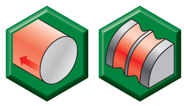




order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3879769	**SVJBR1616H16**	16	16	20,0	100	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879776	**SVJBR2020K16**	20	20	25,0	125	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879775	**SVJBR2525M16**	25	25	32,0	150	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879773	**SVJBR3225P16**	32	25	32,0	170	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
left hand												
3879772	**SVJBL1616H16**	16	16	20,0	100	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879770	**SVJBL2020K16**	20	20	25,0	125	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879774	**SVJBL2525M16**	25	25	32,0	150	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879771	**SVJBL3225P16**	32	25	32,0	170	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15

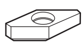
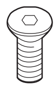
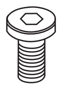


See pages B94–B99 for inserts.





SVVB 72,5°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
3879777	**SVVBN2020K16**	20	20	10,0	125	33,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879778	**SVVBN2525M16**	25	25	12,5	150	33,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879779	**SVVBN3225P16**	32	25	12,5	170	33,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15

Today's modern boring operations require the most reliable, high-performance tools. WIDIA™ offers an extensive range of toolholders for internal boring to meet even the most precise production demands across a broad spectrum of workpiece shapes and sizes.

Tools for Internal Boring

WIDIA boring bars, available with both a conventional steel shank or a vibration-resistant carbide shank and coolant hole, guarantee consistent results and enhanced production reliability.

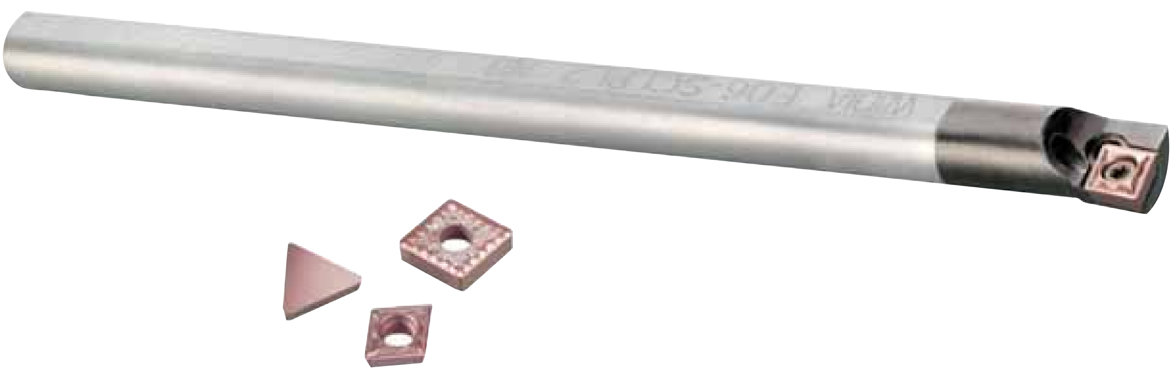
D-Style Clamping

- Used for negative style inserts.
- Clamp assembly contains clamp, screw, and retaining ring.
- Quick insert indexing.
- Ensures insert repeatability and seating.
- Reduced chatter and extended tool life.

P-Style Clamping

- Lever-type clamping system for negative indexable inserts.
- No interference to chip flow.
- Fast insert changes.

P-style available in metric sizes only.



S-Style Clamping

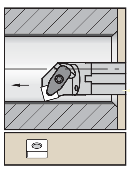
- Screw clamping system for positive indexable inserts.
- Compact design for high reliability and cost efficiency.
- Carbide shim for additional tool protection.

C-Style Clamping

- Height-adjustable clamp permits use of additional chipbreakers.
- Universal clamping system for positive and negative flat top inserts.
- Robust engineering makes it easy to handle.
- Carbide shim for extra tool protection.

WIDIA

Each unique clamping system offers product options to fill your specific toolholder needs. Find the illustration that fits your application and navigate to the corresponding page to get the correct solution.



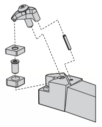
A-DCLN — Product Name

Application Illustration

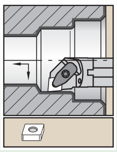
Page: C56 — Page Number

D-Style Clamping

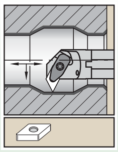
D



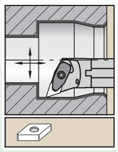
One-piece clamp assembly holder for use with negative style inserts. An extremely rigid clamping system. The tool is protected by a carbide shim.



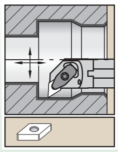
A-DCLN
95°
Page: **C56**



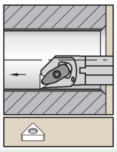
A-DDPN
117,5°
Page: **C56**



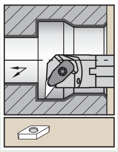
A-DDQN
107,5°
Page: **C57**



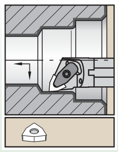
A-DDUN
93°
Page: **C57**



A-DTFN
90°
Page: **C58**



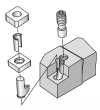
DVUN
93°
Page: **C58**



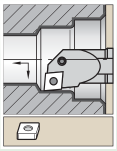
A-DWLN
95°
Page: **C59**

P-Style Clamping

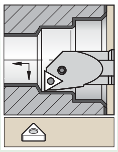
P



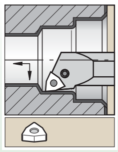
Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20mm in diameter. Inserts with one- and two-side chip control geometries have positive rakes from 6° to 18°. Advantages of this system are fast insert changes and no interference with chip flow.



A-PCLN
95°
Page: **C60**



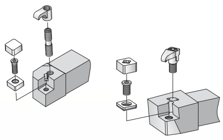
A-PTFN
90°
Page: **C60**



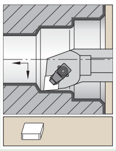
A-PWLN
95°
Page: **C61**

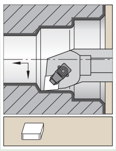
C-Style Clamping

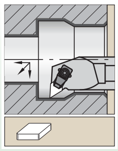
C

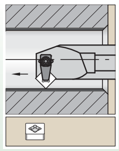


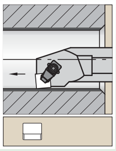
Top clamping system for negative and positive indexable inserts to DIN 4968. This universal clamping system is robust and easy to handle. Some height-adjustable clamps enable the use of additional chipbreakers. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of 16mm and insert iCs greater than 6,35mm.

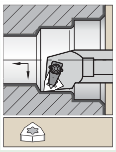

S-CCLN-MX 95° Page: C62

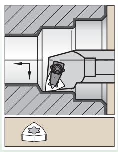

S-CCLN-MN 95° Page: C62


S-CDQN-MX Page: C63


S-CSSN-MX 45° Page: C63

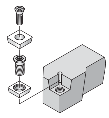

S-CSYN-MN 85° Page: C64


S-CWLN-MX 95° Page: C64

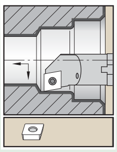

A-CTFP 90° Page: C65

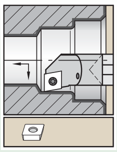
S-Style Clamping

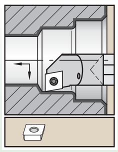
S

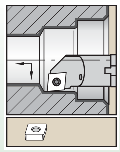


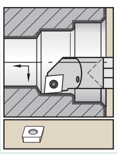
Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967. Compact design using a minimum of spare parts for high reliability and cost efficiency. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of .625" and insert iCs from .375" are secured by means of a threaded bushing.

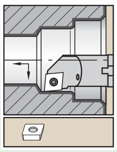

A-SCFP 90° Page: C66

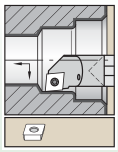

E-SCFC 90° Page: C66

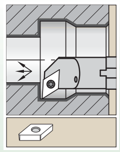

E-SCFP 90° Page: C67

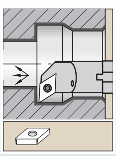

A-SCLC 95° Page: C67

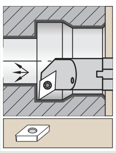

E-SCLC 95° Page: C68

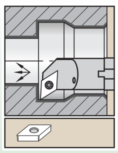

A-SCLP 95° Page: C69

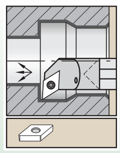

E-SCLP 95° Page: C70

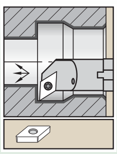

A-SDQC 107,5° Page: C71

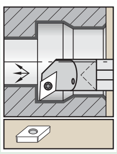

E-SDQC 107,5° Page: C72

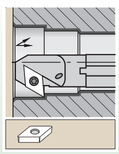

A-SDQP Page: C72

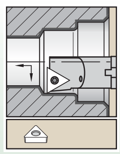

A-SDUC 93° Page: C73

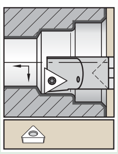

E-SDUC 93° Page: C74

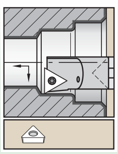

A-SDUP 93° Page: C75

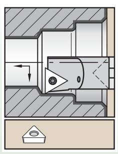

E-SDUP 93° Page: C75

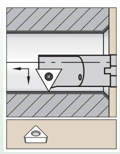

A-SDXP 95° Page: C76

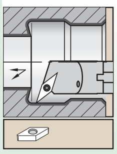

A-STFC 90° Page: C76

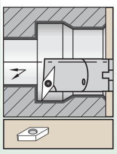

E-STFC 90° Page: C77


A-STFP 90° Page: C78


E-STFP 90° Page: C79


A-STWP 60° Page: C80


A-SVQB 107,5° Page: C80


A-SVUB 93° Page: C81

WIDIA

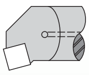
How Do Catalogue Numbers Work?

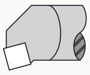
Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.

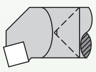
A32SDCLNL12KC04

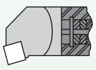
A	32	S	D	C
Bar Type	Bar Diameter	Bar Length**	Insert Holding Method	Insert Shape

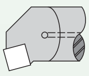
A — Bar Type

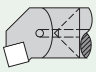
A 
Steel bar with coolant

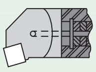
S 
Steel bar without coolant

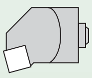
C 
Carbide bar

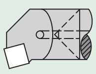
D 
DeVibrator bar with coolant

D 
Tunable bar with coolant

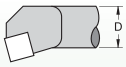
E 
Carbide bar with coolant

B 
DeVibrator

H 
Interchangeable head

L 
Heavy metal bar with coolant

32 — Bar Diameter



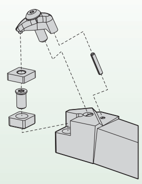
Metric:
A two-digit number indicates the bar diameter in mm.
If the diameter is represented by a one digit number, a 0 (zero) will be used in front of it.
Example:
8mm = 08

S — Bar Length**

3	=	F
3.5	=	G
4	=	H
4.5	=	J
5	=	K
5.5	=	L
6	=	M
6.5	=	N
7	=	Q
8	=	R
10	=	S
12	=	T
14	=	U
16	=	V
18	=	W
20	=	Y

**Used only when more than one length is available or a special length is required.

D — Insert Holding Method

D


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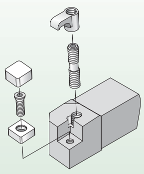

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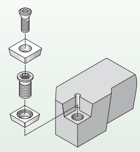
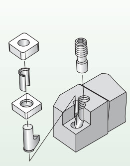
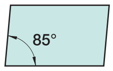
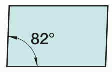
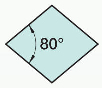


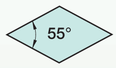
P


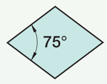
C — Insert Shape

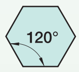
A 

B 

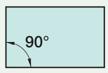
C 

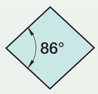
D 

E 

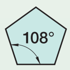
H 

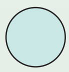
K 

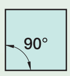
L 

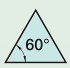
M 

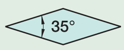
O 

P 

R 

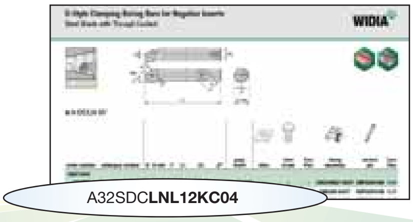
S 

T 

V 

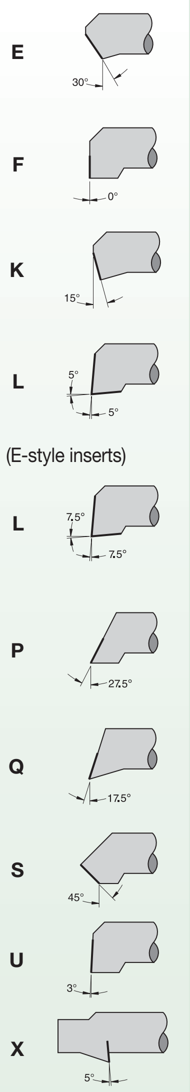
W 

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



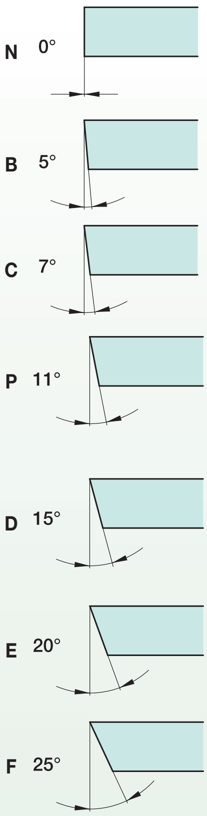
L

Bar Style or Lead Angle



N

Insert Clearance Angle

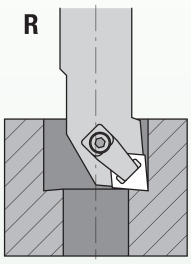


L

Hand of Tool

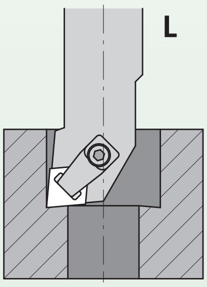
R =

Right-hand boring bar



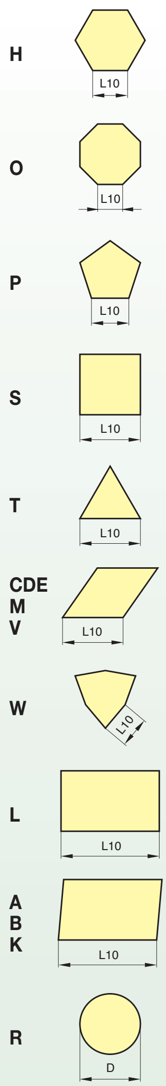
L =

Left-hand boring bar



12

Insert Size Cutting Edge Length L10



KC04

Additional Information

M... =

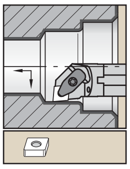
M.. MF, MN, MX, for ceramic and PcBN inserts

KC =

D-Style Clamping

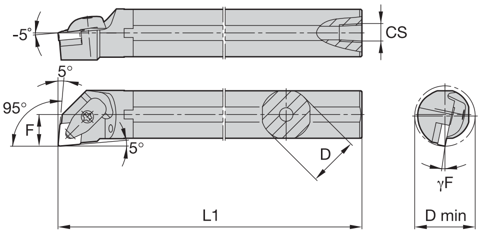
+ =

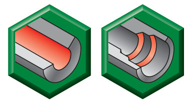
Insert thickness



Steel shank with through coolant.

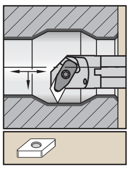
See pages B30–B46 for inserts.





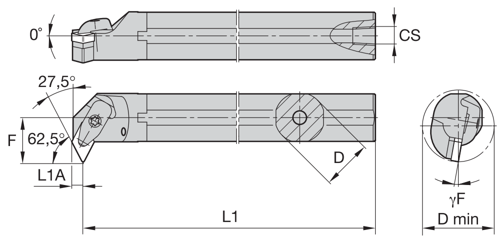
A-DCLN 95°

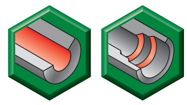
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand														
5696071	A25RDCLNR12KC04	25	32,0	17,0	200	1/4-18 NPT	-12.0	CN..120408	–	–	–	CM234RLP ASSY	SSP025016M	15 IP
5696073	A32SDCLNR12KC04	32	40,0	22,0	250	1/4-18 NPT	-12.0	CN..120408	ICSN433	KMSP415IP	15 IP	CM234R ASSY	SSP025016M	15 IP
5696075	A40TDCLNR12KC04	40	50,0	27,0	300	1/4-18 NPT	-9.0	CN..120408	ICSN433	KMSP415IP	15 IP	CM234R ASSY	SSP025016M	15 IP
5696077	A40TDCLNR16KC06	32	45,0	27,0	250	1/4-18 NPT	-12.0	CN..160612	ICSN533	KMSP515IP	15 IP	CM209R ASSY	SSP025018M	15 IP
left hand														
5696072	A25RDCLNL12KC04	25	32,0	17,0	200	1/4-18 NPT	-12.0	CN..120408	–	–	–	CM234RLP ASSY	SSP025016M	15 IP
5696074	A32SDCLNL12KC04	40	50,0	27,0	300	1/4-18 NPT	-9.0	CN..120408	ICSN433	KMSP415IP	15 IP	CM234R ASSY	SSP025016M	15 IP
5696076	A40TDCLNL12KC04	32	45,0	27,0	250	1/4-18 NPT	-12.0	DN..150608	ICSN433	KMSP415IP	15 IP	CM234R ASSY	SSP025016M	15 IP
5696078	A40TDCLNL16KC06	32	45,0	27,0	250	1/4-18 NPT	-12.0	CN..160612	ICSN533	KMSP515IP	15 IP	CM209R ASSY	SSP025018M	15 IP



Steel shank with through coolant.

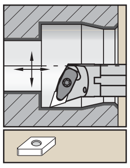
See pages B47–B64 for inserts.





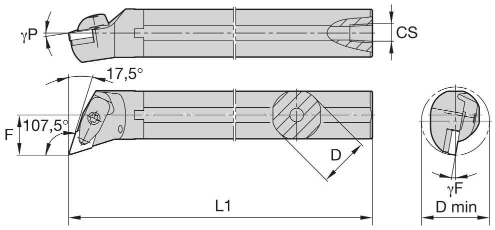
A-DDPN 117,5°

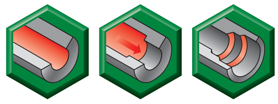
order number	catalogue number	D	D min	F	L1	L1A	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand															
5696079	A25RDDPNR11KC04	32	45,0	27,0	250	6,5	1/4-18 NPT	-12.0	DN..150608	IDSN322	KMSP315IP	15 IP	CM234RLP ASSY	SSP025016M	15 IP
5696080	A32SDDPNR15KC06	40	52,0	30,0	300	6,6	1/4-18 NPT	-10.0	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	SSP025016M	15 IP
5696082	A40TDDPNR15KC06	40	52,0	30,0	300	6,6	1/4-18 NPT	-10.0	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	SSP025016M	15 IP
left hand															
5696081	A32SDDPNL15KC06	40	52,0	30,0	300	6,6	1/4-18 NPT	-10.0	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	SSP025016M	15 IP
5696083	A40TDDPNL15KC06	40	52,0	30,0	300	6,6	1/4-18 NPT	-10.0	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	SSP025016M	15 IP



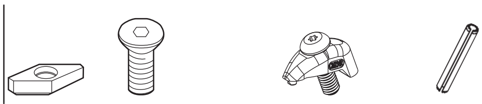
Steel shank with through coolant.

See pages B47–B64 for inserts.

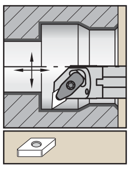




A-DDQN 107,5°

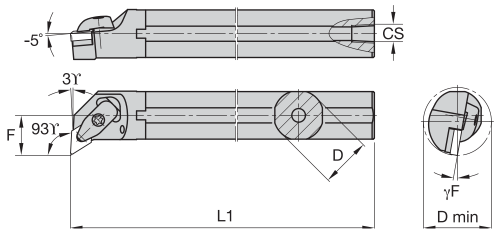


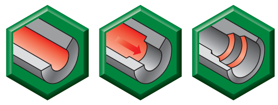
order number	catalogue number	D	D min	F	L1	CS	γF°	γP°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand															
5696085	**A32SDDQNR15KC06**	32	40,0	22,0	250	1/4-18 NPT	-12.0	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696087	**A40TDDQNR15KC06**	40	50,0	27,0	300	1/4-18 NPT	-10.0	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
left hand															
5696086	**A32SDDQNL15KC06**	32	40,0	22,0	250	1/4-18 NPT	-12.0	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696088	**A40TDDQNL15KC06**	40	50,0	27,0	300	1/4-18 NPT	-10.0	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP



Steel shank with through coolant.

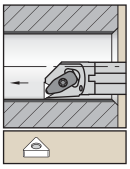
See pages B47–B64 for inserts.





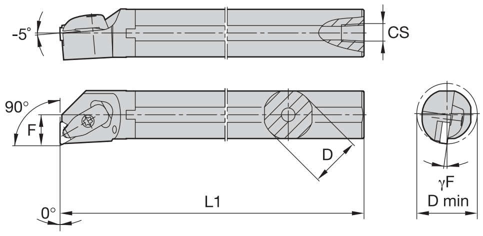
A-DDUN 93°

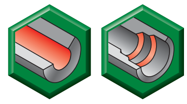
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand														
5696089	**A25RDDUNR11KC04**	25	32,0	17,0	200	1/4-18 NPT	-12.0	DN..110408	–	–	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696211	**A32SDDUNR11KC04**	32	40,0	22,0	250	1/4-18 NPT	-12.0	DN..110408	**IDSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696213	**A32SDDUNR15KC06**	32	40,0	22,0	250	1/4-18 NPT	-12.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696215	**A40TDDUNR15KC06**	40	50,0	27,0	300	1/4-18 NPT	-9.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696217	**A50UDDUNR15KC06**	50	63,0	35,0	350	1/4-18 NPT	-7.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
left hand														
5696210	**A25RDDUNL11KC04**	25	32,0	17,0	200	1/4-18 NPT	-12.0	DN..110408	–	–	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696212	**A32SDDUNL11KC04**	32	40,0	22,0	250	1/4-18 NPT	-12.0	DN..110408	**IDSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696214	**A32SDDUNL15KC06**	32	40,0	22,0	250	1/4-18 NPT	-12.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696216	**A40TDDUNL15KC06**	40	50,0	27,0	300	1/4-18 NPT	-9.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696218	**A50UDDUNL15KC06**	50	63,0	35,0	350	1/4-18 NPT	-7.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP



Steel shank with through coolant.

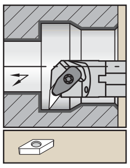
See pages B81–B93 for inserts.





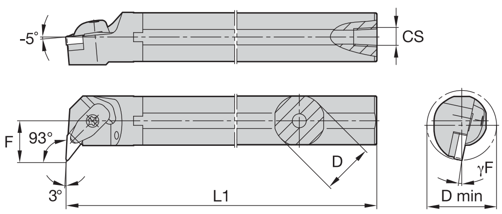
■ A-DTFN 90°

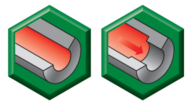
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand														
5696219	**A25RDTFNR16KC04**	25	32,0	17,0	200	1/4-18 NPT	-14.0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696261	**A32SDTFNR16KC04**	32	40,0	22,0	250	1/4-18 NPT	-12.0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
left hand														
5696260	**A25RDTFNL16KC04**	25	32,0	17,0	200	1/4-18 NPT	-14.0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696262	**A32SDTFNL16KC04**	32	40,0	22,0	250	1/4-18 NPT	-12.0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP



Steel shank with through coolant.

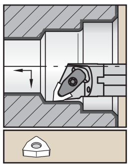
See pages B94–B99 for inserts.





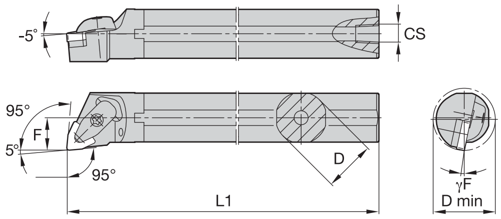
■ A-DVUN 93°

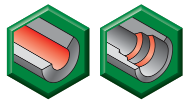
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand														
5696263	**A32SDVUNR16KC04**	32	40,0	22,0	250	1/4-18 NPT	-9.0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696265	**A40TDVUNR16KC04**	40	50,0	27,0	300	1/4-18 NPT	-8.0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	**SSP025016M**	15 IP
left hand														
5696264	**A32SDVUNL16KC04**	32	40,0	22,0	250	1/4-18 NPT	-9.0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696266	**A40TDVUNL16KC04**	40	50,0	27,0	300	1/4-18 NPT	-8.0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	**SSP025016M**	15 IP



Steel shank with through coolant.

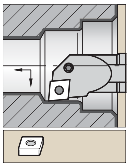
See pages B99–B105 for inserts.





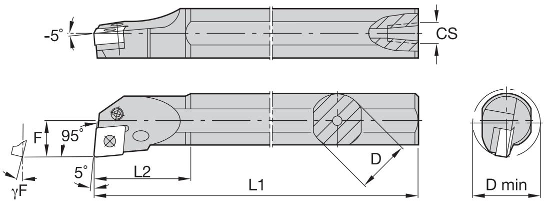
A-DWLN 95°

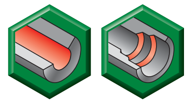
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand														
5696267	**A25RDWLNR06KC04**	25	32,0	17,0	200	1/4-18 NPT	-14.0	WN..060408	**–**	**–**	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696269	**A25RDWLNR08KC04**	25	32,0	17,0	200	1/4-18 NPT	-12.0	WN..080408	**–**	**–**	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696281	**A32SDWLNR08KC04**	32	40,0	22,0	250	1/4-18 NPT	-14.0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696283	**A40TDWLNR08KC04**	40	50,0	27,0	300	1/4-18 NPT	-14.0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
left hand														
5696268	**A25RDWLNL06KC04**	25	32,0	17,0	200	1/4-18 NPT	-14.0	WN..060408	**–**	**–**	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696280	**A25RDWLNL08KC04**	25	32,0	17,0	200	1/4-18 NPT	-12.0	WN..080408	**–**	**–**	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696282	**A32SDWLNL08KC04**	32	40,0	22,0	250	1/4-18 NPT	-14.0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696284	**A40TDWLNL08KC04**	40	50,0	27,0	300	1/4-18 NPT	-14.0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP



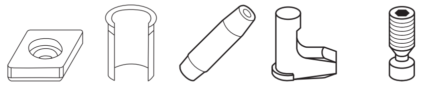
Steel shank with through coolant.

See pages B30–B46 for inserts.

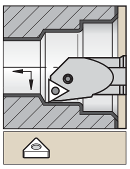




■ A-PCLN 95°

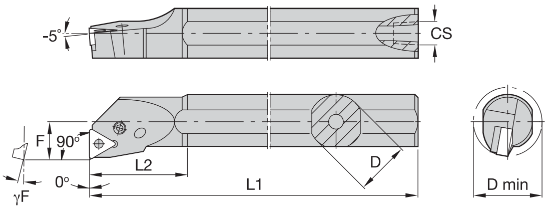


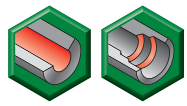
order number	catalogue number	D	D min	F	L1	L2	CS	γF°	gage insert	shim	shim pin	pin	toggle lever	lever screw	Torx Plus
right hand															
3883468	**A25TPCLNR12**	25	32,0	17,0	300	40	1/4-18 NPT	-12.0	CN..120408	–	–	–	**511.022**	**514.122**	10 IP
3883466	**A32UPCLNR12**	32	40,0	22,0	350	50	1/4-18 NPT	-10.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883463	**A40VPCLNR12**	40	50,0	27,0	400	55	1/4-18 NPT	-10.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883442	**A40VPCLNR16**	40	50,0	27,0	400	55	1/4-18 NPT	-11.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
left hand															
3883469	**A25TPCLNL12**	25	32,0	17,0	300	40	1/4-18 NPT	-12.0	CN..120408	–	–	–	**511.022**	**514.122**	10 IP
3883467	**A32UPCLNL12**	32	40,0	22,0	350	50	1/4-18 NPT	-10.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883465	**A40VPCLNL12**	40	50,0	27,0	400	55	1/4-18 NPT	-10.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883464	**A40VPCLNL16**	40	50,0	27,0	400	55	1/4-18 NPT	-11.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP



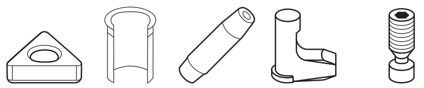
Steel shank with through coolant.

See pages B81–B93 for inserts.

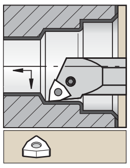




■ A-PTFN 90°

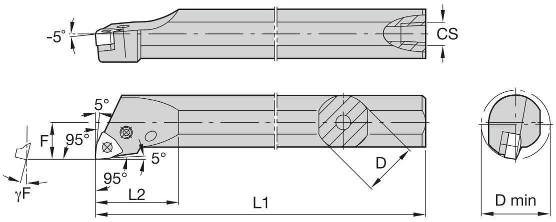


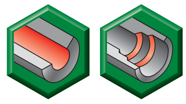
order number	catalogue number	D	D min	F	L1	L2	CS	γF°	gage insert	shim	shim pin	pin	toggle lever	lever screw	Torx Plus
right hand															
3883263	**A25TPTFNR16**	25	32,0	17,0	300	40	1/4-18 NPT	-12.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3883151	**A32UPTFNR16**	32	40,0	22,0	350	50	1/4-18 NPT	-10.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3883149	**A40VPTFNR22**	40	48,0	27,0	400	55	1/4-18 NPT	-10.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
left hand															
3883264	**A25TPTFNL16**	25	32,0	17,0	300	40	1/4-18 NPT	-12.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3883150	**A40VPTFNL22**	40	48,0	27,0	400	55	1/4-18 NPT	-10.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP



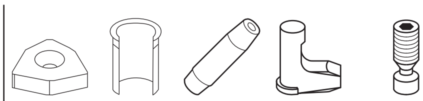
Steel shank with
through coolant.

See pages B99–B105
for inserts.

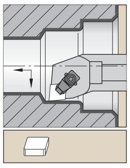
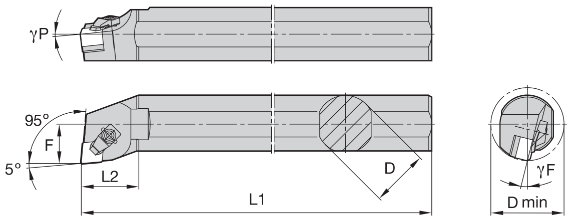


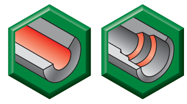


■ A-PWLN 95°



order number	catalogue number	D	D min	F	L1	L2	CS	γF°	gage insert	shim	shim pin	pin	toggle lever	lever screw	Torx Plus
right hand															
3883459	**A16RPWLNR06**	16	27,0	11,0	200	32	1/8-27 NPT	-12.0	WN..060408	**–**	**–**	**–**	**511.030**	**514.112**	–
3883455	**A20SPWLNR06**	20	25,0	13,0	250	–	1/8-27 NPT	-14.0	WN..060408	**–**	**–**	**–**	**511.030**	**514.112**	8 IP
3883458	**A25RPWLNR08**	25	32,0	17,0	200	–	1/4-18 NPT	-12.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883454	**A32SPWLNR08**	32	40,0	22,0	250	50	1/4-18 NPT	-10.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	–
left hand															
3883461	**A16RPWLNL06**	16	27,0	11,0	200	32	1/8-27 NPT	-12.0	WN..060408	**–**	**–**	**–**	**511.030**	**514.112**	–
3883457	**A20SPWLNL06**	20	25,0	13,0	250	–	1/8-27 NPT	-14.0	WN..060408	**–**	**–**	**–**	**511.030**	**514.112**	8 IP
3883456	**A32SPWLNL08**	32	40,0	22,0	250	50	1/4-18 NPT	-10.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	–

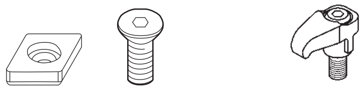





See pages B177–B179 and B197–B205 for inserts.

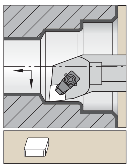
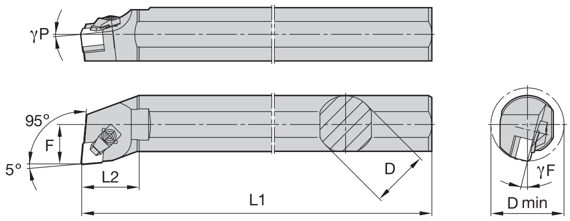
Steel shank with through coolant.

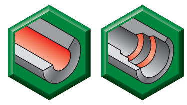
S-CCLN-MX 95°



order number	catalogue number	D	D min	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand														
3883565	**S32SCCLNR12MX7**	32	40,0	22,0	251	43	-14.0	-5.0	CN.X120708	**–**	**–**	–	**551.316**	4 mm
3029009	**S40TCCLNR12MX7**	40	55,0	27,0	300	40	-14.0	-6.0	CN.X120708	**552.221**	**554.252**	2.5 mm	**551.316**	4 mm
left hand														
3883564	**S32SCCLNL12MX7**	32	40,0	22,0	251	43	-14.0	-5.0	CN.X120708	**–**	**–**	–	**551.316**	4 mm
3029010	**S40TCCLNL12MX7**	40	55,0	27,0	300	40	-14.0	-6.0	CN.X120708	**552.221**	**554.252**	2.5 mm	**551.316**	4 mm

NOTE: MN — clamping version is shown.

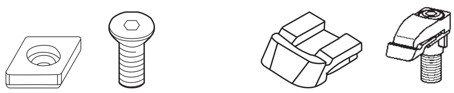





See pages B177–B179 and B197–B205 for inserts.

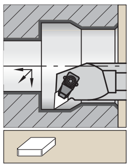
Steel shank with through coolant.

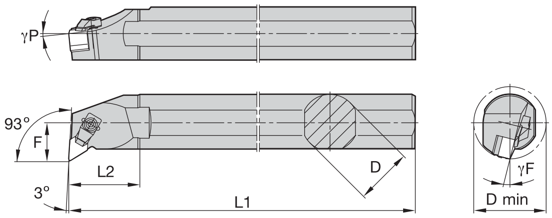
S-CCLN-MN 95°



order number	catalogue number	D	D min	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand															
3029011	**S40TCCLNR12MN4**	40	55,0	27,0	300	40	-14.0	-6.0	CN.N120408	**552.220**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3029143	**S40TCCLNR12MN7**	40	55,0	27,0	300	40	-14.0	-6.0	CN.N120708	**552.221**	**554.253**	2.5 mm	**557.111**	**551.317**	4 mm
left hand															
3029012	**S40TCCLNL12MN4**	40	55,0	27,0	300	40	-14.0	-6.0	CN.N120408	**552.220**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3029144	**S40TCCLNL12MN7**	40	55,0	27,0	300	40	-14.0	-6.0	CN.N120708	**552.221**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm

NOTE: MN — clamping version is shown.

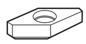
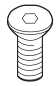
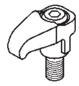




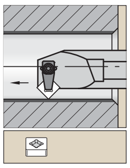
See pages B180–B181 and B206–B216 for inserts.

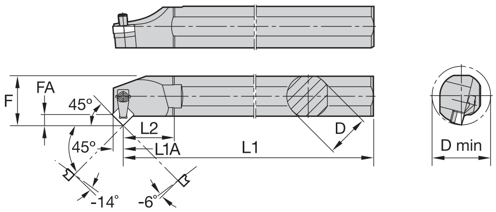
Steel shank with through coolant.

■ S-CDQN-MX

order number	catalogue number	D	D min	F	L1	L2	γF°	γP°	gage insert	shim 	shim screw 	hex	clamp assembly 	hex
right hand														
3883567	**S40TCDQNR12MX7**	40	50,0	27,0	302	45,0	-14.0	-5.0	DN.X120708	**552.225**	**554.254**	2.5 mm	**551.316**	4 mm
left hand														
3883566	**S40TCDQNL12MX7**	40	50,0	27,0	302	45,0	-14.0	-5.0	DN.X120708	**552.225**	**554.254**	2.5 mm	**551.316**	4 mm

NOTE: MN — clamping version is shown.

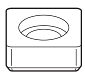
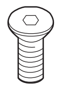
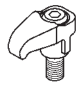




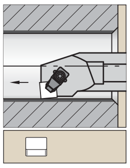
See pages B186–B191 and B211–B212 for inserts.

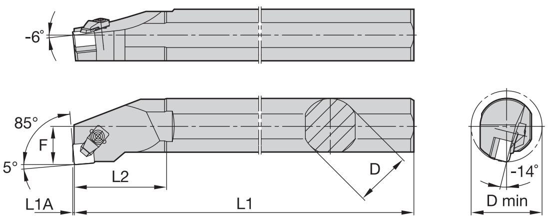
Steel shank with through coolant.

■ S-CSSN-MX 45°

order number	catalogue number	D	D min	F	L1	L2	L1A	FA	gage insert	shim 	shim screw 	hex	clamp assembly 	hex
right hand														
3029151	**S40TCSSNR12MX7**	40	55,0	27,0	300	67,0	8,5	8,2	SN.X120708	**552.232**	**554.252**	2.5 mm	**551.316**	4 mm
left hand														
3029152	**S40TCSSNL12MX7**	40	55,0	27,0	300	67,0	8,5	8,2	SN.X120708	**552.232**	**554.252**	2.5 mm	**551.316**	4 mm

NOTE: MX — clamping version is shown.





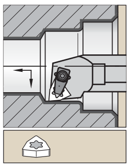
See pages B186–B191 and B211–B212 for inserts.

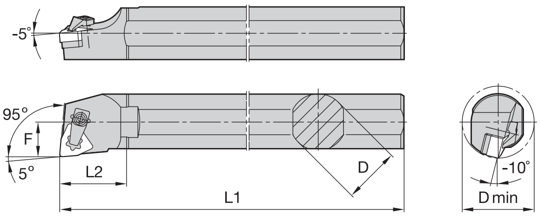
Steel shank with through coolant.

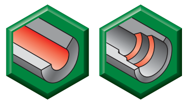
S-CSYN-MN 85°

order number	catalogue number	D	D min	F	L1	L2	L1A	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand														
3883569	**S40TCSYNR12MN7**	40	55,0	27,0	300	67,0	1,0	SN.N120708	**552.232**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
left hand														
3883568	**S40TCSYNL12MN7**	40	55,0	27,0	300	67,0	1,0	SN.N120708	**552.232**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm

NOTE: MN — clamping version is shown.



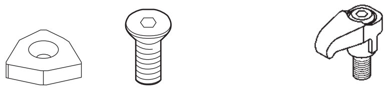




See pages B195–B198 and B218 for inserts.

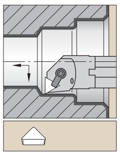
Steel shank with through coolant.

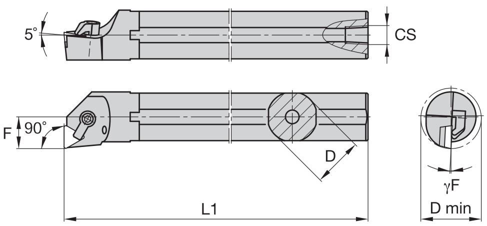
S-CWLN-MX 95°

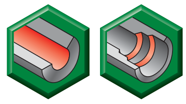


order number	catalogue number	D	D min	F	L1	L2	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand												
3029153	**S40TCWLNR08MX7**	40	80,0	27,0	300	55,0	WN.X080708	**552.210**	**554.252**	2.5 mm	**551.316**	4 mm
left hand												
3029154	**S40TCWLNL08MX7**	40	80,0	27,0	300	55,0	WN.X080708	**552.210**	**554.252**	2.5 mm	**551.316**	4 mm

NOTE: MX — clamping version is shown.



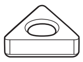
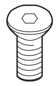
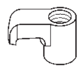
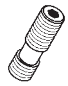


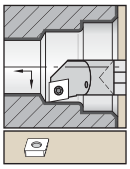


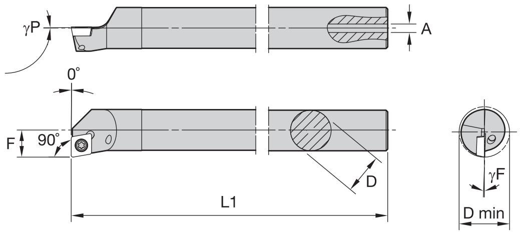
See pages B192–B194 and B212–B216 for inserts.

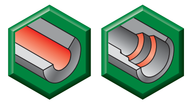
Steel shank with through coolant.

A-CTFP 90°

order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	 shim	 shim screw	hex	 clamp	 clamp screw	hex
right hand														
3883451	**A16RCTFPR11**	16	20,0	11,0	200	1/8-27 NPT	-4.0	TP..110304	**–**	**–**	–	**CKM19**	**STCM9**	2.5 mm
3883450	**A25RCTFPR16**	25	32,0	17,0	200	1/4-18 NPT	-3.0	TP..160308	**SM841**	**MS110**	2 mm	**CKM10**	**STCM8**	4 mm
left hand														
3883453	**A16RCTFPL11**	16	20,0	11,0	200	1/8-27 NPT	-4.0	TP..110304	**–**	**–**	–	**CKM19**	**STCM9**	2.5 mm
3883452	**A25RCTFPL16**	25	32,0	17,0	200	1/4-18 NPT	-3.0	TP..160308	**SM841**	**MS110**	2 mm	**CKM10**	**STCM8**	4 mm



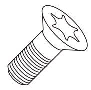




Carbide shank with through coolant.

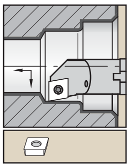
See pages B30–B46 for inserts.

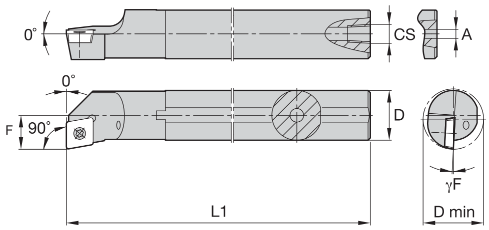
E-SCFC 90°

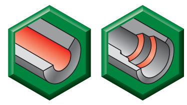


order number	catalogue number	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand											
2023600	**E08KSCFCR06**	8	11,0	6,0	125	3,0	-12.0	0.0	CC..060204	**12148036300**	T8
left hand											
2031019	**E08KSCFCL06**	8	11,0	6,0	125	3,0	-12.0	0.0	CC..060204	**12148036300**	T8

Steel Shank with Through Coolant



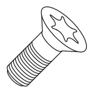




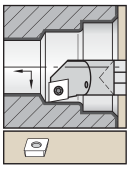
Steel shank with through coolant.

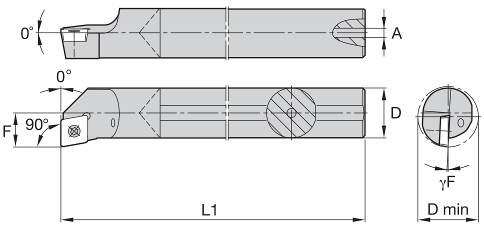
See pages B30–B46 for inserts.

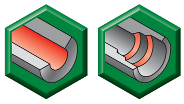
A-SCFP 90°



order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
5077442	**A08JSCFPR06**	8	11,0	6,0	110	2,4	—	-8.0	CP..0602..	**MS1153**	T7
5077449	**A10KSCFPR06**	10	13,0	7,0	125	3,2	—	-6.0	CP..0602..	**MS1153**	T7
5077497	**A12MSCFPR06**	12	16,0	9,0	150	—	1/16 - 27 NPT	-4.0	CP..0602..	**MS1153**	T7
5077552	**A16RSCFPR06**	16	20,0	11,0	200	—	1/8 - 27 NPT	-5.0	CC..0602..	**MS1153**	T7
5077553	**A16RSCFPR09**	16	20,0	11,0	200	—	1/8 - 27 NPT	-4.0	CP..09T3..	**MS1155**	T15
5077614	**A20SSCFPR06**	20	25,0	13,0	250	—	1/8 - 27 NPT	-3.0	CC..0602..	**MS1153**	T7
5077615	**A20SSCFPR09**	20	25,0	13,0	250	—	1/8 - 27 NPT	-2.0	CP..09T3..	**MS1155**	T15
left hand											
5077441	**A08JSCFPL06**	8	11,0	6,0	110	2,4	—	-8.0	CP..0602..	**MS1153**	T15
5077447	**A10KSCFPL06**	10	13,0	7,0	125	3,2	—	-6.0	CP..0602..	**MS1153**	T7
5077496	**A12MSCFPL06**	12	16,0	9,0	150	—	1/16 - 27 NPT	-4.0	CP..0602..	**MS1153**	T7
5077550	**A16RSCFPL06**	16	20,0	11,0	200	—	1/8 - 27 NPT	-5.0	CC..0602..	**MS1153**	T7
5077551	**A16RSCFPL09**	16	20,0	11,0	200	—	1/8 - 27 NPT	-4.0	CP..09T3..	**MS1155**	T15
5077556	**A20SSCFPL06**	20	25,0	13,0	250	—	1/8 - 27 NPT	-3.0	CC..0602..	**MS1153**	T7
5077557	**A20SSCFPL09**	20	25,0	13,0	250	—	1/8 - 27 NPT	-2.0	CP..09T3..	**MS1155**	T7



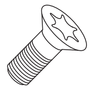




Carbide shank with through coolant.

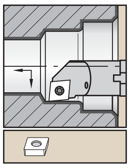
See pages B30–B46 for inserts.

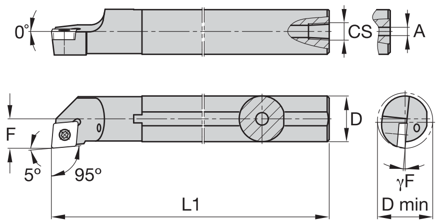
E-SCFP 90°

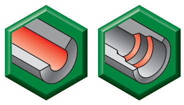


order number	catalogue number	D	D min	F	L1	A	A1	γF°	gage insert	insert screw	Torx
right hand											
2010047	**E06JSCFPR04**	6	8,0	4,5	110,0	2,0	1,4	-10.0	CP..04T104	**12148005800**	T6
5092759	**E08KSCFPR06A**	8	11,0	6,0	123,0	2,4	—	-8.0	CP..060204	**MS1939**	T7
5092921	**E10MSCFPR06A**	10	13,0	7,0	148,0	3,2	—	-4.0	CP..060204	**MS1939**	T7
5092923	**E12QSCFPR06**	12	16,0	9,0	177,5	4,8	—	-3.0	CP..060204	**MS1153**	T7
left hand											
2031018	**E06JSCFPL04**	6	8,0	4,5	110,0	2,0	1,4	-10.0	CP..04T104	**12148005800**	T6
5092757	**E08KSCFPL06A**	8	11,0	6,0	123,0	2,4	—	-8.0	CP..060204	**MS1939**	T7
5092920	**E10MSCFPL06A**	10	13,0	7,0	148,0	3,2	—	-4.0	CP..060204	**MS1939**	T7
5092922	**E12QSCFPL06**	12	16,0	9,0	177,5	4,8	—	-3.0	CP..060204	**MS1153**	T7

Steel Shank with Through Coolant



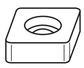
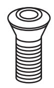
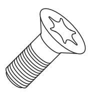




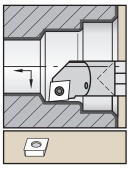
Steel shank with through coolant.

See pages B30–B46 for inserts.

A-SCLC 95°

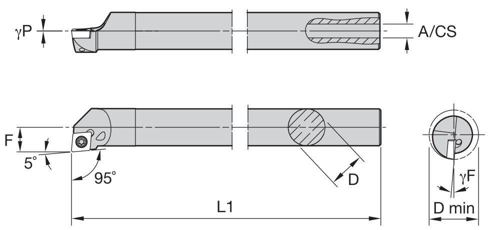




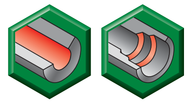
order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	shim	shim screw	hex	insert screw	Torx
right hand														
3883285	**A08JSCLCR06**	8	11,0	6,0	110	2,4	—	-8.0	CC..060204	**–**	**–**	–	**MS1939**	T7
3883283	**A10KSCLCR06**	10	13,0	7,0	125	3,2	—	-7.0	CC..060204	**–**	**–**	–	**MS1153**	T7
3883271	**A16RSCLCR09**	16	20,0	11,0	200	—	1/8-27 NPT	-7.0	CC..09T308	**–**	**–**	–	**MS1155**	T15
3883269	**A20SSCLCR09**	20	25,0	13,0	250	4,0	1/8-27 NPT	-5.0	CC..09T308	**–**	**–**	–	**MS1155**	T15
3883265	**A25TSCLCR12**	25	32,0	17,0	300	6,4	1/4-18 NPT	-7.0	CC..120408	**–**	**–**	–	**MS1157**	T15
3883266	**A32TSCLCR12**	32	40,0	22,0	300	6,4	1/4-18 NPT	-7.0	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15
left hand														
3883286	**A08JSCLCL06**	8	11,0	6,0	110	2,4	—	-8.0	CC..060204	**–**	**–**	–	**MS1939**	T7
3883284	**A10KSCLCL06**	10	13,0	7,0	125	3,2	—	-7.0	CC..060204	**–**	**–**	–	**MS1153**	T7
3883272	**A16RSCLCL09**	16	20,0	11,0	200	4,0	1/8-27 NPT	-7.0	CC..09T308	**–**	**–**	–	**MS1155**	T15
3883270	**A20SSCLCL09**	20	25,0	13,0	250	—	1/8-27 NPT	-5.0	CC..09T308	**–**	**–**	–	**MS1155**	T15
3883267	**A25TSCLCL12**	25	32,0	17,0	300	6,4	1/4-18 NPT	-7.0	CC..120408	**–**	**–**	–	**MS1157**	T15
3883268	**A32TSCLCL12**	32	40,0	22,0	300	6,4	1/4-18 NPT	-7.0	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15



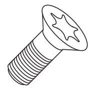
Carbide shank with through coolant.

See pages B30–B46 for inserts.

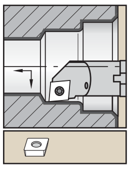




■ E-SCLC 95°

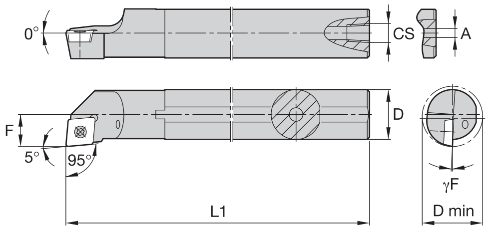


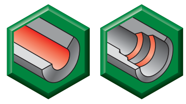
order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
right hand												
2010068	**E08KSCLCR06**	8	11,0	6,0	125	3,0	—	-12.0	0.0	CC..060204	**12148036300**	T8
2023603	**E08KSCLCR065**	8	10,0	5,0	125	3,0	—	-15.0	0.0	CC..060204	**12148036300**	T8
2031021	**E10MSCLCR06**	10	13,0	7,0	150	3,5	—	-10.0	0.0	CC..060204	**12148068700**	T8
2023608	**E12QSCLCR06**	12	16,0	9,0	180	4,5	—	-8.0	0.0	CC..060204	**12148068700**	T8
2010139	**E16RSCLCR09**	16	20,0	11,0	200	4,5	—	-7.0	0.0	CC..090308	**12148038800**	T15
2023614	**E16RSCLCR09T3**	16	20,0	11,0	200	4,5	—	-7.0	0.0	CC..09T308	**12148038800**	T15
2023621	**E20SSCLCR09**	20	25,0	13,0	250	—	G 1/8	-5.0	0.0	CC..090308	**12148038800**	T15
2010184	**E20SSCLCR09T3**	20	25,0	13,0	250	—	G 1/8	-5.0	0.0	CC..09T308	**12148038800**	T15
2031029	**E25TSCLCR09**	25	32,0	17,0	300	—	G 1/4	-3.0	0.0	CC..090308	**12148038800**	T15
2010224	**E25TSCLCR09T3**	25	32,0	17,0	300	—	G 1/4	-3.0	0.0	CC..09T308	**12148038800**	T15
2023632	**E32USCLCR12**	32	40,0	22,0	350	—	G 1/4	-10.0	0.0	CC..120408	**MS2260**	T20
left hand												
2023601	**E08KSCLCL06**	8	11,0	6,0	125	3,0	—	-12.0	0.0	CC..060204	**12148036300**	T8
2031020	**E08KSCLCL065**	8	10,0	5,0	125	3,0	—	-15.0	0.0	CC..060204	**12148036300**	T8
2031022	**E10MSCLCL06**	10	13,0	7,0	150	3,5	—	-10.0	0.0	CC..060204	**12148036300**	T8
2023607	**E12QSCLCL06**	12	16,0	9,0	180	4,5	—	-8.0	0.0	CC..060204	**12148068700**	T8
2023613	**E16RSCLCL09**	16	20,0	11,0	200	4,5	—	-7.0	0.0	CC..090308	**12148038800**	T15
2023615	**E16RSCLCL09T3**	16	20,0	11,0	200	4,5	—	-7.0	0.0	CC..09T308	**12148038800**	T15
2031026	**E20SSCLCL09**	20	25,0	13,0	250	—	G 1/8	-5.0	0.0	CC..090308	**12148038800**	T15
2031027	**E20SSCLCL09T3**	20	25,0	13,0	250	—	G 1/8	-5.0	0.0	CC..09T308	**12148038800**	T15
2010215	**E25TSCLCL09**	25	32,0	17,0	300	—	G 1/4	-3.0	0.0	CC..090308	**12148038800**	T15
2031028	**E25TSCLCL09T3**	25	32,0	17,0	300	—	G 1/4	-3.0	0.0	CC..09T308	**12148038800**	T15



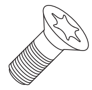
Steel shank with through coolant.

See pages B30–B46 for inserts.

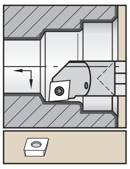




A-SCLP 95°

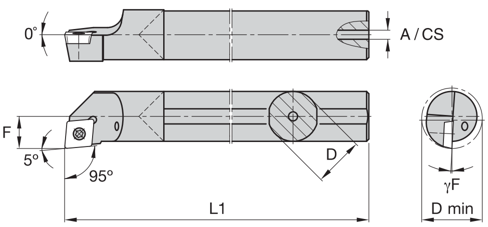


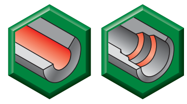
order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
5077640	**A08JSCLPR06**	8	11,0	6,0	110	2,4	–	-6.0	CP..0602..	**MS1939**	T7
5077645	**A10KSCLPR06**	10	13,0	7,0	125	3,2	–	-4.0	CP..0602..	**MS1939**	T7
5077681	**A12MSCLPR06**	12	16,0	9,0	150	4,0	–	-3.0	CP..0602..	**MS1153**	T7
5077694	**A16RSCLPR06**	16	20,0	11,0	200	–	1/8 - 27 NPT	-5.0	CC..0602..	**MS1153**	T7
5077695	**A16RSCLPR09**	16	20,0	11,0	200	4,0	1/8 - 27 NPT	-4.0	CP..09T308	**MS1155**	T15
5077722	**A20SSCLPR09**	20	25,0	13,0	250	–	1/8 - 27 NPT	-2.0	CP..09T3..	**MS1155**	T15
left hand											
5077619	**A08JSCLPL06**	8	11,0	6,0	110	2,4	–	-6.0	CP..0602..	**MS1939**	T7
5077644	**A10KSCLPL06**	10	13,0	7,0	125	3,2	–	-4.0	CP..0602..	**MS1939**	T7
5077680	**A12MSCLPL06**	12	16,0	9,0	150	4,0	–	-3.0	CP..0602..	**MS1153**	T7
5077688	**A16RSCLPL06**	16	20,0	11,0	200	–	1/8 - 27 NPT	-5.0	CC..0602..	**MS1153**	T7
5077692	**A16RSCLPL09**	16	20,0	11,0	200	–	1/8 - 27 NPT	-4.0	CP..09T3..	**MS1155**	T15
5077721	**A20SSCLPL09**	20	25,0	13,0	250	–	1/8 - 27 NPT	-2.0	CP..09T3..	**MS1155**	T15



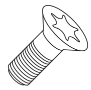
Carbide shank with through coolant.

See pages B30–B46 for inserts.

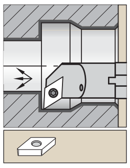




E-SCLP 95°

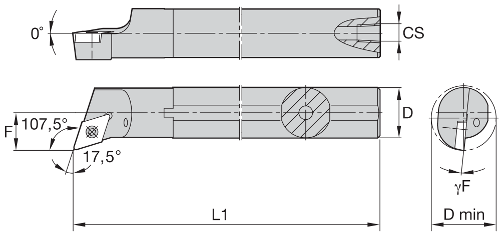


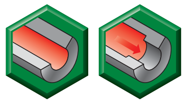
order number	catalogue number	D	D min	F	L1	A	γF°	gage insert	insert screw	Torx
right hand										
2023598	**E06JSCLPR04**	6	8,0	4,5	110	2,0	-10.0	CP..04T104	**12148005800**	T6
5093094	**E08KSCLPR06A**	8	11,0	6,0	122	2,4	-6.0	CP..060204	**MS1939**	T7
5093098	**E10MSCLPR06A**	10	13,0	7,0	149	3,2	-4.0	CP..060204	**MS1939**	T7
5093144	**E12QSCLPR06**	12	16,0	9,0	178	4,8	-3.0	CP..060204	**MS1153**	T7
5093181	**E16RSCLPR09**	16	20,0	11,0	201	5,5	-4.0	CP..09T308	**MS1155**	T15
5093185	**E20SSCLPR09**	20	25,0	13,0	250	7,1	-2.0	CP..09T308	**MS1155**	T15
left hand										
2023597	**E06JSCLPL04**	6	8,0	4,5	110	2,0	-10.0	CP..04T104	**12148005800**	T6
5093093	**E08KSCLPL06A**	8	11,0	6,0	122	2,4	-6.0	CP..060204	**MS1939**	T7
5093097	**E10MSCLPL06A**	10	13,0	7,0	149	3,2	-4.0	CP..060204	**MS1939**	T7
5093143	**E12QSCLPL06**	12	16,0	9,0	178	4,8	-3.0	CP..060204	**MS1153**	T7
5093149	**E16RSCLPL09**	16	20,0	11,0	201	5,5	-4.0	CP..09T308	**MS1155**	T15
5093184	**E20SSCLPL09**	20	25,0	13,0	250	7,1	-2.0	CP..09T308	**MS1155**	T15



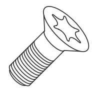
Steel shank with through coolant.

See pages B47–B64 for inserts.

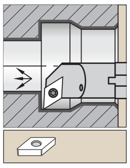




■ A-SDQC 107,5°

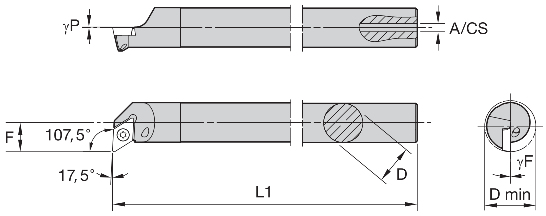


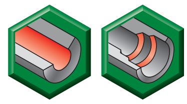
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	insert screw	Torx
right hand										
3883476	**A16RSDQCR07**	16	20,0	11,0	200	1/8-27 NPT	-5.0	DC..070204	**MS1153**	T7
3883474	**A20SSDQCR11**	20	25,0	13,0	250	1/8-27 NPT	-5.0	DC..11T308	**MS1155**	T15
3883462	**A25TSDQCR11**	25	32,0	17,0	300	1/4-18 NPT	-4.0	DC..11T308	**MS1155**	T15
left hand										
3883477	**A16RSDQCL07**	16	20,0	11,0	200	1/8-27 NPT	-5.0	DC..070204	**MS1153**	T7
3883475	**A20SSDQCL11**	20	25,0	13,0	250	1/8-27 NPT	-5.0	DC..11T308	**MS1155**	T15
3883473	**A25TSDQCL11**	25	32,0	17,0	300	1/4-18 NPT	-4.0	DC..11T308	**MS1155**	T15



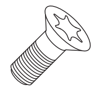
Carbide shank with through coolant.

See pages B47–B64 for inserts.



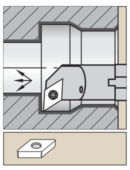


E-SDQC 107,5°



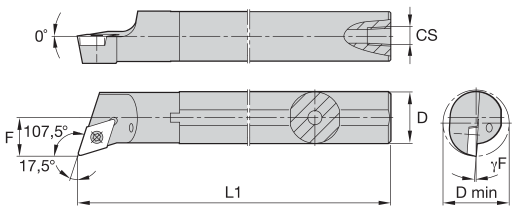
order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
right hand												
2010111	**E12QSDQCR07**	12	16,0	9,0	180	4,5	—	-7.0	0.0	DC..070204	**12148080000**	T8
2031025	**E16RSDQCR07**	16	20,0	11,0	200	5,5	—	-5.0	0.0	DC..070204	**12148080000**	T8
2023623	**E20SSDQCR11**	20	25,0	13,0	250	—	G 1/8	-7.0	0.0	DC..11T308	**12148038800**	T15
left hand												
2031023	**E12QSDQCL07**	12	16,0	9,0	180	4,5	—	-7.0	0.0	DC..070204	**12148080000**	T8
2010148	**E16RSDQCL07**	16	20,0	11,0	200	5,5	—	-5.0	0.0	DC..070204	**12148080000**	T8
2023622	**E20SSDQCL11**	20	25,0	13,0	250	—	G 1/8	-7.0	0.0	DC..11T308	**12148038800**	T15

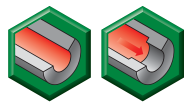
Steel Shank with Through Coolant



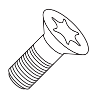
Steel shank with through coolant.

See pages B47–B64 for inserts.

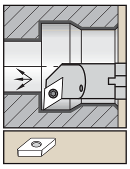




A-SDQP

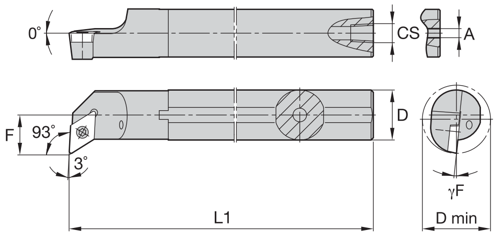


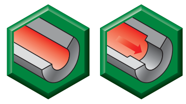
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	insert screw	Torx
right hand										
5078292	**A12MSDQPR07**	12	16,0	9,0	150	1/16-27 NPT	2.0	DP..0702..	**MS1153**	T7
5078295	**A16RSDQPR07**	16	20,0	11,0	200	1/8-27 NPT	0.0	DP..0702..	**MS1153**	T7
5078298	**A20SSDQPR11**	20	25,0	13,0	250	1/8-27 NPT	2.0	DP..11T3..	**MS1155**	T15
5078320	**A25TSDQPR11**	25	32,0	17,0	300	1/4-18 NPT	0.0	DP..11T3..	**MS1155**	T15
left hand										
5078291	**A12MSDQPL07**	12	16,0	9,0	150	1/16-27 NPT	2.0	DP..0702..	**MS1153**	T7
5078293	**A16RSDQPL07**	16	20,0	11,0	200	1/8-27 NPT	0.0	DP..0702..	**MS1153**	T7
5078296	**A20SSDQPL11**	20	25,0	13,0	250	1/8-27 NPT	2.0	DP..11T3..	**MS1155**	T15
5078299	**A25TSDQPL11**	25	32,0	17,0	300	1/4-18 NPT	0.0	DP..11T3..	**MS1155**	T15



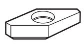
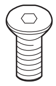
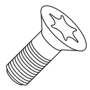
Steel shank with through coolant.

See pages B47–B64 for inserts.

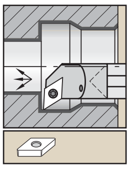




■ A-SDUC 93°

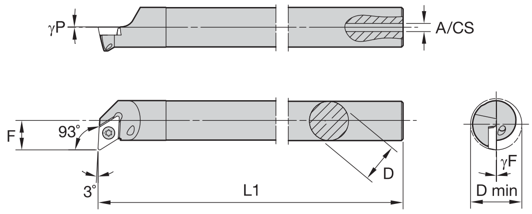




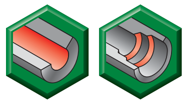
order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	shim	shim screw	hex	insert screw	Torx
right hand														
3883297	**A10KSDUCR07**	10	13,0	7,0	125	3,2	–	-7.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3883294	**A16RSDUCR07**	16	20,0	11,0	200	–	1/8-27 NPT	-4.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3883293	**A16RSDUCR11**	16	20,0	11,0	200	–	1/8-27 NPT	-6.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883291	**A20SSDUCR11**	20	25,0	13,0	250	–	1/8-27 NPT	-5.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883288	**A25TSDUCR11**	25	32,0	17,0	300	–	1/8-27 NPT	-4.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883287	**A32TSDUCR15**	32	40,0	22,0	300	–	1/8-27 NPT	-7.0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
left hand														
3883298	**A10KSDUCL07**	10	13,0	7,0	125	3,2	–	-7.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3883296	**A16RSDUCL07**	16	20,0	11,0	200	–	1/8-27 NPT	-4.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3883295	**A16RSDUCL11**	16	20,0	11,0	200	–	1/8-27 NPT	-6.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883292	**A20SSDUCL11**	20	25,0	13,0	250	–	1/8-27 NPT	-5.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883290	**A25TSDUCL11**	25	32,0	17,0	300	–	1/8-27 NPT	-4.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883289	**A32TSDUCL15**	32	40,0	22,0	300	–	1/8-27 NPT	-7.0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15



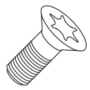
Carbide shank with through coolant.

See pages B47–B64 for inserts.

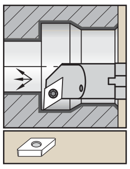




■ E-SDUC 93°

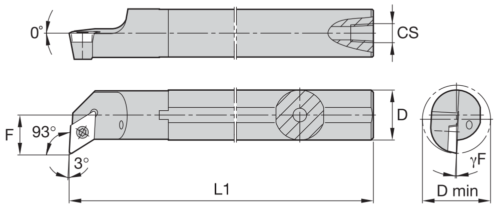


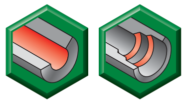
order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
right hand												
2023611	**E12QSDUCR07**	12	16,0	9,0	180	4,5	—	-7.0	0.0	DC..070204	**12148068700**	T8
2010157	**E16RSDUCR07**	16	20,0	11,0	200	4,5	—	-5.0	0.0	DC..070204	**12148080000**	T8
2023624	**E20SSDUCR11**	20	25,0	13,0	250	—	G 1/8	-7.0	0.0	DC..11T308	**12148038800**	T15
2023630	**E25TSDUCR11**	25	32,0	17,0	300	—	G 1/4	-5.0	0.0	DC..11T308	**12148038800**	T15
left hand												
2023610	**E12QSDUCL07**	12	16,0	9,0	180	4,5	—	-7.0	0.0	DC..070204	**12148068700**	T8
2023617	**E16RSDUCL07**	16	20,0	11,0	200	4,5	—	-5.0	0.0	DC..070204	**12148080000**	T8
2010193	**E20SSDUCL11**	20	25,0	13,0	250	—	G 1/8	-7.0	0.0	DC..11T308	**12148038800**	T15
2023629	**E25TSDUCL11**	25	32,0	17,0	300	—	G 1/4	-5.0	0.0	DC..11T308	**12148038800**	T15



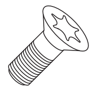
Steel shank with through coolant.

See pages B47–B64 for inserts.



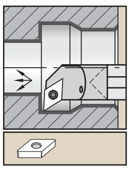


■ A-SDUP 93°



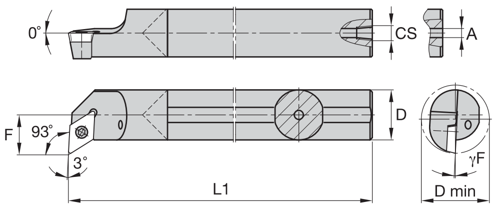
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	insert screw	Torx
right hand										
5078360	**A12MSDUPR07**	12	16,0	9,0	150	1/16-27 NPT	-2.0	DP..070204	**MS1153**	T7
5078364	**A16RSDUPR07**	16	20,0	11,0	200	1/8-27 NPT	0.0	DP..070204	**MS1153**	T7
5078368	**A20SSDUPR11**	20	25,0	13,0	250	1/8-27 NPT	-2.0	DP..11T308	**MS1155**	T15
5078376	**A25TSDUPR11**	25	32,0	17,0	300	1/4-18 NPT	0.0	DP..11T308	**MS1155**	T15
left hand										
5078329	**A12MSDUPL07**	12	16,0	9,0	150	1/16-27 NPT	-2.0	DP..070204	**MS1153**	T7
5078363	**A16RSDUPL07**	16	20,0	11,0	200	1/8-27 NPT	0.0	DP..070204	**MS1153**	T7
5078367	**A20SSDUPL11**	20	25,0	13,0	250	1/8-27 NPT	-2.0	DP..11T308	**MS1155**	T15
5078375	**A25TSDUPL11**	25	32,0	17,0	300	1/4-18 NPT	0.0	DP..11T308	**MS1155**	T15

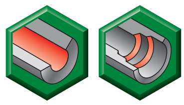
Carbide Shank with Through Coolant



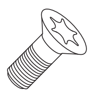
Carbide shank with through coolant.

See pages B47–B64 for inserts.

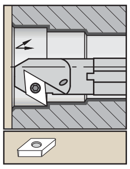




■ E-SDUP 93°

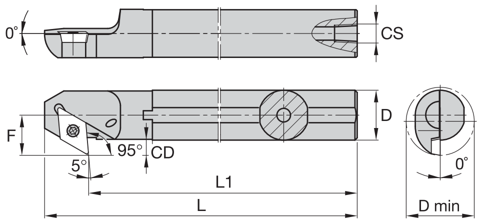


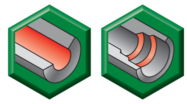
order number	catalogue number	D	D min	F	L1	A	γF°	gage insert	insert screw	Torx
right hand										
5093591	**E12QSDUPR07**	12	16,0	9,0	179	4,8	-2.0	DP..070204	**MS1153**	T7
5093634	**E16RSDUPR07**	16	20,0	11,0	199	5,5	0.0	DP..070204	**MS1153**	T7
5093639	**E20SSDUPR11**	20	25,0	13,0	253	7,1	-2.0	DP..11T308	**MS1155**	T15
left hand										
5093429	**E12QSDUPL07**	12	16,0	9,0	179	4,8	-2.0	DP..070204	**MS1153**	T7
5093633	**E16RSDUPL07**	16	20,0	11,0	199	5,5	0.0	DP..070204	**MS1153**	T7
5093638	**E20SSDUPL11**	20	25,0	13,0	253	7,1	-2.0	DP..11T308	**MS1155**	T15



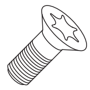
Steel shank with through coolant.

See pages B47–B64 for inserts.

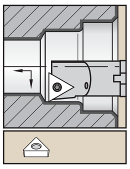




■ A-SDXP 95°

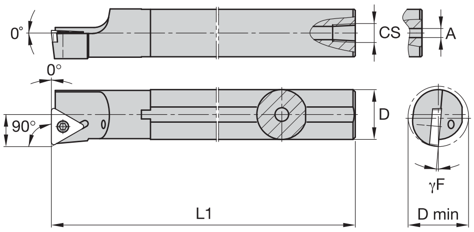


order number	catalogue number	D	D min	F	L1	L	CD	CS	gage insert	insert screw	Torx
right hand											
5078401	**A12MSDXPR07**	12	16,0	9,0	150	162,0	3,09	1/16-27 NPT	DP..070204	**MS1153**	T7
5078405	**A16RSDXPR07**	16	20,0	11,0	200	212,0	3,20	1/8-27 NPT	DP..070204	**MS1153**	T7
5078430	**A20SSDXPR11**	20	25,0	13,0	250	270,0	4,31	1/8-27 NPT	DP..11T308	**MS1155**	T15
left hand											
5078400	**A12MSDXPL07**	12	16,0	9,0	150	162,0	3,09	1/16-27 NPT	DP..070204	**MS1153**	T7
5078404	**A16RSDXPL07**	16	20,0	11,0	200	212,0	3,20	1/8-27 NPT	DP..070204	**MS1153**	T7
5078409	**A20SSDXPL11**	20	25,0	13,0	250	270,0	4,31	1/8-27 NPT	DP..11T308	**MS1155**	T15

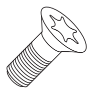


Steel shank with through coolant.

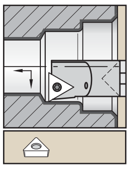
See pages B81–B93 for inserts.



■ A-STFC 90°

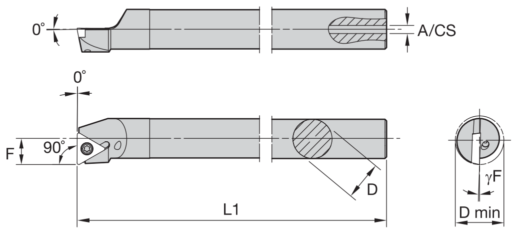


order number	catalogue number	D	D min	F	L1	A	γF°	gage insert	insert screw	Torx
right hand										
3883382	**A10KSTFCR11**	10	13,0	7,0	125	3,2	-7.0	TC..110204	**MS1153**	T7
left hand										
3883443	**A10KSTFCL11**	10	13,0	7,0	125	3,2	-7.0	TC..110204	**MS1153**	T7

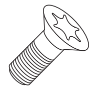


Carbide shank with through coolant.

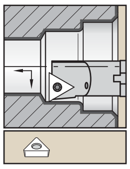
See pages B81–B93 for inserts.



E-STFC 90°

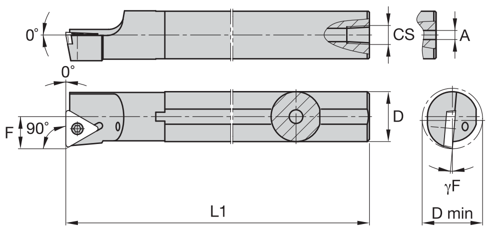


order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
2031888	**E10MSTFCR11**	10	13,0	7,0	150	3,5	—	-10.0	TC..110204	**12148068700**	T8
2031024	**E12QSTFCR11**	12	16,0	9,0	180	4,5	—	-8.0	TC..110204	**12148068700**	T8
2010174	**E16RSTFCR16**	16	20,0	11,0	200	4,5	—	-9.0	TC..16T308	**12148038800**	T15
2023626	**E20SSTFCR16**	20	25,0	13,0	250	—	G 1/8	-7.0	TC..16T308	**12148038800**	T15
2023631	**E25TSTFCR16**	25	32,0	17,0	300	—	G 1/4	-5.0	TC..16T308	**12148038800**	T15
left hand											
2010090	**E10MSTFCL11**	10	13,0	7,0	150	3,5	—	-10.0	TC..110204	**12148068700**	T8
2010120	**E12QSTFCL11**	12	16,0	9,0	180	4,5	—	-8.0	TC..110204	**12148068700**	T8
2023618	**E16RSTFCL16**	16	20,0	11,0	200	4,5	—	-9.0	TC..16T308	**12148038800**	T15
2023625	**E20SSTFCL16**	20	25,0	13,0	250	—	G 1/8	-7.0	TC..16T308	**12148038800**	T15
2010233	**E25TSTFCL16**	25	32,0	17,0	300	—	G 1/4	-5.0	TC..16T308	**12148038800**	T15

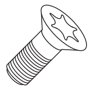


Steel shank with through coolant.

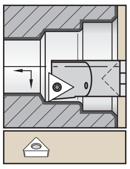
See pages B81–B93 for inserts.



A-STFP 90°

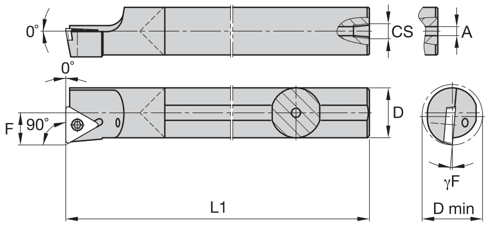


order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
5086726	**A08JSTFPR09**	8	11,0	6,0	110	—	—	-8.0	TP..090204	**MS1933**	T7
3883446	**A10KSTFPR11**	10	13,0	7,0	125	3,2	—	-4.0	TP..110204	**MS1153**	T7
5086802	**A12MSTFPR11**	12	16,0	9,0	150	4,0	—	-2.0	TP..110204	**MS1153**	T7
3883444	**A16RSTFPR11**	16	20,0	11,0	200	—	1/16-27 NPT	0.0	TP..110204	**MS1153**	T7
5086807	**A20SSTFPR16**	20	25,0	13,0	250	—	—	-2.0	TP..16T308	**MS1155**	T15
5086809	**A25TSTFPR16**	25	32,0	17,0	300	6,4	1/4-18 NPT	0.0	TP..16T308	**MS1155**	T15
left hand											
5086724	**A08JSTFPL09**	8	11,0	6,0	110	—	—	-8.0	TP..090204	**MS1933**	T7
3883447	**A10KSTFPL11**	10	13,0	7,0	125	3,2	—	-4.0	TP..110204	**MS1153**	T7
5086800	**A12MSTFPL11**	12	16,0	9,0	150	4,0	—	-2.0	TP..110204	**MS1153**	T7
3883445	**A16RSTFPL11**	16	20,0	11,0	200	—	1/16-27 NPT	0.0	TP..110204	**MS1153**	T7
5086806	**A20SSTFPL16**	20	25,0	13,0	250	—	—	-2.0	TP..16T308	**MS1155**	T15
5086808	**A25TSTFPL16**	25	32,0	17,0	300	6,4	1/4-18 NPT	0.0	TP..16T308	**MS1155**	T15

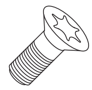


Carbide shank with through coolant.

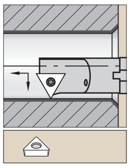
See pages B81–B93 for inserts.



E-STFP 90°

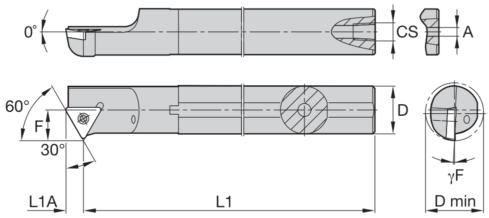


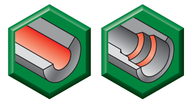
order number	catalogue number	D	D min	F	L1	A	γF°	gage insert	insert screw	Torx
right hand										
5093696	**E08KSTFPR09A**	8	11,0	6,0	124	2,4	-6.0	TP..090204	**MS1933**	T7
5093750	**E10MSTFPR11A**	10	13,0	7,0	152	3,2	-4.0	TP..110204	**MS1153**	T7
5093755	**E12QSTFPR11**	12	16,0	9,0	181	4,8	-2.0	TP..110204	**MS1153**	T7
5093759	**E16RSTFPR11**	16	20,0	11,0	201	5,5	0.0	TP..110204	**MS1153**	T7
5093773	**E20SSTFPR16**	20	25,0	13,0	251	7,1	-2.0	TP..16T308	**MS1155**	T15
left hand										
5093694	**E08KSTFPL09A**	8	11,0	6,0	124	2,4	-6.0	TP..090204	**MS1933**	T7
5093699	**E10MSTFPL11A**	10	13,0	7,0	152	3,2	-4.0	TP..110204	**MS1153**	T7
5093754	**E12QSTFPL11**	12	16,0	9,0	181	4,8	-2.0	TP..110204	**MS1153**	T7
5093758	**E16RSTFPL11**	16	20,0	11,0	201	5,5	0.0	TP..110204	**MS1153**	T7
5093772	**E20SSTFPL16**	20	25,0	13,0	251	7,1	-2.0	TP..16T308	**MS1155**	T15



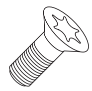
Steel shank with through coolant.

See pages B81–B93 for inserts.

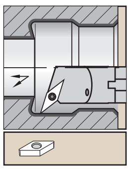




A-STWP 60°

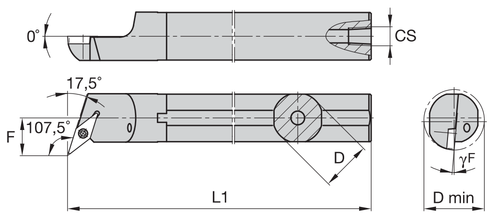


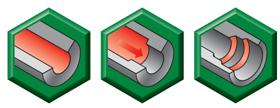
order number	catalogue number	D	D min	F	L1	L1A	A	γF°	gage insert	insert screw	Torx
right hand											
5086811	**A12MSTWPR11**	12	16,0	9,0	150	—	—	-2.0	TP..110204	**MS1153**	T7
5086813	**A16RSTWPR11**	16	20,0	11,0	200	—	—	-2.0	TP..110204	**MS1153**	T7
left hand											
3883449	**A10KSTWPL11**	10	13,0	7,0	125	5,0	3,2	-4.0	TP..110204	**MS1153**	T7
5086810	**A12MSTWPL11**	12	16,0	9,0	150	—	—	-2.0	TP..110204	**MS1153**	T7
5086812	**A16RSTWPL11**	16	20,0	11,0	200	—	—	-2.0	TP..110204	**MS1153**	T7



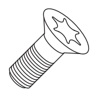
Steel shank with through coolant.

See pages B94–B99 for inserts.

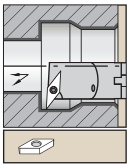




A-SVQB 107,5°

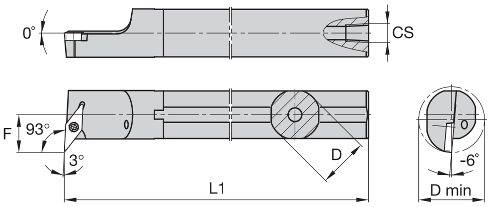


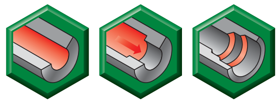
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	insert screw	Torx
right hand										
3883436	**A16RSVQBR11**	16	20,0	11,0	200	1/8-27 NPT	-7.0	VB..110304	**MS1153**	T7
3883434	**A25TSVQBR16**	25	32,0	17,0	300	1/4-18 NPT	-6.0	VB..160408	**MS1155**	T15
left hand										
3883435	**A25TSVQBL16**	25	32,0	17,0	300	1/4-18 NPT	-6.0	VB..160408	**MS1155**	T15



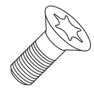
Steel shank with through coolant.

See pages B94–B99 for inserts.





■ A-SVUB 93°

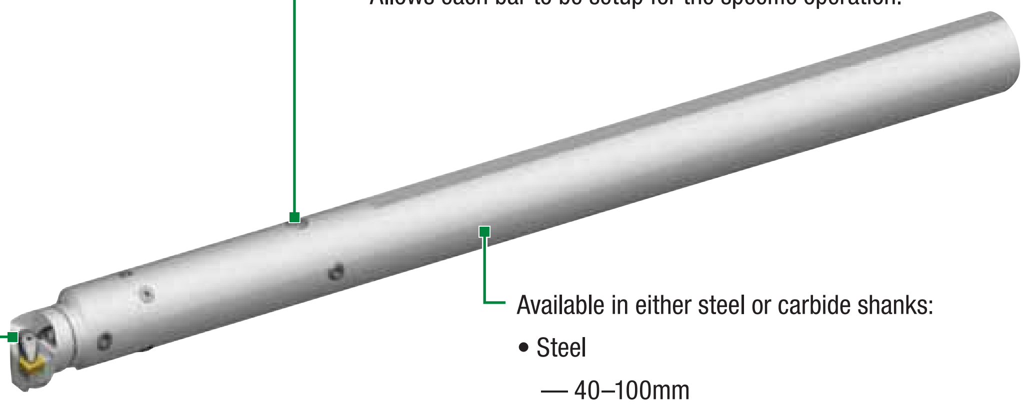


order number	catalogue number	D	D min	F	L1	CS	gage insert	insert screw	Torx
right hand									
3883440	**A20SSVUBR11**	20	25,0	13,0	250	1/8-27 NPT	VB..110304	**MS1153**	T7
3883438	**A25TSVUBR16**	25	32,0	17,0	300	1/4-18 NPT	VB..160408	**MS1155**	T15
left hand									
3883439	**A25TSVUBL16**	25	32,0	17,0	300	1/4-18 NPT	VB..160408	**MS1155**	T15

Tunable Boring Bars with Front End KM™ Quick Change Adaptor

Reduce vibrations and enhance productivity in deep boring applications with KM Quick Change heads and tunable boring bars.

Tunable Boring Bars



Adjustment screw to allow for on-machine tuning. Allows each bar to be setup for the specific operation.

Available in either steel or carbide shanks:

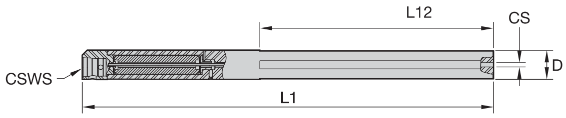
- Steel
  — 40–100mm
- Carbide
  — 50–100mm

Comprehensive offering of KM Quick Change cutting units. See WIDIA™ Tooling Systems Catalogue (A-09-02122) for KM adaptors.

Features	Function	Benefit
Robust internal clamping package	• Eliminates chatter and vibration. • Higher metal removal rate. • Larger depths of cut.	• High surface quality. • Low scrap rate. • Increased productivity. • Reduced noise exposure.
Tunable clamping mechanism	Bar can be tuned on the machine with just turning a screw.	Optimised damping characteristics for all kinds of machining conditions.
KM™ Quick Change front end adaptor	• Ridged clamping system. • Wide selection of KM Quick Change cutting units.	Flexible system reduces tooling inventory and setup times.

Tuning Procedure

1. Loosen the two locking screws on the bar.
2. Turn the adjusting screw in the positive direction until it becomes snug. The adjusting screw becomes snug when it locks the tuner mass.
3. Turn the screw one complete turn in the negative direction and take a test cut.
4. Repeat Step 3 until chatter is eliminated.
5. Once chatter is eliminated, note that chatter starts between the current screw setting and one turn in the positive direction. Make 1/4 turn adjustments within this range, taking test cuts for each setting, until you can identify the adjusting screw setting that causes chatter to start.
6. Once the adjusting screw setting that causes chatter is determined, back the adjusting screw off a 1/2 turn in the negative direction.
7. Tighten both clamping screws and take a test cut to confirm desired results.

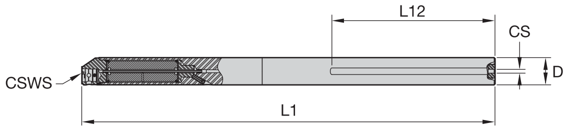


Tunable steel shank with through coolant and front end KM™ clamping unit.

D...TTB-KM • Metric

order number	catalogue number	D	L1	CS	L12	L1 min	CSWS system size
3637636	D40MTTB560KM40	40	520	RP 3/8-19	305	330	KM40
3637637	D50MTTB737KM40	50	697	RP 3/8-19	470	337	KM40
3637638	D60MTTB1000KM40	60	976	RP 3/8-19	686	396	KM40
3642134	D80MTTB1120KM63	80	1060	RP 3/8-19	610	560	KM63
3642135	D100MTTB1330KM63	100	1384	RP 3/8-19	622	695	KM63

NOTE: KM adaptors can be found in the WIDIA™ Tooling Systems Catalogue (A-09-02122EN).



Carbide tunable boring bar with KM™ Quick Change connection.

G-KM-TTB • Metric

order number	catalogue number	D	L1	CS	L12	CSWS system size
3954298	G50MTTB1026KM40	50	986	RP 3/8-19	300	KM40
3954299	G60MTTB1226KM40	60	1186	RP 3/8-19	381	KM40
3954300	G80MTTB1564KM63	80	1504	RP 3/8-19	480	KM63
3954301	G100MTTB2066KM63	100	1975	RP 3/8-19	600	KM63

NOTE: KM adaptors can be found in the WIDIA™ Tooling Systems Catalogue (A-09-02122EN).

Modern machining operations demand high-quality, high-performance toolholders that provide straightforward design and application versatility.

Standard WIDIA™ cartridges are ideal for turning tools with one, or several, cutting edges. A wide range of cartridge sizes and styles provide numerous combinations and application possibilities.

Cartridges

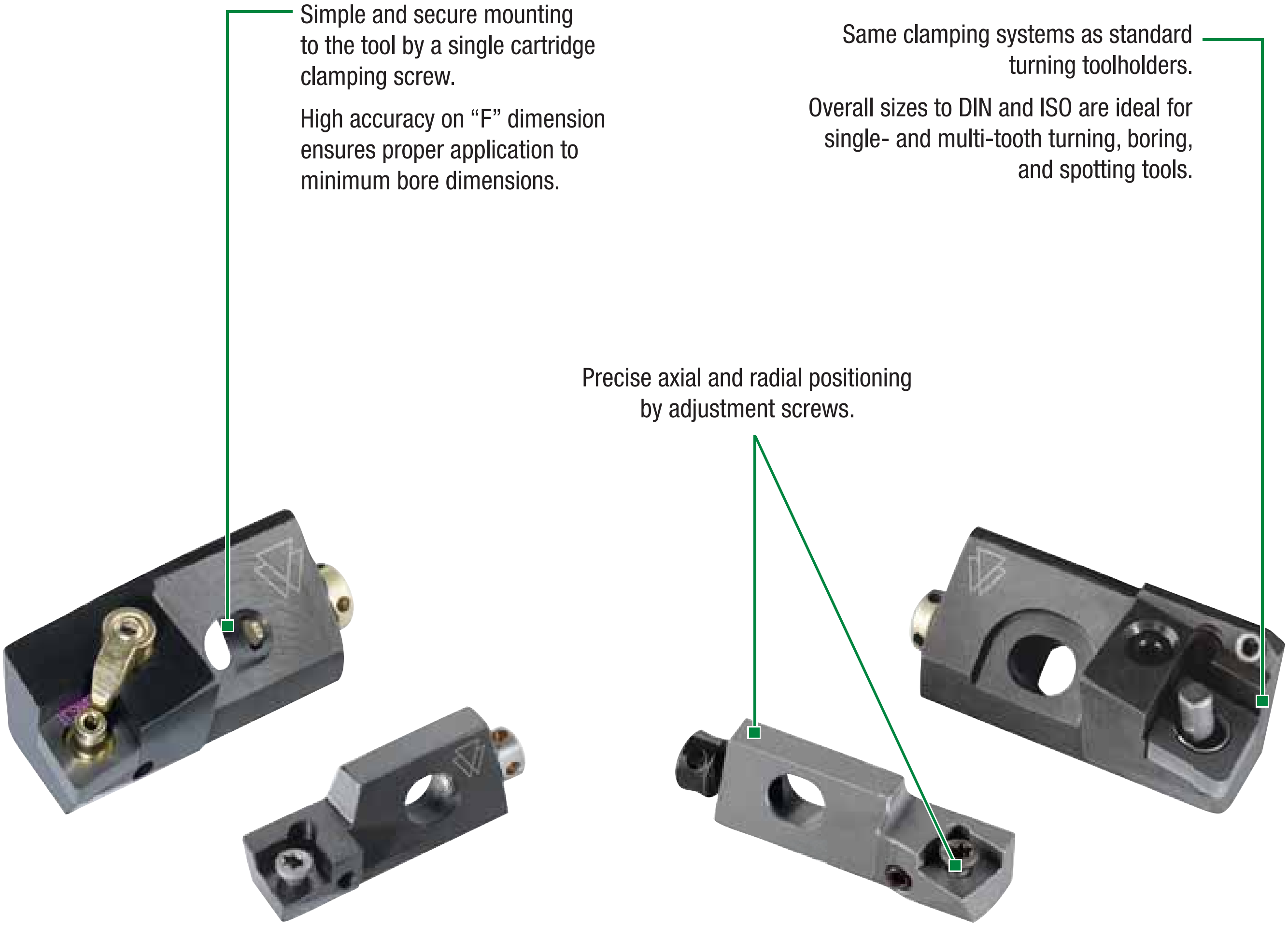
Clamping System M

- Combined pin/wedge clamp for negative inserts.
- An extremely sturdy clamping system, specially designed for interrupted cuts.
- The tool is protected by a carbide shim.

Clamping System P

- Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20mm in diameter.
- Inserts with one- and two-side chip control geometries have positive rakes from 6° to 18°.
- Advantages of this system are fast insert changes and no interference with chip flow.

P-style available in metric sizes only.



Clamping System C

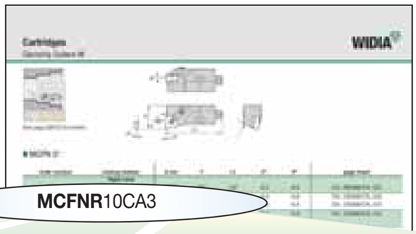
- Top clamping system for negative and positive indexable inserts to DIN 4968.
- This universal clamping system is robust and easy to handle.
- Some height-adjustable clamps enable the use of additional chipbreakers.
- A carbide shim provides additional tool protection.

Clamping System S

- Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967.
- Compact design using a minimum of spare parts for high reliability and cost efficiency.
- A carbide shim provides additional tool protection.
- Toolholders with cutting edge heights upwards of 16mm (.625") and insert iCs from 9,52mm (.375") are secured by means of a threaded bushing.

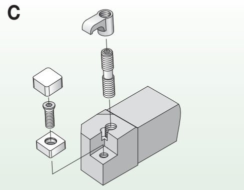
How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.

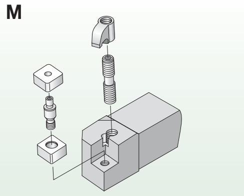


MCFNR10CA3

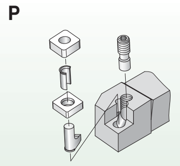
M — Insert Clamping System



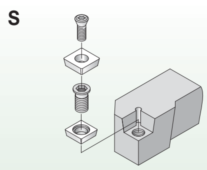
Top clamping by clamping finger for inserts without hole.



Top and hole clamping for inserts with hole.

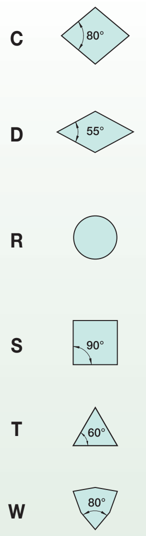


Insert clamping by toggle lever for insert hole.

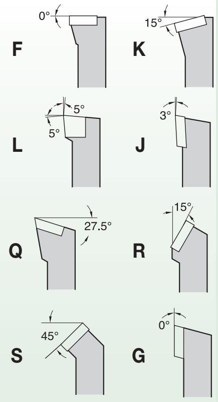


Centre clamping by screw for inserts with hole.

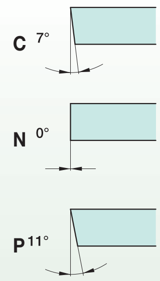
C — Insert Shape



F — Cartridge Style

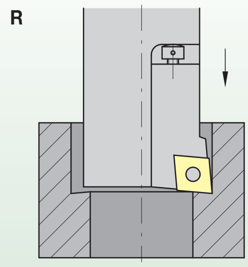


N — Insert Clearance Angle

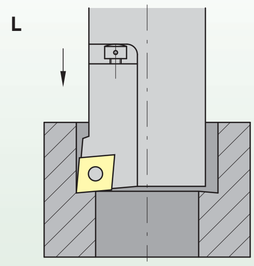


R — Hand of Tool

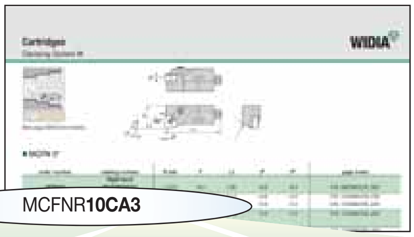
Right-hand cartridge



Left-hand cartridge



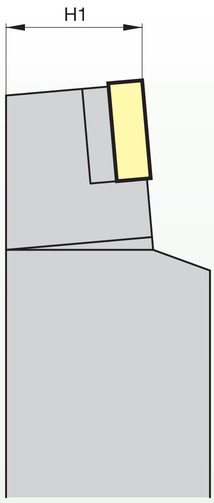
By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



MCFNR**10CA3**

10	C	A	3	
Cartridge Size	Identifying Code of Cartridge	Mounting Design of Cartridge	Insert Size	Additional Information

10 — Cartridge Size



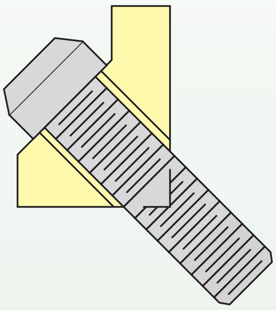
H1 = Cutting edge height of cartridge, in inches

C — Identifying Code of Cartridge

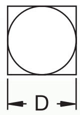
C = Cartridge

A — Mounting Design of Cartridge

A-design conforming to ISO 5611



3 — Insert Size

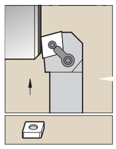


Insert iC

Number of 1/8ths of “D”

Additional Information

Each unique clamping system offers product options to fill your specific toolholder needs. Find the illustration that fits your application and navigate to the corresponding page to get the correct solution.



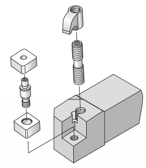
MCFN — Product Name

Application Illustration

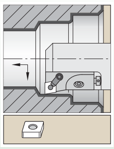
Page: C62 — Page Number

Clamping System M

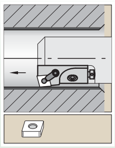
M



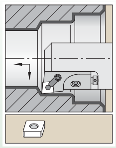
Combined pin/wedge clamp for negative inserts. An extremely sturdy clamping system, specially designed for interrupted cuts. The tool is protected by a carbide shim.



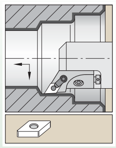
MCFN 90° **Page:** **C92**



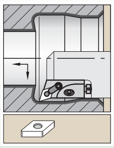
MCKN 75° **Page:** **C93**



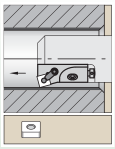
MCLN 95° **Page:** **C94**



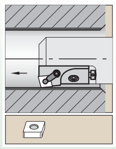
MDJN 93° **Page:** **C95**



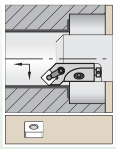
MDQN 107,5° **Page:** **C96**



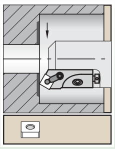
MSKN 75° **Page:** **C97**



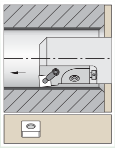
MSRN 75° **Page:** **C98**



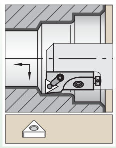
MSSN 45° **Page:** **C99**



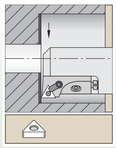
MSTN 60° **Page:** **C100**



MSYN 85° **Page:** **C101**



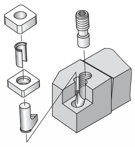
MTFN 90° **Page:** **C102**



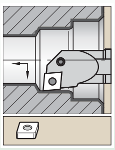
MTGN 90° **Page:** **C103**

P-Style Clamping

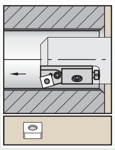
P



Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20mm in diameter. Inserts with one- and two-side chip control geometries have positive rakes from 6° to 18°. Advantages of this system are fast insert changes and no interference with chip flow.



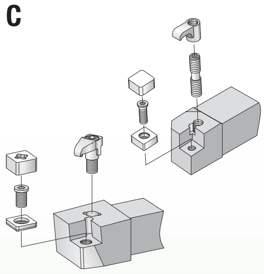
PCLN 95° **Page:** **C104**



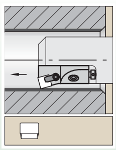
PSKN 75° **Page:** **C105**

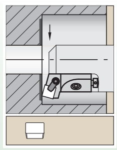
Clamping System C

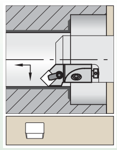
C

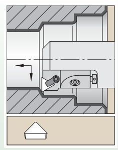


Top clamping system for negative and positive indexable inserts to DIN 4968. This universal clamping system is robust and easy to handle. Some height-adjustable clamps enable the use of additional chipbreakers. A carbide shim provides additional tool protection.


CSKP 75° Page: C106

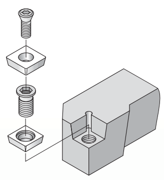

CSRP 75° Page: C107


CSSP 45° Page: C108

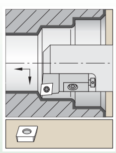

CTFP 90° Page: C109

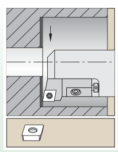
Clamping System S

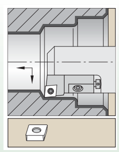
S

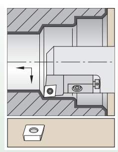


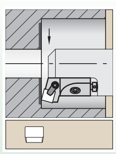
Combined pin/wedge clamp for negative inserts. An extremely sturdy clamping system, specially designed for interrupted cuts. The tool is protected by a carbide shim.

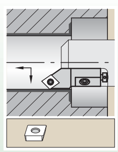

SCFP 90° Page: C110

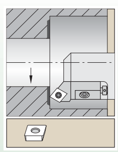

SCGP 90° Page: C111

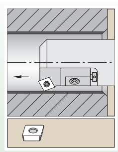

SCLC 95° Page: C112

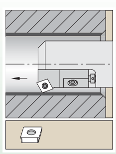

SCLP 95° Page: C113

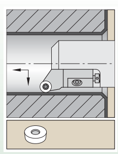

SCRP 75° Page: C114

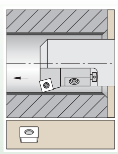

SCSP 45° Page: C115

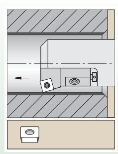

SCTP 60° Page: C116

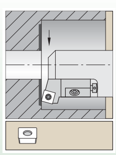

SCWP 60° Page: C117

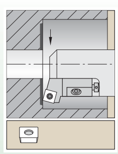

SDJP 93° Page: C118

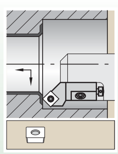

SRGC Page: C119

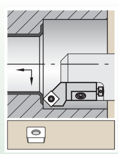

SSKC 75° Page: C120

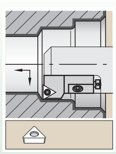

SSKP 75° Page: C121

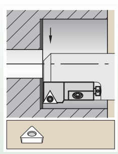

SSRC 75° Page: C122

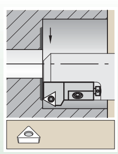

SSRP 75° Page: C123

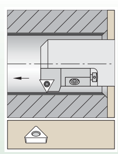

SSSC 45° Page: C124

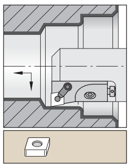

SSSP 45° Page: C125


STFP 90° Page: C126

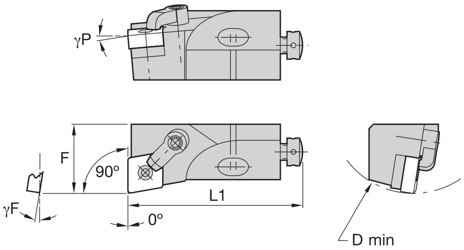

STGP 90° Page: C127


STTP 60° Page: C128


STWP 60° Page: C129



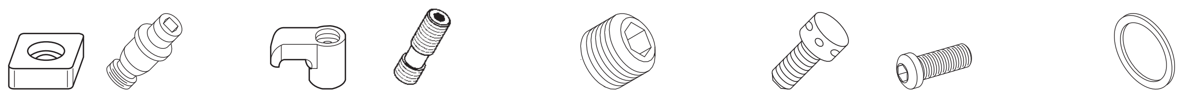
See pages B30–B46 for inserts.



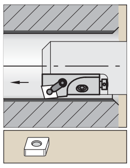
MCFN 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870421	**MCFNR10CA09**	40	14,0	50	-9.0	-9.0	CN..090308/CN..322
3870420	**MCFNR12CA12**	50	20,0	55	-9.0	-5.0	CN..120408/CN..432
3870419	**MCFNR16CA12**	60	25,0	63	-9.0	-5.0	CN..120408/CN..432
3870418	**MCFNR20CA12**	70	25,0	70	-9.0	-5.0	CN..120408/CN..432
left hand							
3870423	**MCFNL12CA12**	50	20,0	55	-9.0	-5.0	CN..120408/CN..432
3870422	**MCFNL16CA12**	60	25,0	63	-9.0	-5.0	CN..120408/CN..432

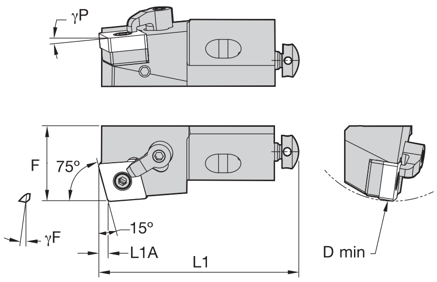
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	–	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	–	4 mm	**CSWM 060 050**
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ICSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**ICSN432**	**KLM46**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



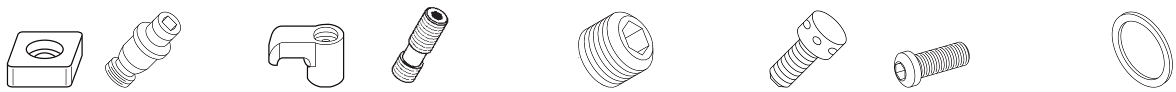
See pages B30–B46 for inserts.



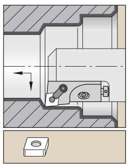
■ MCKN 75°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
right hand								
3870416	**MCKNR12CA12**	50	20,0	55	3	-9.0	-5.0	CN..120408/CN..432
3870415	**MCKNR16CA12**	60	25,0	63	3	-9.0	-5.0	CN..120408/CN..432
left hand								
3870417	**MCKNL12CA12**	50	20,0	55	3	-9.0	-5.0	CN..120408/CN..432

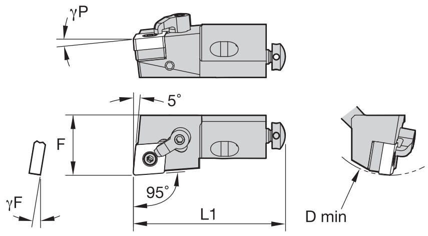
■ Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ICSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



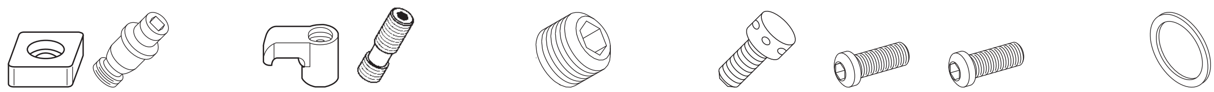
See pages B30–B46 for inserts.



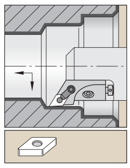
MCLN 95°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870410	MCLNR12CA12	50	20,0	55	-9.0	-5.0	CN..120408/CN..432
3870409	MCLNR16CA12	60	25,0	63	-9.0	-5.0	CN..120408/CN..432
3870408	MCLNR20CA12	70	25,0	70	-9.0	-5.0	CN..120408/CN..432
3870407	MCLNR25CA19	100	32,0	100	-9.0	-5.0	CN..190612/CN..643
left hand							
3870414	MCLNL12CA12	50	20,0	55	-9.0	-5.0	CN..120408/CN..432
3870413	MCLNL16CA12	60	25,0	63	-9.0	-5.0	CN..120408/CN..432
3870412	MCLNL20CA12	70	25,0	70	-9.0	-5.0	CN..120408/CN..432
3870411	MCLNL25CA19	100	32,0	100	-9.0	-5.0	CN..190612/CN..643

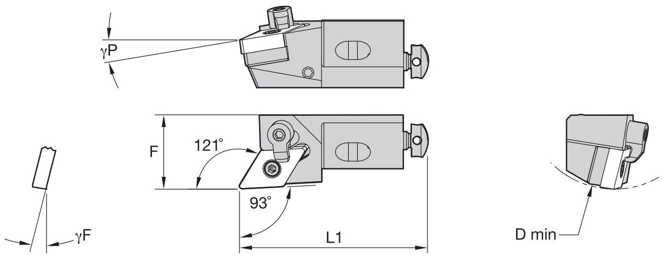
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
50	–	KLM43	2 mm	CKM34	STCM38	2 mm	KUAM22	2 mm	KUAM31	191.406	–	4 mm	CSWM 060 050
60	ICSN432	KLM46S	2.5 mm	CKM34	STCM9	2.5 mm	KUAM25	2.5 mm	KUAM32	191.407	–	5 mm	CSWM 080 050
70	ICSN432	KLM46	2.5 mm	CKM34	STCM9	2.5 mm	KUAM25	2.5 mm	KUAM32	191.407	–	5 mm	CSWM 080 050
100	ICSN633	KLM68	4 mm	CKM35	STCM8	4 mm	KUAM27	4 mm	KUAM32	–	MS364	8 mm	CSWM 100 080



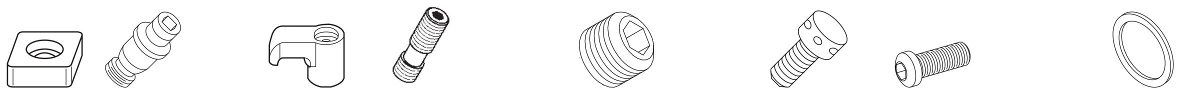
See pages B47–B64 for inserts.



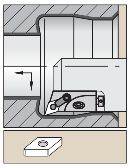
MDJN 93°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870405	**MDJNR16CA15**	60	25,0	63	-9.0	-9.0	DN..150408/DN..3.532
3870404	**MDJNR20CA15**	70	25,0	70	-8.5	-8.5	DN..150408/DN..3.532
left hand							
3870406	**MDJNL16CA15**	60	25,0	63	-9.0	-9.0	DN..150408/DN..3.532

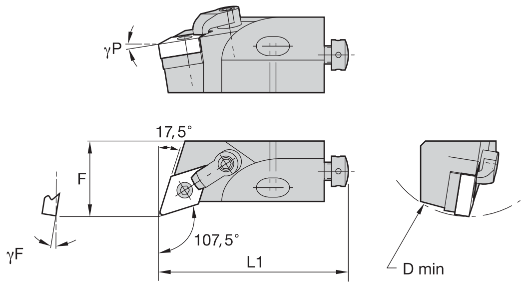
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
60	**IDSN432**	**KLM46S**	2.5 mm	**CKM36**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**IDSN432**	**KLM46**	2.5 mm	**CKM41**	**STCM40**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



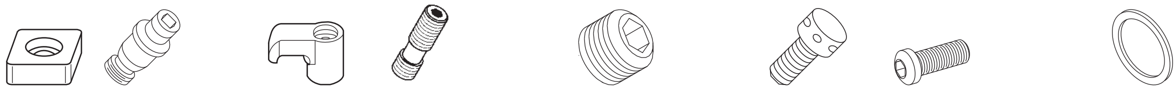
See pages B47–B64 for inserts.



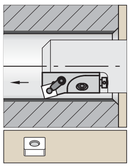
MDQN 107,5°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870361	**MDQNR16CA15**	60	25,0	63	-9.0	-6.0	DN..150408/DN..3.532
3870360	**MDQNR20CA15**	70	25,0	70	-9.0	-8.0	DN..150408/DN..3.532
left hand							
3870403	**MDQNL16CA15**	60	25,0	63	-9.0	-6.0	DN..150408/DN..3.532
3870362	**MDQNL20CA15**	70	25,0	70	-9.0	-8.0	DN..150408/DN..3.532

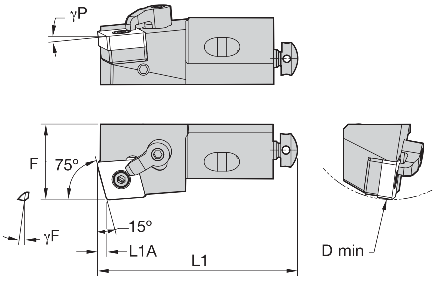
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
60	**IDSN432**	**KLM46S**	2.5 mm	**CKM36**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**IDSN432**	**KLM46**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



See pages B68–B80 for inserts.

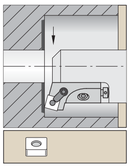


MSKN 75°

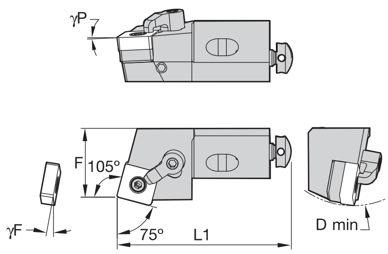
order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
right hand								
3870352	MSKNR10CA09	40,0	14,0	50	2,2	-9.0	-5.0	SN..090308/SN..322
3870351	MSKNR12CA12	50,0	20,0	55	3,0	-9.0	-5.0	SN..120408/SN..432
3870350	MSKNR16CA12	60,0	25,0	63	3,0	-9.0	-5.0	SN..120408/SN..432
3870349	MSKNR20CA15	70,0	25,0	70	3,7	-9.0	-5.0	SN..150612/SN..543
3870348	MSKNR25CA19	100,0	32,0	100	4,6	-9.0	-5.0	SN..190612/SN..543
left hand								
3870356	MSKNL10CA09	40,0	14,0	50	2,2	-9.0	-5.0	SN..090308/SN..322
3870354	MSKNL16CA12	60,0	25,0	63	3,0	-9.0	-5.0	SN..120408/SN..432
3870353	MSKNL20CA15	70,0	25,0	70	3,7	-9.0	-5.0	SN..150612/SN..543

Spare Parts

D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
40	–	KLM33	2 mm	CKM36	STCM38	2 mm	KUAM28	2 mm	KUAM30	191.405	–	4 mm	CSWM 060 050
50	–	KLM43	2 mm	CKM34	STCM38	2 mm	KUAM22	2 mm	KUAM31	191.406	–	4 mm	CSWM 060 050
60	ISSN432	KLM46S	2.5 mm	CKM34	STCM9	2.5 mm	KUAM25	2.5 mm	KUAM32	191.407	–	5 mm	CSWM 080 050
70	SKSN566K	KLM54	2.5 mm	CKM37	STCM40	2.5 mm	KUAM25	2.5 mm	KUAM32	191.407	–	5 mm	CSWM 080 050
100	ISSN633	KLM68	4 mm	CKM35	STCM8	4 mm	KUAM27	4 mm	KUAM32	–	MS364	8 mm	CSWM 100 080



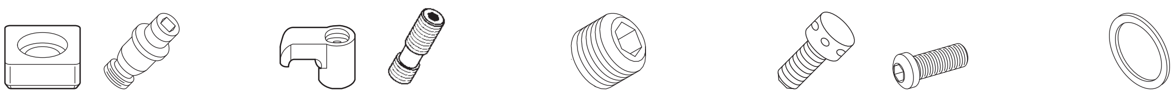
See pages B68–B80 for inserts.



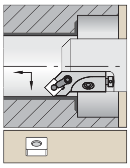
MSRN 75°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870344	**MSRNR10CA09**	40,0	14,0	50	-9.0	-5.0	SN..090308/SN..322
3870343	**MSRNR12CA12**	50,0	20,0	55	-9.0	-5.0	SN..120408/SN..432
3870341	**MSRNR20CA15**	70,0	25,0	70	-9.0	-5.0	SN..150612/SN..543
left hand							
3870347	**MSRNL12CA12**	50,0	20,0	55	-9.0	-5.0	SN..120408/SN..432
3870346	**MSRNL16CA12**	60,0	25,0	63	-9.0	-5.0	SN..120408/SN..432
3870345	**MSRNL20CA15**	70,0	25,0	70	-9.0	-5.0	SN..150612/SN..543

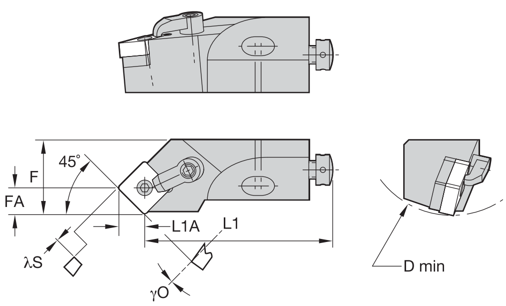
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**–**	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**–**	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ISSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**SKSN566K**	**KLM54**	2.5 mm	**CKM37**	**STCM40**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



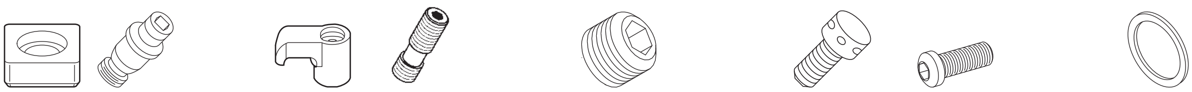
See pages B68–B80
for inserts.



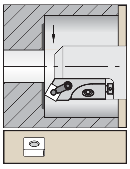
■ MSSN 45°

order number	catalogue number	D min	F	L1	L1A	λS°	γO°	gage insert
right hand								
3870336	**MSSNR10CA09**	40,0	14,0	44	6,1	-13.0	0.0	SN..090308/SN..322
3870335	**MSSNR12CA12**	50,0	20,0	47	8,3	-13.0	0.0	SN..120408/SN..432
3870334	**MSSNR16CA12**	60,0	25,0	53	8,3	-13.0	0.0	SN..120408/SN..432
3870333	**MSSNR20CA15**	70,0	25,0	60	10,3	-13.0	0.0	SN..150612/SN..543
left hand								
3870340	**MSSNL10CA09**	40,0	14,0	44	6,1	-13.0	0.0	SN..090308/SN..322
3870339	**MSSNL12CA12**	50,0	20,0	47	8,3	-13.0	0.0	SN..120408/SN..432
3870338	**MSSNL16CA12**	60,0	25,0	53	8,3	-13.0	0.0	SN..120408/SN..432

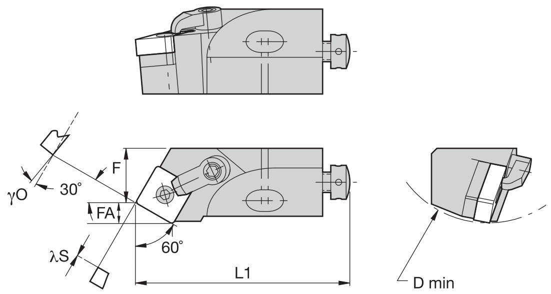
■ Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**–**	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**–**	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ISSN432**	**KLM46S**	2.5 mm	**CKM36**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**SKSN566K**	**KLM54**	2.5 mm	**CKM37**	**STCM40**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



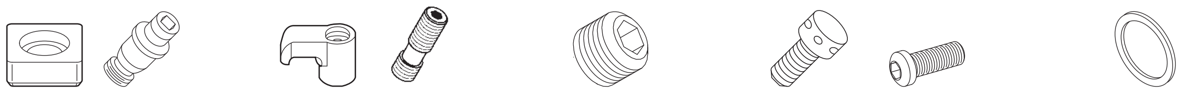
See pages B68–B80 for inserts.



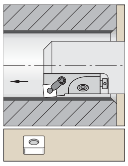
MSTN 60°

order number	catalogue number	D min	F	L1	FA	λS°	γO°	gage insert
right hand								
3870312	**MSTNR10CA09**	40,0	9,0	50	13,3	-11.0	0.0	SN..090308/SN..322
3870311	**MSTNR12CA12**	50,0	13,0	55	5,9	-11.0	0.0	SN..120408/SN..432
3870310	**MSTNR16CA12**	60,0	15,0	63	5,9	0.0	-11.0	SN..120408/SN..432

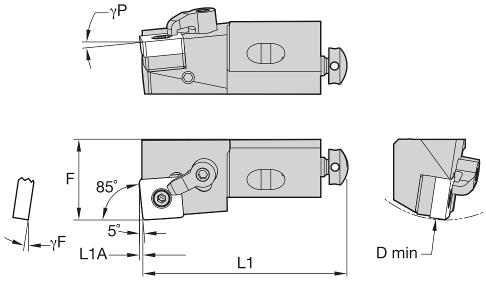
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**–**	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**–**	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ISSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



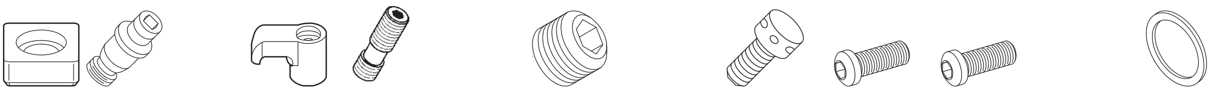
See pages B68–B80 for inserts.



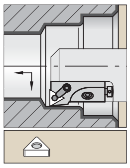
MSYN 85°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
right hand								
3870308	**MSYNR10CA09**	40,0	14,0	50	0,8	-9.0	-5.0	SN..090308/SN..322
3870307	**MSYNR12CA12**	50,0	20,0	55	1,0	-9.0	-5.0	SN..120408 / SN..432
3870306	**MSYNR16CA12**	60,0	25,0	63	1,0	-9.0	-5.0	SN..120408 / SN..432
3870305	**MSYNR25CA19**	100,0	32,0	100	1,5	-9.0	-5.0	SN..190612/SN..643
left hand								
3870309	**MSYNL10CA09**	40,0	14,0	50	0,8	-9.0	-5.0	SN..090308/SN..322

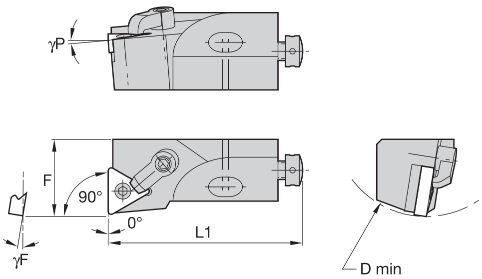
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
40	–	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	–	4 mm	**CSWM 060 050**
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	–	4 mm	**CSWM 060 050**
60	**ISSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	–	5 mm	**CSWM 080 050**
100	**ISSN633**	**KLM68**	4 mm	**CKM35**	**STCM8**	4 mm	**KUAM27**	4 mm	**KUAM33**	–	**MS364**	8 mm	**CSWM 100 080**



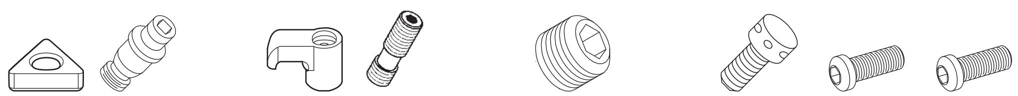
See pages B81–B93 for inserts.



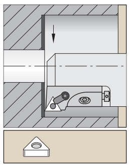
MTFN 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871303	MTFNR12CA16	50,0	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871302	MTFNR16CA16	60,0	25,0	63	-9.0	-5.0	TN..160408/TN..332
3871301	MTFNR20CA22	70,0	25,0	70	-9.0	-5.0	TN..220408/TN..432
3871300	MTFNR25CA27	100,0	32,0	100	-9.0	-5.0	TN..270612/TN..443
left hand							
3871306	MTFNL12CA16	50,0	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871305	MTFNL16CA16	60,0	25,0	63	-9.0	-5.0	TN..160408/TN..332

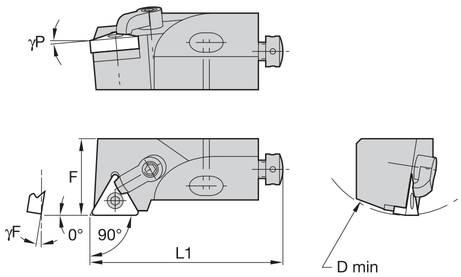
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
50	–	KLM33L	2 mm	CKM34	STCM38	2 mm	KUAM22	2 mm	KUAM31	191.406	–	4 mm	CSWM 060 050
60	ITSN322	KLM34L	2 mm	CKM34	STCM9	2 mm	KUAM25	2 mm	KUAM32	191.407	–	5 mm	CSWM 080 050
70	ITSN433	KLM46	2.5 mm	CKM35	STCM37	2.5 mm	KUAM25	2.5 mm	KUAM32	191.407	–	5 mm	CSWM 080 050
100	ITSN534	KLM58	3 mm	CKM38	STCM39	3 mm	KUAM26	3 mm	KUAM32	–	MS364	8 mm	CSWM 100 080



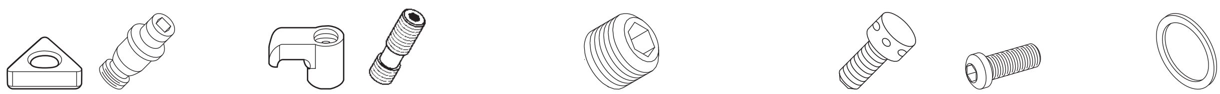
See pages B81–B93 for inserts.



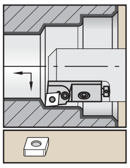
MTGN 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871296	**MTGNR12CA16**	50,0	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871295	**MTGNR16CA16**	60,0	25,0	63	-9.0	-5.0	TN..160408/TN..332
3871294	**MTGNR20CA22**	70,0	25,0	70	-9.0	-5.0	TN..220408/TN..432
left hand							
3871299	**MTGNL12CA16**	50,0	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871298	**MTGNL16CA16**	60,0	25,0	63	-9.0	-5.0	TN..160408/TN..332
3871297	**MTGNL20CA22**	70,0	25,0	70	-9.0	-5.0	TN..220408/TN..432

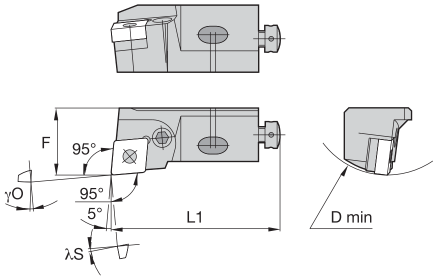
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
50	**–**	**KLM33L**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ITSN322**	**KLM34L**	2 mm	**CKM34**	**STCM9**	2 mm	**KUAM25**	2 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**ITSN433**	**KLM46**	2.5 mm	**CKM35**	**STCM37**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



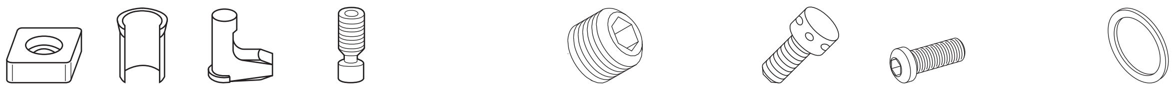
See pages B30–B46 for inserts.



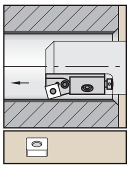
PCLN 95°

order number	catalogue number	D min	F	L1	λS°	γO°	gage insert
right hand							
3871291	**PCLNR12CA12**	50	20,0	55	-6.0	-9.0	CN..120408/CN..432
3871290	**PCLNR16CA12**	60	25,0	63	-6.0	-7.0	CN..120408/CN..432
left hand							
3871293	**PCLNL16CA12**	60	25,0	63	-6.0	-7.0	CN..120408/CN..432
3871292	**PCLNL20CA16**	70	25,0	70	—	—	CN..160612/CN..543

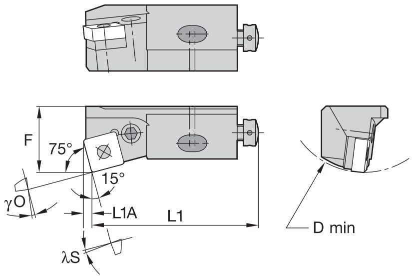
Spare Parts



D min	shim	shim pin	toggle lever	lever screw	wrench size lever screw	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
50	**—**	**—**	**511.022**	**514.122**	10 IP	**KUAM28**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**512.112**	**513.023**	**511.023**	**514.123**	15 IP	**KUAM23**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**512.117**	**513.025**	**511.025**	**514.125**	15 IP	**KUAM23**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



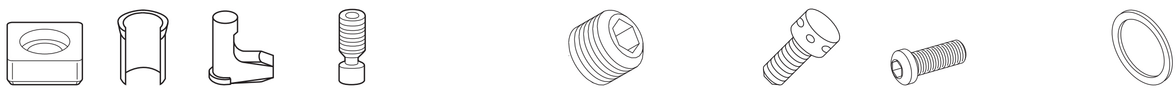
See pages B68–B80 for inserts.



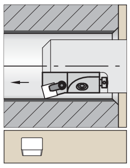
PSKN 75°

order number	catalogue number	D min	F	L1	L1A	λS°	γO°	gage insert
right hand								
3871287	**PSKNR12CA12**	50,0	20,0	55	3,1	-8.0	-6.0	SN..120408/SN..432
3871286	**PSKNR16CA12**	60,0	25,0	63	3,1	-6.0	-6.0	SN..120408/SN..432
3871289	**PSKNR20CA15**	70,0	25,0	70	3,8	—	—	SN..150612/SN..543
left hand								
3871288	**PSKNL16CA12**	60,0	25,0	63	3,1	-6.0	-6.0	SN..120408/SN..432

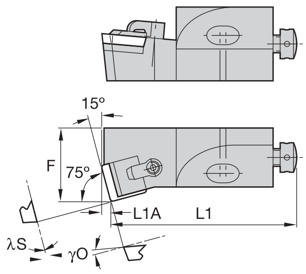
Spare Parts

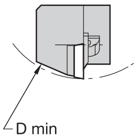


D min	shim	shim pin	toggle lever	lever screw	wrench size lever screw	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
50	**—**	**—**	**511.022**	**514.122**	10 IP	**KUAM28**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**512.063**	**513.023**	**511.023**	**514.123**	15 IP	**KUAM23**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**512.025**	**513.025**	**511.025**	**514.125**	15 IP	**KUAM23**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



See pages B186–B191 and B211–B212 for inserts.

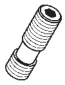
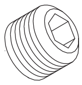
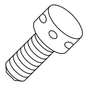
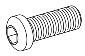
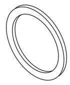




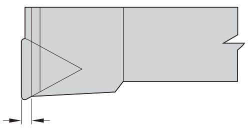
CSKP 75°

order number	catalogue number	D min	F	L1	L1A	λS°	γO°	gage insert
right hand								
3870437	**CSKPR10CA09**	40,0	14,0	50	2,2	0.0	5.0	SP..090308/SP..322
3870436	**CSKPR12CA12**	50,0	20,0	55	3,1	0.0	5.0	SP..120308/SP..422

Spare Parts

D min	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**CKM34**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**

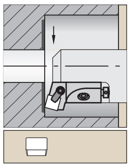


Effective Width

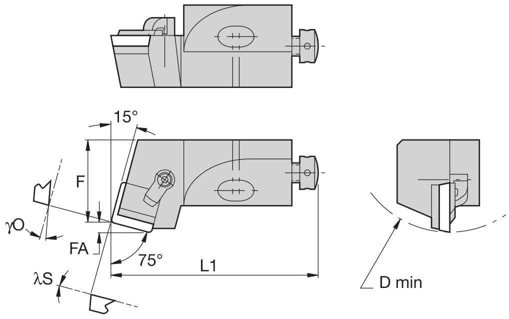
Chipbreakers for C-Style Cartridges

Chipbreakers

insert	chipbreaker	effective width	note
SP..090308/SP..322	CBS-12	2.1	
	CBS-12D**	2.1	**For chipbreaking on both primary and secondary cutting edges
SP..120308/SP..422	CBS16	4.4	
	CBS-16D**	2.8	**For chipbreaking on both primary and secondary cutting edges
	CBS-16N	3.0	
	CBS16F	2.1	



See pages B186–B191 and B211–B212 for inserts.

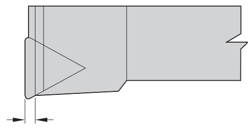


CSRP 75°

order number	catalogue number	D min	F	L1	FA	λS°	γO°	gage insert
right hand								
3870435	**CSRPR10CA09**	40,0	14,0	50	2,2	0.0	0.0	SP..090308/SP..322
3870434	**CSRPR12CA12**	50,0	20,0	55	3,0	3.0	0.0	SP..120308/SP..422

Spare Parts

D min	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**CKM34**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**

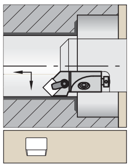


Effective Width

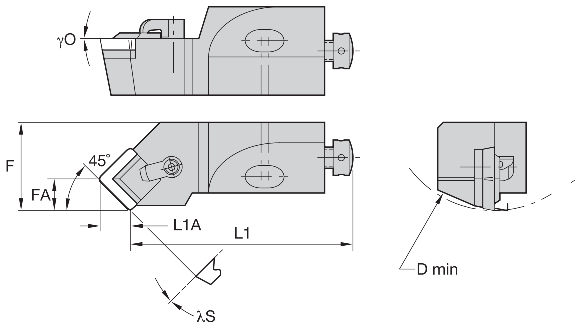
Chipbreakers for C-Style Cartridges

Chipbreakers

insert	chipbreaker	effective width	note
SP..090308/SP..322	CBS-12	2.1	
	CBS-12D**	2.1	**For chipbreaking on both primary and secondary cutting edges
SP..120308/SP..422	CBS16	4.4	
	CBS-16D**	2.8	**For chipbreaking on both primary and secondary cutting edges
	CBS-16N	3.0	
	CBS16F	2.1	



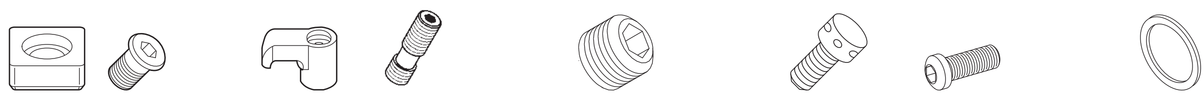
See pages B186–B191 and B211–B212 for inserts.



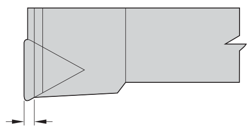
CSSP 45°

order number	catalogue number	D min	F	L1	FA	L1A	λS°	γO°	gage insert
right hand									
3870430	**CSSPR10CA09**	40,0	14,0	44	6,5	6,1	0.0	0.0	SP..090308/SP..322
3870429	**CSSPR12CA12**	50,0	20,0	47	8,7	8,3	0.0	0.0	SP..120308/SP..422
left hand									
3870433	**CSSPL10CA09**	40,0	14,0	44	6,5	6,1	0.0	0.0	SP..090308/SP..322
3870432	**CSSPL12CA12**	50,0	20,0	47	8,7	8,3	0.0	0.0	SP..120308/SP..422
3870431	**CSSPL20CA12**	70,0	25,0	60	—	8,3	0.0	0.0	SP..120308/SP..422

Spare Parts



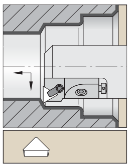
D min	shim	shim screw	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	–	–	–	**CKM34**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	–	–	–	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
70	**SM840**	**MS111**	2 mm	**CKM20**	**STCM11**	3 mm	**KUAM26**	3 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



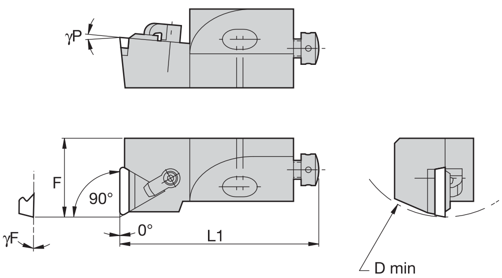
Effective Width

Chipbreakers for C-Style Cartridges

insert	Chipbreakers chipbreaker	effective width	note
SP..090308/SP..322	CBS-12	2.1	
	CBS-12D**	2.1	**For chipbreaking on both primary and secondary cutting edges
SP..120308/SP..422	CBS16	4.4	
	CBS-16D**	2.8	**For chipbreaking on both primary and secondary cutting edges
	CBS-16N	3.0	
	CBS16F	2.1	



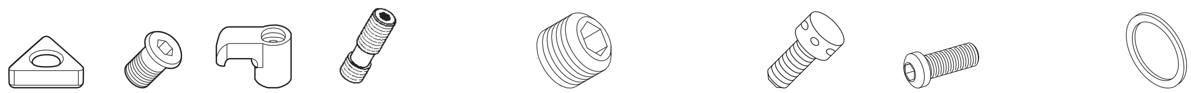
See pages B192–B194 and B212–B216 for inserts.



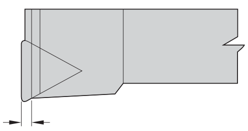
CTFP 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870427	**CTFPR10CA11**	40,0	14,0	50	0.0	5.0	TP..110304/TP..421
3870426	**CTFPR12CA16**	50,0	20,0	55	0.0	5.0	TP..160308/TP..322
3870424	**CTFPR20CA22**	70,0	25,0	70	0.0	5.0	TP..220408/TP..432
left hand							
3870428	**CTFPL12CA16**	50,0	20,0	55	0.0	5.0	TP..160308/TP..322

Spare Parts



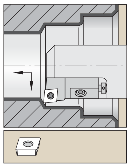
D min	shim	shim screw	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**–**	**–**	**CKM34**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**–**	**–**	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
70	**SM837**	**MS125**	**CKM35**	**STCM8**	4 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



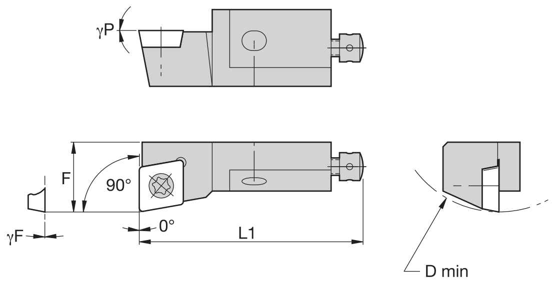
Effective Width

Chipbreakers for C-Style Cartridges

insert	Chipbreakers chipbreaker	effective width	note
TP..110304/TP..421	CBT-8	2.2	
TP..160308/TP..322	CBT-12*	4.0	*Use with CTC-style holder only
	CBT-12*	2.7	*Use with CTC-style holder only
	CBT-12*	2.2	*Use with CTC-style holder only
TP..220408/TP..432	CBT-16	5.5	
	CBT-16N	3.2	
	CBT-16F	2.1	



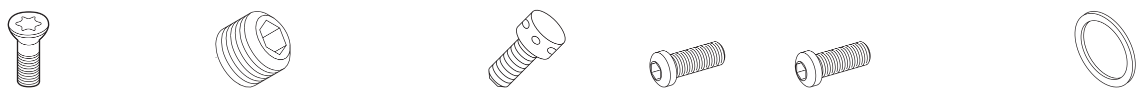
See pages B30–B46 for inserts.



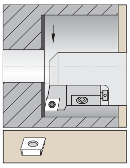
SCFP 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871284	SCFPR06CA05	20	8,0	25	0.0	0.0	CP..050204/CP..18151
3871283	SCFPR08CA06	25	10,0	32	0.0	0.0	CP..060204/CP..2151
3871272	SCFPR10CA09	40	14,0	50	0.0	0.0	CP..09T308/CP..3252
left hand							
3871285	SCFPL08CA06	25	10,0	32	0.0	0.0	CP..060204/CP..2151

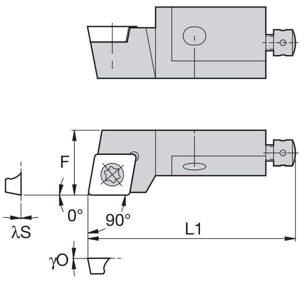
Spare Parts

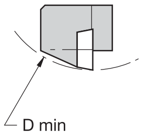


D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
20	**MS1933**	T7	**KUAM34**	1.5 mm	**KUAM35**	–	**MS2173**	2 mm	**CSWM 035 040**
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	–	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	–	4 mm	**CSWM 060 050**



See pages B30–B46 for inserts.

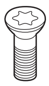
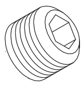
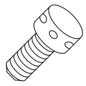
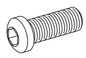
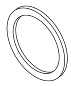




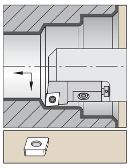
SCGP 90°

order number	catalogue number	D min	F	L1	λS°	γO°	gage insert
right hand							
3871270	**SCGPR08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151
left hand							
3871271	**SCGPL08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151

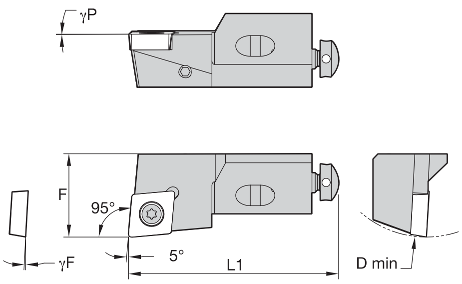
Spare Parts

D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	holding screw	hex	washer
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**MS2175**	2.5 mm	**CSWM 040 050**



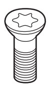
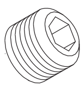
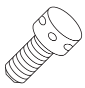
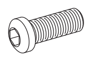
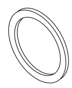
See pages B30–B46 for inserts.



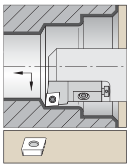
SCLC 95°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871268	**SCLCR10CA09**	40	14,0	50	-3.0	0.0	CC..09T308/CC..3252
3871265	**SCLCR12CA12**	50	20,0	55	-3.0	0.0	CC..120408/CC..432
left hand							
3871267	**SCLCL12CA12**	50	20,0	55	-3.0	0.0	CC..120408/CC..432
3871266	**SCLCL16CA12**	60	25,0	63	-3.0	0.0	CC..120408/CC..432

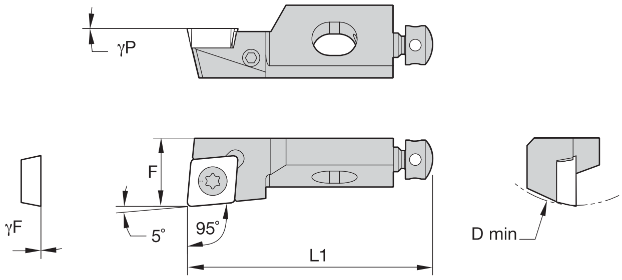
Spare Parts

D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**MS1157**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**MS1157**	T15	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



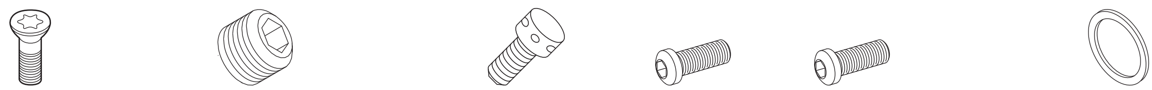
See pages B30–B46 for inserts.



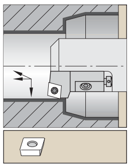
SCLP 95°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871261	SCLPR06CA05	20	8,0	25	0.0	0.0	CP..050204/CP..18151
3871260	SCLPR08CA06	25	10,0	32	0.0	0.0	CP..060204/CP..2151
3871259	SCLPR10CA09	40	14,0	50	0.0	0.0	CP..09T308/CP..3252
left hand							
3871264	SCLPL06CA05	20	8,0	25	0.0	0.0	CP..050204/CP..18151
3871263	SCLPL08CA06	25	10,0	32	0.0	0.0	CP..060204/CP..2151
3871262	SCLPL10CA09	40	14,0	50	0.0	0.0	CP..09T308/CP..3252

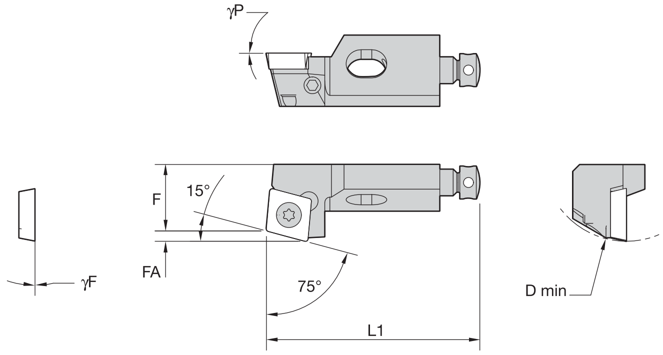
Spare Parts



D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
20	MS1933	T7	KUAM34	1.5 mm	KUAM35	–	MS2173	2 mm	CSWM 035 040
25	MS1153	T7	KUAM34	1.5 mm	KUAM20	–	MS2175	2.5 mm	CSWM 040 050
40	MS1155	T15	KUAM28	2 mm	KUAM30	191.405	–	4 mm	CSWM 060 050



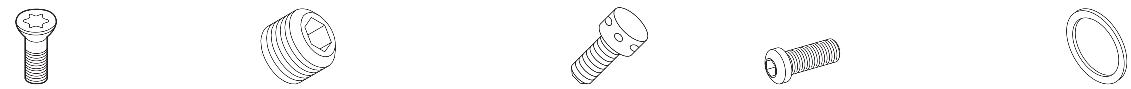
See pages B30–B46 for inserts.



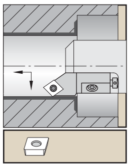
SCRP 75°

order number	catalogue number	D min	F	FA	L1	γF°	γP°	gage insert
right hand								
3871257	**SCRPR08CA06**	25	10,0	1,5	32	0.0	0.0	CP..060204/CP..2151
left hand								
3871258	**SCRPL08CA06**	25	10,0	1,5	32	0.0	0.0	CP..060204/CP..2151

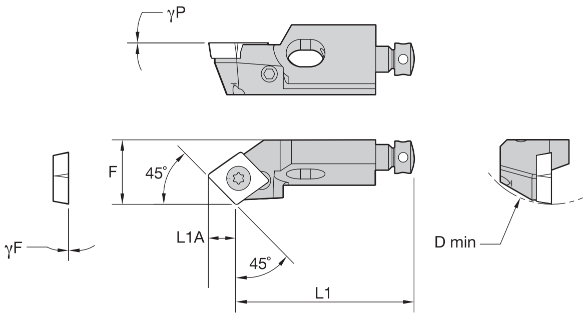
Spare Parts



D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	holding screw	hex	washer
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**MS2175**	2.5 mm	**CSWM 040 050**



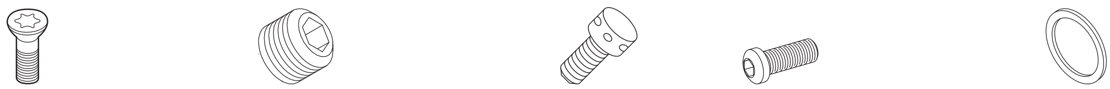
See pages B30–B46 for inserts.



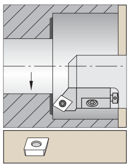
SCSP 45°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
right hand								
3871255	**SCSPR06CA05**	20	8,0	21	4	0.0	0.0	CP..050204/CP..18151
3871254	**SCSPR08CA06**	25	10,0	28	4	0.0	0.0	CP..060204/CP..2151

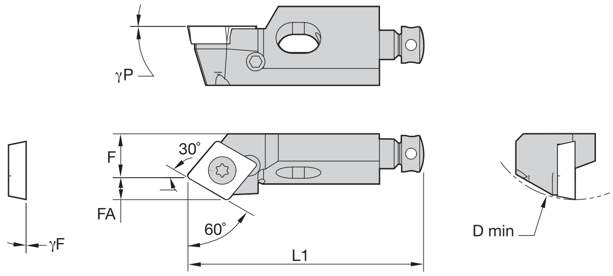
Spare Parts



D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	holding screw	hex	washer
20	**MS1933**	T7	**–**	–	**KUAM35**	**MS2173**	2 mm	**CSWM 035 040**
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**MS2175**	2.5 mm	**CSWM 040 050**



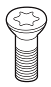
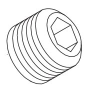
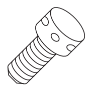
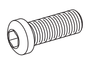
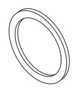
See pages B30–B46 for inserts.



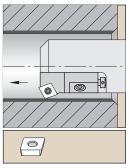
SCTP 60°

order number	catalogue number	D min	F	FA	L1	γF°	γP°	gage insert
right hand								
3871252	**SCTPR06CA05**	20	5,5	2,6	25	0.0	0.0	CP..050204/CP..18151
3871251	**SCTPR08CA06**	25	6,0	3,0	32	0.0	0.0	CP..060204/CP..2151
left hand								
3871253	**SCTPL08CA06**	25	6,0	3,0	32	0.0	0.0	CP..060204/CP..2151

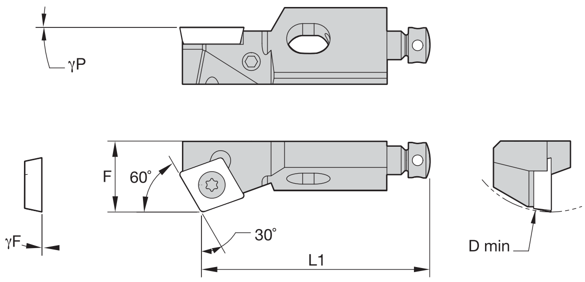
Spare Parts

D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	holding screw	hex	washer
20	**MS1933**	T7	**–**	–	**KUAM35**	**MS2173**	2 mm	**CSWM 035 040**
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**MS2175**	2.5 mm	**CSWM 040 050**



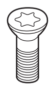
See pages B30–B46 for inserts.

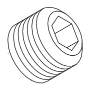


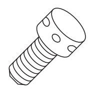
SCWP 60°

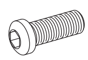
order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871249	**SCWPR08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151
left hand							
3871250	**SCWPL08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151

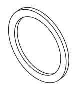
Spare Parts



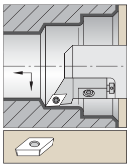




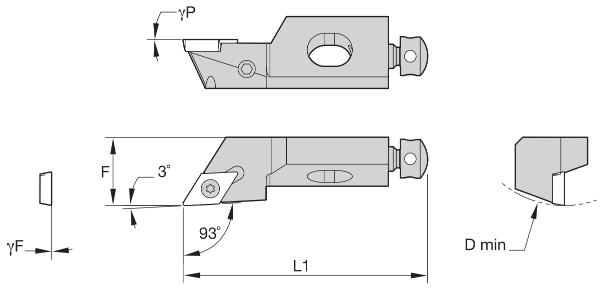




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	holding screw	hex	washer
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**MS2175**	2.5 mm	**CSWM 040 050**



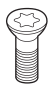
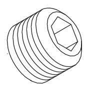
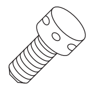
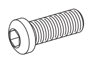
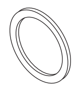
See pages B47–B64 for inserts.



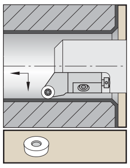
SDJP 93°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871247	**SDJPR10CA07**	40	14,0	50	0.0	0.0	DP..070204/DP..2151
left hand							
3871248	**SDJPL10CA07**	40	14,0	50	0.0	0.0	DP..070204/DP..2151

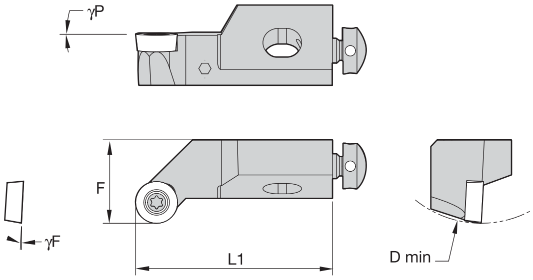
Spare Parts

D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1153**	T7	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**



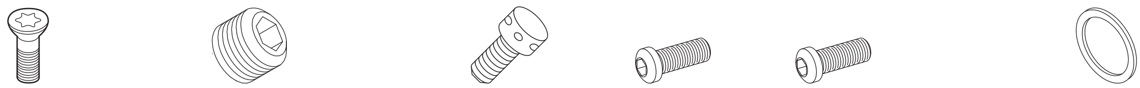
See pages B65–B67 for inserts.



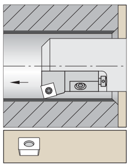
SRGC

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871245	**SRGCR08CA06**	25	10,0	32	-4.0	0.0	RC..0602M0/RC..215
3871244	**SRGCR10CA08**	40	14,0	50	-3.0	0.0	RC..0803M0/RC..0803M0
left hand							
3871246	**SRGCL12CA10**	50	20,0	55	-3.0	0.0	RC..10T3M0/RC..10T3M0

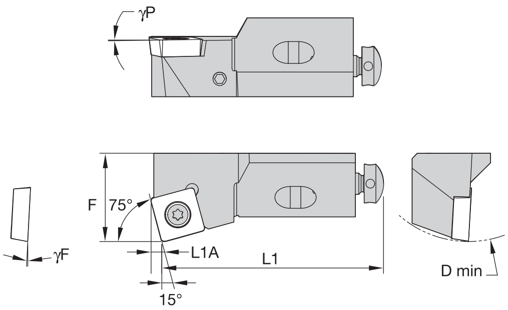
Spare Parts



D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	–	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1154**	T9	**KUAM28**	2 mm	**KUAM30**	**191.405**	–	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	–	4 mm	**CSWM 060 050**



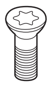
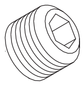
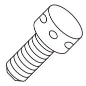
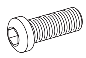
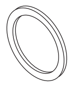
See pages B68–B80 for inserts.



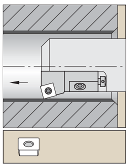
SSKC 75°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871192	**SSKCR10CA09**	40	14,0	50	-4.3	-2.5	SC..09T308/SC..3252
3871191	**SSKCR12CA12**	50	20,0	55	-3.0	0.0	SC..120408/SC..432
3871190	**SSKCR16CA12**	60	25,0	63	-3.0	0.0	SC..120408/SC..432
left hand							
3871243	**SSKCL12CA12**	50	20,0	55	-3.0	0.0	SC..120408/SC..432

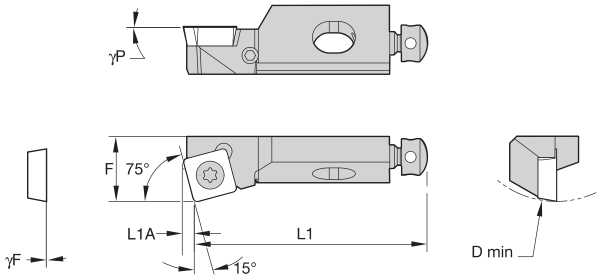
Spare Parts

D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**MS1157**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**MS1157**	T15	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



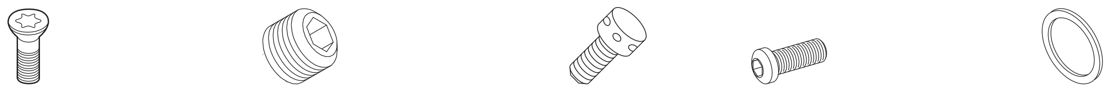
See pages B68–B80 for inserts.



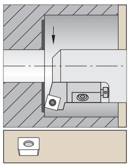
■ SSKP 75°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870393	**SSKPR10CA09**	40	14,0	50	0.0	0.0	SP..09T308/SP..3252
3870392	**SSKPR12CA09**	50	20,0	55	0.0	0.0	SP..09T308/SP..3252
left hand							
3870394	**SSKPL10CA09**	40	14,0	50	0.0	0.0	SP..09T308/SP..3252

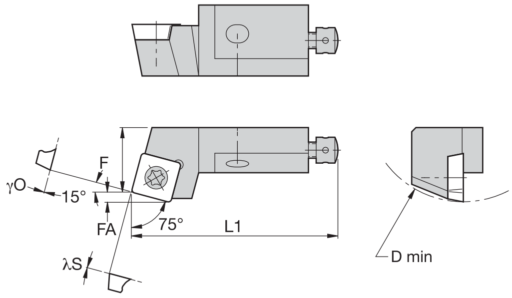
■ Spare Parts



D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**



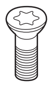
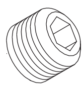
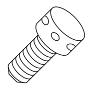
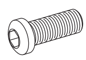
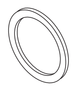
See pages B68–B80 for inserts.



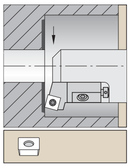
■ SSRC 75°

order number	catalogue number	D min	F	FA	L1	λS°	γO°	gage insert
right hand								
3870390	**SSRCR12CA12**	50	20,0	3,1	55	-3.0	0.0	SC..120408/SC..432
left hand								
3870391	**SSRCL12CA12**	50	20,0	3,1	55	-3.0	0.0	SC..120408/SC..432

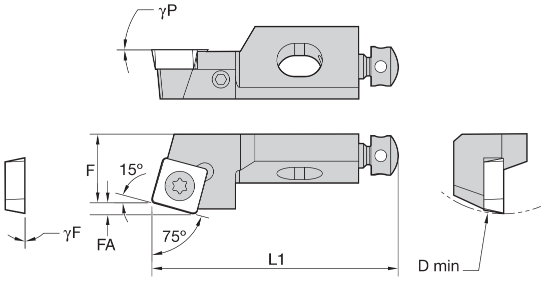
■ Spare Parts

D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
50	**MS1157**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**



See pages B68–B80 for inserts.

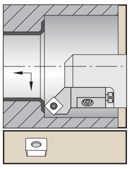


SSRP 75°

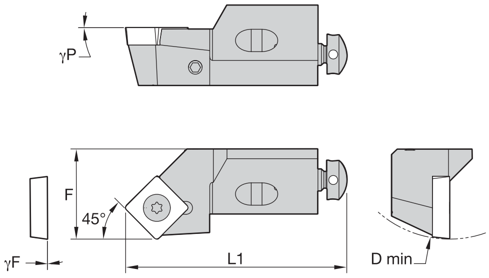
order number	catalogue number	D min	F	FA	L1	γF°	γP°	gage insert
right hand								
3870388	SSRPR10CA09	40	14,0	2,2	50	0.0	0.0	SP..09T308/SP..3252
left hand								
3870389	SSRPL10CA09	40	14,0	2,2	50	0.0	0.0	SP..09T308/SP..3252

Spare Parts

D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	MS1155	T15	KUAM28	2 mm	KUAM30	191.405	4 mm	CSWM 060 050



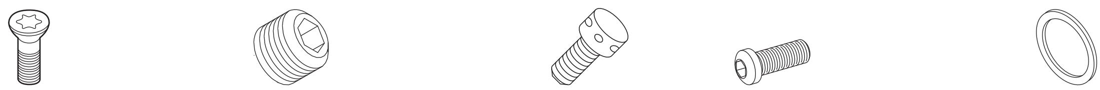
See pages B68–B80 for inserts.



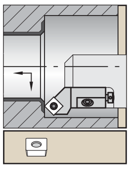
SSSC 45°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870386	SSSCR10CA09	40	14,0	44	-3.0	0.0	SC..09T308/SC..3252
3870385	SSSCR12CA12	50	20,0	47	-3.0	0.0	SC..120408/SC..432
3870384	SSSCR16CA12	60	25,0	53	0.0	0.0	SC..120408/SC..432
left hand							
3870387	SSSCL12CA12	50	20,0	47	-3.0	0.0	SC..120408/SC..432

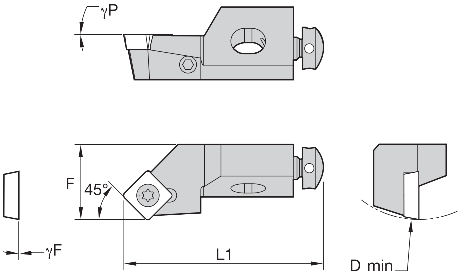
Spare Parts



D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	MS1155	T15	KUAM28	2 mm	KUAM30	191.405	4 mm	CSWM 060 050
50	MS1157	T15	KUAM23	2.5 mm	KUAM31	191.406	4 mm	CSWM 060 050
60	MS1157	T15	KUAM25	2.5 mm	KUAM32	191.407	5 mm	CSWM 080 050



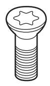
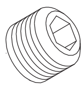
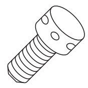
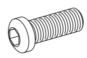
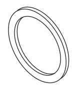
See pages B68–B80 for inserts.



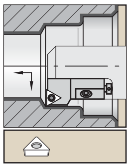
■ SSSP 45°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870382	**SSSPR10CA09**	40	14,0	44	0.0	0.0	SP..09T308/SP..3252
left hand							
3870383	**SSSPL10CA09**	40	14,0	44	0.0	0.0	SP..09T308/SP..3252

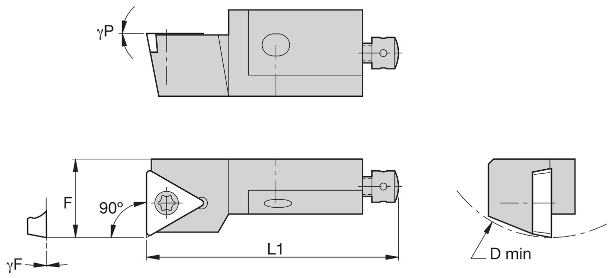
■ Spare Parts

D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**



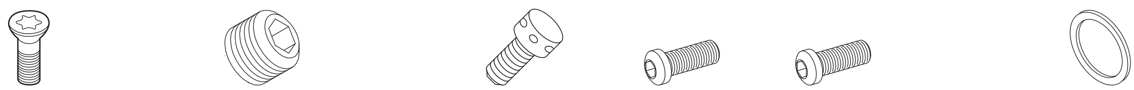
See pages B81–B93 for inserts.



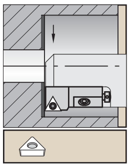
STFP 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870378	**STFPR08CA09**	25	10,0	32	0.0	0.0	TP..090204/TP..18151
3870377	**STFPR10CA11**	40	14,0	50	0.0	0.0	TP..110204/TP..2151
3870376	**STFPR12CA16**	50	20,0	55	0.0	0.0	TP..16T308/TP..3252
left hand							
3870381	**STFPL08CA09**	25	10,0	32	0.0	0.0	TP..090204/TP..18151
3870380	**STFPL10CA11**	40	14,0	50	0.0	0.0	TP..110204/TP..2151
3870379	**STFPL12CA16**	50	20,0	55	0.0	0.0	TP..16T308/TP..3252

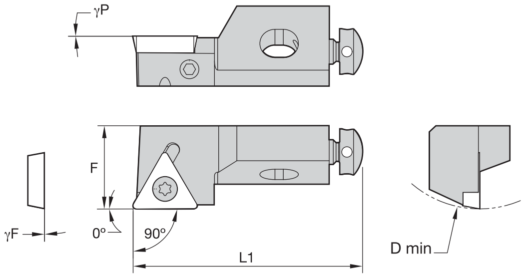
Spare Parts



D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
25	**MS1152**	T7	**KUAM34**	1.5 mm	**KUAM20**	**–**	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1153**	T7	**KUAM28**	2 mm	**KUAM30**	**191.405**	**–**	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	**–**	4 mm	**CSWM 060 050**



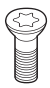
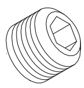
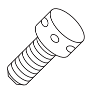
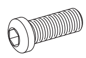
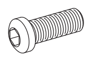
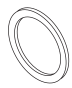
See pages B81–B93 for inserts.



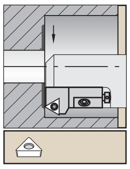
■ STGP 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870372	**STGPR08CA09**	25	10,0	32	0.0	0.0	TP..090204/TP..18151
3870371	**STGPR10CA11**	40	14,0	50	0.0	0.0	TP..110204/TP..2151
3870370	**STGPR12CA16**	50	20,0	55	0.0	0.0	TP..16T308/TP..3252
left hand							
3870374	**STGPL08CA09**	25	10,0	32	0.0	0.0	TP..090204/TP..18151
3870373	**STGPL10CA11**	40	14,0	50	0.0	0.0	TP..110204/TP..2151

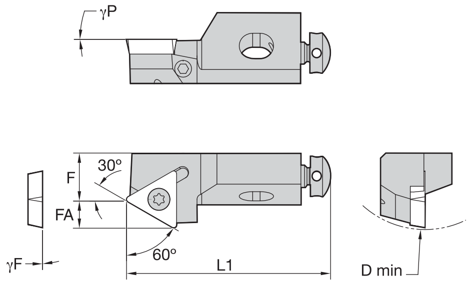
■ Spare Parts

D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
25	**MS1152**	T7	**KUAM34**	1.5 mm	**KUAM20**	–	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1153**	T7	**KUAM28**	2 mm	**KUAM30**	**191.405**	–	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	–	4 mm	**CSWM 060 050**



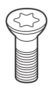
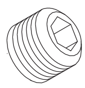
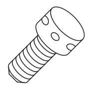
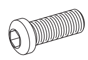
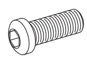
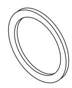
See pages B81–B93 for inserts.



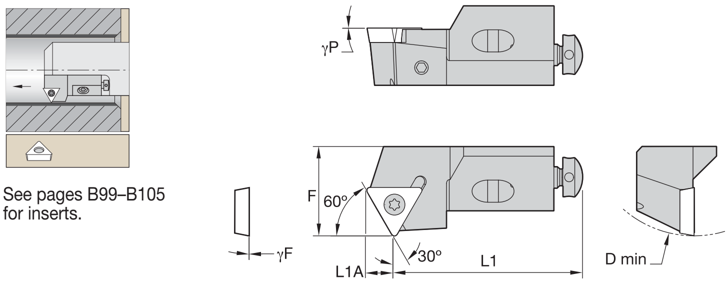
STTP 60°

order number	catalogue number	D min	F	FA	L1	γF°	γP°	gage insert
right hand								
3870369	**STTPR08CA09**	25	6,0	4,3	32	0.0	0.0	TP..090204/TP..18151
3870368	**STTPR10CA11**	40	9,0	4,9	50	0.0	0.0	TP..110204/TP..2151
3870367	**STTPR12CA16**	50	13,0	7,2	55	0.0	0.0	TP..16T308/TP..3252

Spare Parts

D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
25	**MS1152**	T7	**KUAM34**	1.5 mm	**KUAM20**	**–**	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1153**	T7	**KUAM28**	2 mm	**KUAM30**	**191.405**	**–**	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	**–**	4 mm	**CSWM 060 050**

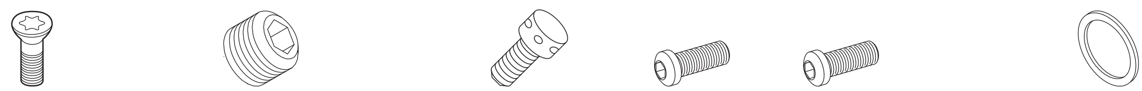


See pages B99–B105 for inserts.

STWP 60°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
right hand								
3870364	**STWPR08CA09**	25	10,0	28	4,3	0.0	0.0	TP..090204/TP..18151
3870363	**STWPR10CA11**	40	14,0	44	5,0	0.0	0.0	TP..110204/TP..2151
3870252	**STWPR12CA16**	50	20,0	47	7,2	0.0	0.0	TP..16T308/TP..3252
left hand								
3870366	**STWPL10CA11**	40	14,0	44	5,0	0.0	0.0	TP..110204/TP..2151
3870365	**STWPL12CA16**	50	20,0	47	7,2	0.0	0.0	TP..16T308/TP..3252

Spare Parts



D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
25	**MS1152**	T7	**KUAM34**	1.5 mm	**KUAM20**	–	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1153**	T7	**KUAM28**	2 mm	**KUAM30**	**191.405**	–	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	–	4 mm	**CSWM 060 050**

Turning • Tools for Small Hole Boring

The WIDIA™ line of micro boring bars provide accurate holemaking tooling in diameters as small as 1,57mm. These economical, indexable inserts are available in both steel and carbide shanks and are stocked in both metric and inch sizes. Ideal for a wide range of applications, including precision micro boring.

I.D. Indexable Insert Tooling

80° Diamond Insert Boring Bars

- Available in shanks as small as 4mm to bore >4,57mm diameter.
- Positive rake geometry for free cutting action and better surface finishes.
- Superior, unobstructed chip evacuation.
- Stocked in multiple grades to bore a wide range of materials.

Threading and Grooving Boring Bars

- Easy insert changes for threading and grooving.
- Thread down to a 48 TPI, 1,3mm TP (pitch).
- Thread and groove capabilities to an inside bore diameter of 6,91mm.

Multi-application tooling — groove and thread with the same bar.

Inserts available in multiple styles and grades, including polycrystalline diamond tipped, for all machining applications.

0,05mm insert nose radii available; insert repeatability within 0,005mm.

Choose from high-quality steel or carbide shanks with through tool coolant capabilities.

Triangle Insert Boring Bars

- Designed for less obstruction and greater chip evacuation.
- Positive rake geometry to bore holes >6,98mm diameter.
- Stocked in all grades, including diamond-tipped and borazon-tipped styles.
- Stocked in shanks as small as 6mm for 7,06mm minimum bore diameter.

The World's Most Comprehensive Boring Solutions

Trust the WIDIA™ full line of boring tools to meet all of your demanding job requirements. Whatever the work at hand, you are sure to find the most appropriate solution in this comprehensive, easy-to-use guide.

We engineer only the BEST boring tools, guaranteed to reduce your machining time, provide superior results, and outperform the competition.

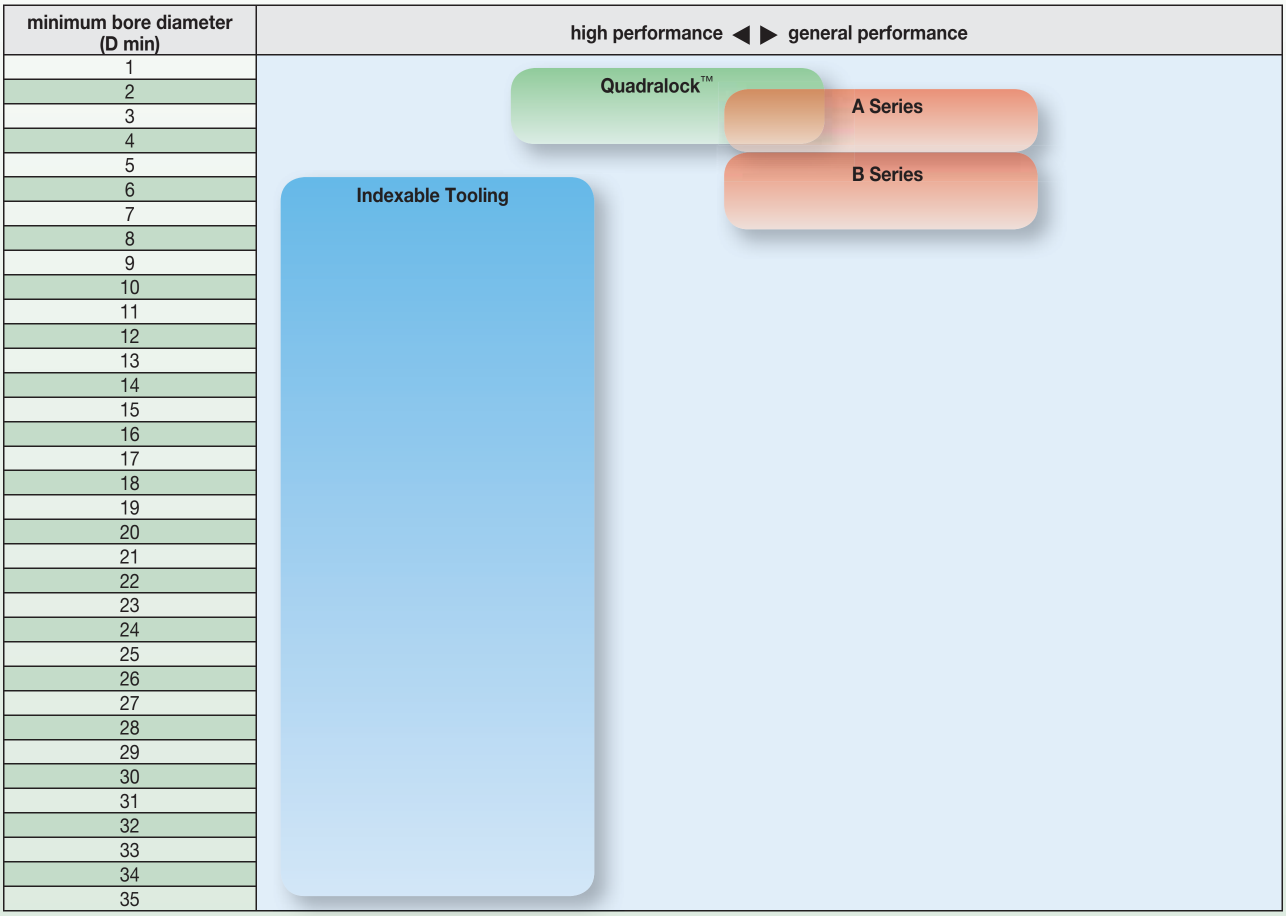
Select the Correct Small Hole Boring Product Platform for Your Application

1 Determine tooling system to be used based on hole size to be bored (D min).

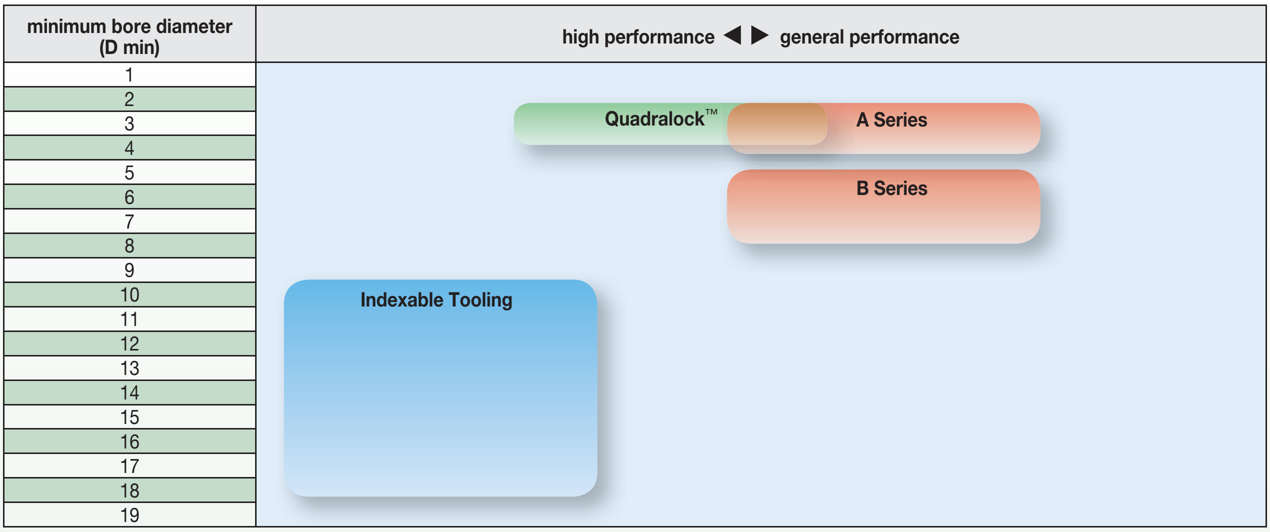
NOTE: Proper bar selection will have largest minimum bore dimension under hole size to be bored.

Indexable Tooling
A/B Series
Quadralock

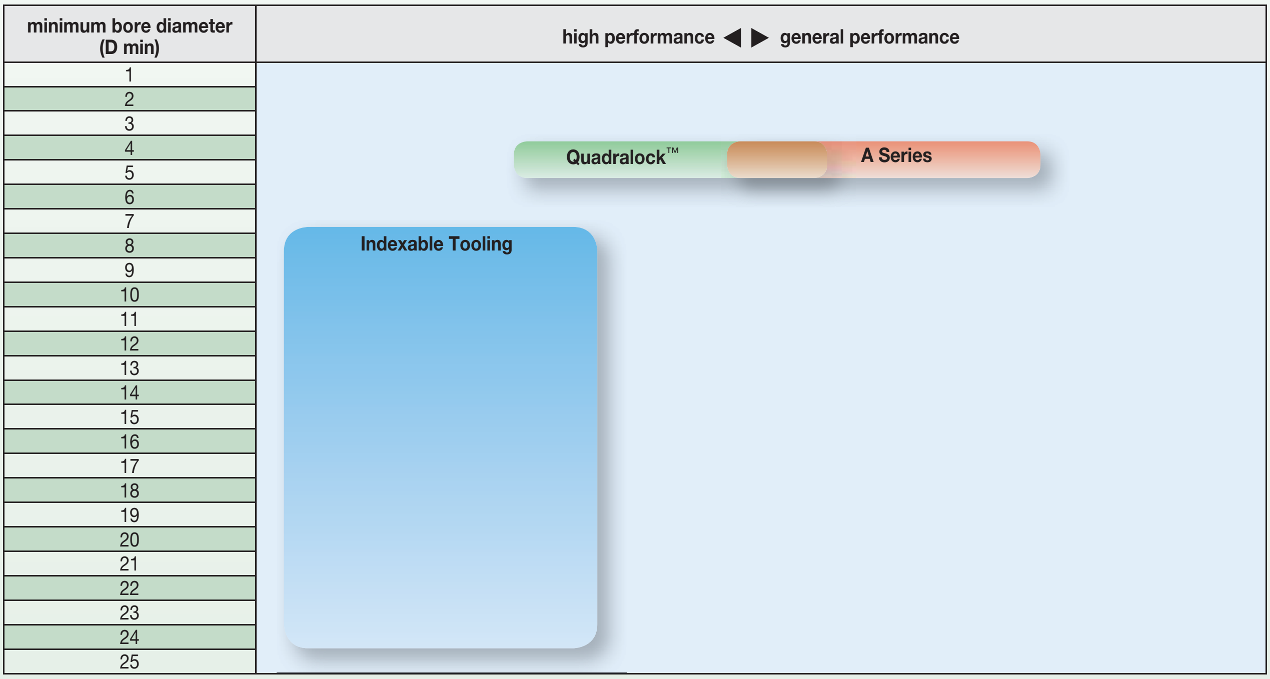
Boring



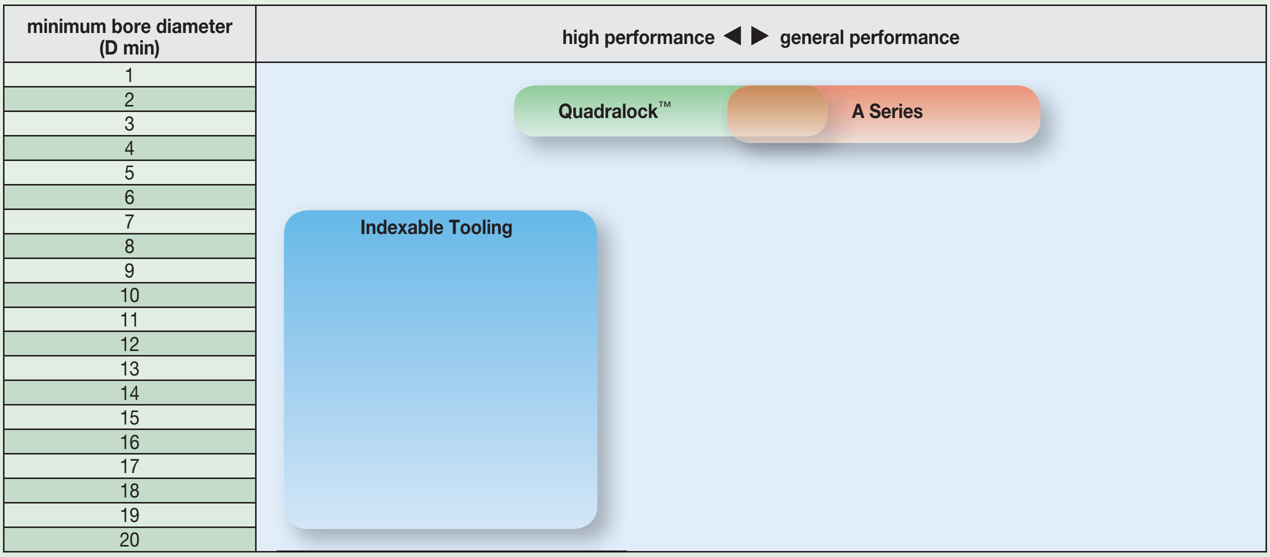
Profiling



Threading



Grooving



NOTE: Proper bar selection will have largest minimum bore dimension under hole size to be bored.

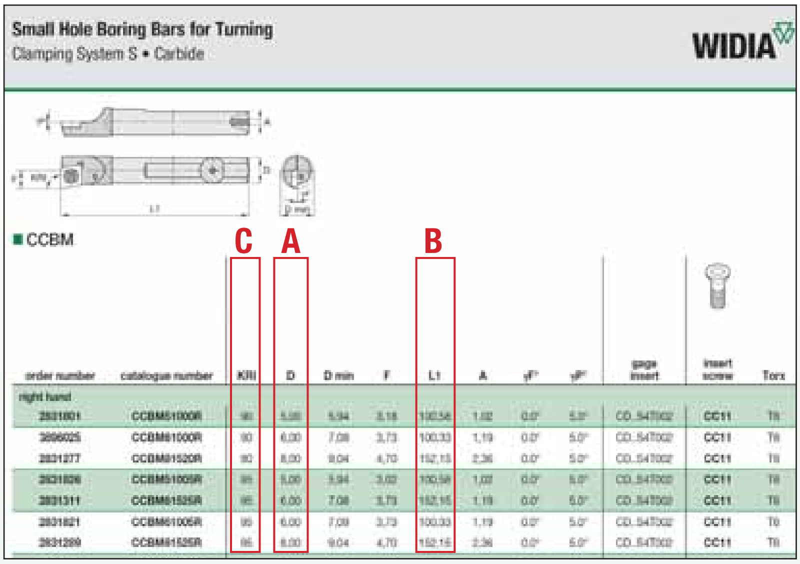
WIDIA

2 Determine boring bar (D).

A Select shank size (D) based on your machine's requirements.

B Determine bore depth (how far the boring bar extends from the holder). Multiply bar diameter by 4. If bore depth is less, use a steel bar. If bore depth exceeds 4:1 ratio, use a carbide bar. Use L1 or L4 depending on bar selected. *(See recommended maximum overhang chart on **page D86**.)* For indexable tooling, go to **step 3**. For all other tooling systems, go directly to **step 4**.

C Determine lead angle (KRA). Zero degree lead angle is used when maximum stability is required. Lead angle may vary based on changing conditions, such as boring in a blind hole.

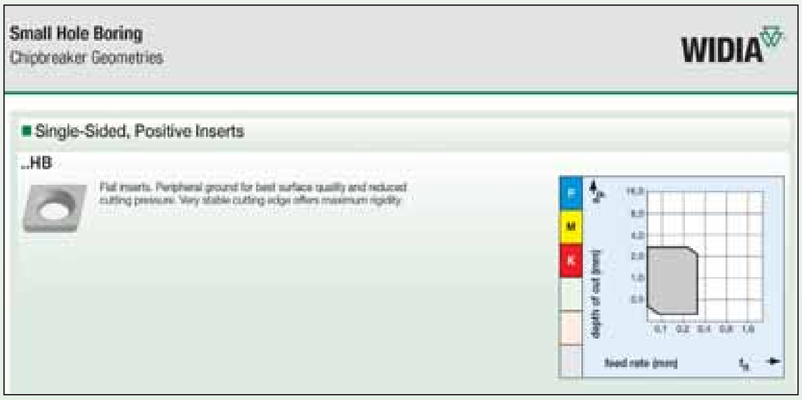

Small Hole Boring Bars for Turning
Clamping System S • Carbide
WIDIA

CCBM

order number	catalogue number	KRI (C)	D (A)	D min	F	L1 (B)	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
2831801	CCBM51000R	90	5,00	5,94	3,18	100,56	1,02	0,0°	5,0°	CD..54T002	CC11	T8
3896025	CCBM61000R	90	6,00	7,08	3,73	100,33	1,19	0,0°	5,0°	CD..54T002	CC11	T8
2831277	CCBM81520R	90	8,00	9,04	4,70	152,15	2,36	0,0°	5,0°	CD..54T002	CC11	T8
2831826	CCBM51005R	95	5,00	5,94	3,02	100,58	1,02	0,0°	5,0°	CD..54T002	CC11	T8
2831311	CCBM61525R	95	6,00	7,08	3,73	152,15	1,19	0,0°	5,0°	CD..54T002	CC11	T8
2831821	CCBM61005R	95	6,00	7,08	3,73	100,33	1,19	0,0°	5,0°	CD..54T002	CC11	T8
2831289	CCBM81525R	95	8,00	9,04	4,70	152,15	2,36	0,0°	5,0°	CD..54T002	CC11	T8

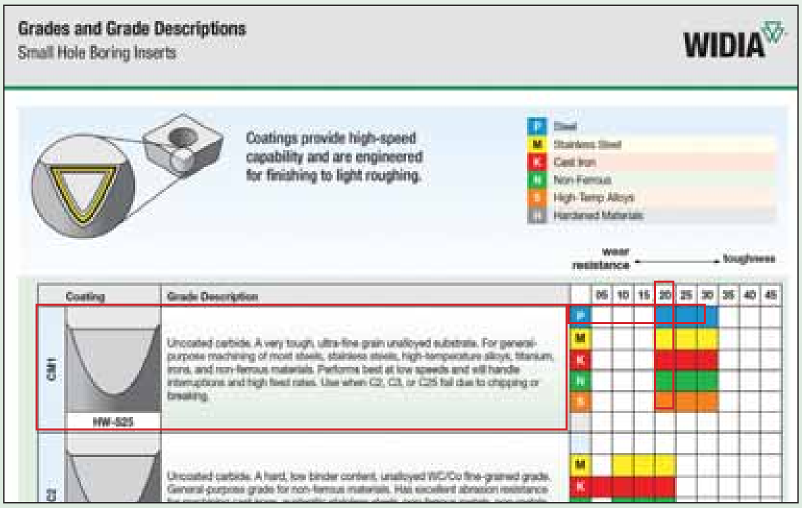
3 Determine which chipbreaker is best for the material to be machined.

Consult the Small Hole Boring Chipbreaker Geometry charts on **pages D34–D37.**



4 Determine which grade is best for the material to be machined.

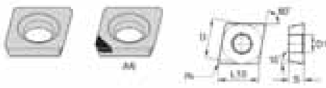
Consult the Grades and Grade Descriptions charts on **pages D38–D39.**



5 Select the appropriate insert based on style, grade, and geometry.

Small Hole Boring Positive Inserts

WIDIA



• first choice
○ alternate choice

	C2	C25	C3	CG5	CG55	CG4	CM1	ALO	TN7	CBN6	CPD1
P				○	○	•	○	○	•		
M	○	○	○	○	•	○	○	○	○		
K	○	•	•	○	○	○	○	•	○		
N	•	•	•	○	○		○		○		•
S	○	○	○	•	○		•			○	
H										•	

■ CDHB

ISO catalogue number	D	L10	S	Rε	D1	max	C2	C25	C3	CG5	CG55	CG4	CM1	ALO	TN7	CBN6	CPD1
CDHB54T0X0	3,97	4,03	1,02	0,05	2,13	–	–	2830897	–	3884731	–	2830888	2830891	–	–	–	–
CDHB54T0X0M	3,97	4,03	1,02	0,05	2,13	1,80	–	–	–	–	–	–	–	–	–	2830748	–
CDHB54T002	3,97	4,03	1,02	0,18	2,13	–	–	2830894	–	3884732	–	2830853	2830848	2830870	2830843	–	–
CDHB54T002M	3,97	4,03	1,02	0,18	2,13	0,96	–	–	–	–	–	–	–	–	–	2830741	2830774
CDHB54T004M	3,97	4,03	1,02	0,38	2,13	0,96	–	–	–	–	–	–	–	–	–	–	2830769
CDHB54T004	3,97	4,03	1,02	0,38	2,13	–	–	2830830	–	2830798	–	2830817	2830813	–	2830833	–	–

NOTE: Max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.

6 Determine the Speed and Feed Chart with the appropriate cutting data.

A Based on grade and edge geometry, identify starting speed (vc) and feed (fz). The first choice starting feed is in bold.

B Use the corresponding speed located in the same column below the feed information.

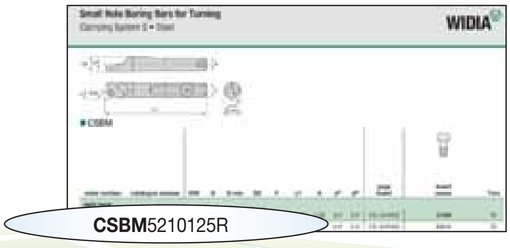
Speed and Feed Chart

Positive Inserts • Metric

Material Group		Cutting Speed — vc m/min													
		C2			C25			C3			CG5			CG55	
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start
P	ap [mm]	–	–	–	–	–	–	–	–	–	0,051	–	0,300	0,051	–
	f [mm/rev]	–	–	–	–	–	–	–	–	–	0,025	–	0,300	0,025	–
	0/1	–	–	–	–	–	–	–	–	–	95	**115**	140	105	**130**
	2	–	–	–	–	–	–	–	–	–	60	**75**	90	65	**85**
	3 A	–	–	–	–	–	–	–	–	–	B 60	**75**	90	65	**85**
	4	–	–	–	–	–	–	–	–	–	45	**60**	70	50	**65**
	5	–	–	–	–	–	–	–	–	–	60	**75**	90	65	**85**
	6	–	–	–	–	–	–	–	–	–	40	**50**	60	45	**55**
M	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–
	1	55	**70**	80	60	**80**	95	60	**80**	95	75	**90**	110	80	**100**
	2	50	**60**	75	55	**70**	85	55	**70**	85	65	**80**	100	75	**90**
	3	35	**45**	55	45	**50**	65	45	**50**	65	50	**60**	75	55	**65**
K	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–
	1	50	**65**	80	60	**70**	85	60	**70**	85	60	**75**	90	65	**80**
	2	65	**80**	100	75	**90**	110	75	**90**	110	75	**95**	115	85	**105**
	3	50	**60**	75	55	**65**	80	55	**65**	80	55	**70**	80	60	**75**
N	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–
	1	400	**505**	605	400	**505**	605	400	**505**	605	400	**505**	605	445	**555**
	2	295	**370**	440	295	**370**	445	295	**370**	445	295	**370**	445	325	**405**
	3	70	**85**	105	70	**85**	105	70	**85**	105	85	**105**	125	90	**115**
	4	310	**380**	465	310	**385**	465	310	**385**	465	140	**175**	210	155	**190**

How Do Catalogue Numbers Work?

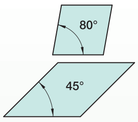
Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



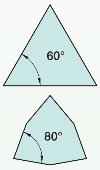
C	S	B	M	
Series Type	Bar Type	Bar Style Designation	Units	Insert Shape (optional)

C — Series Type

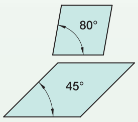
C



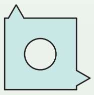
F



G



L



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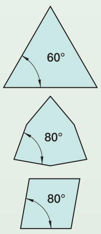
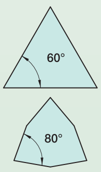
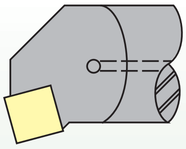


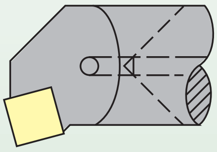
S



S — Bar Type



S = Steel (with coolant)



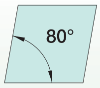
C = Carbide (with coolant)

M — Units

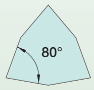
M = Metric

Insert Shape (optional)

C

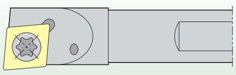


W

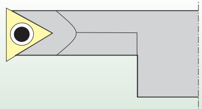


B — Bar Style Designation

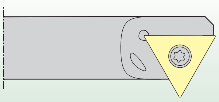
B
Boring Bar



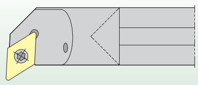
O
Offset Boring Bar



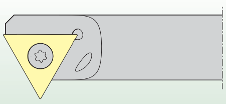
C
External Chamfering Bar



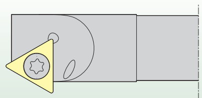
P
Profiling Bar



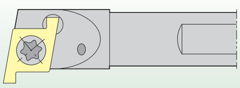
I
Internal Threading Bar



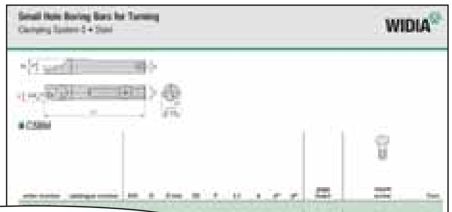
R
Reverse Chamfer or Back Chamfer Bar



M
Offset Internal Grooving Bar



By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



CSBM**5210125R**

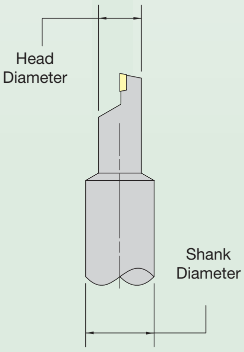
52	10	12	5	R
Head Diameter shown as "D2"	Shank Diameter shown as "D"	Length/Depth shown as "L1/L4"	Lead Angle*	Hand of Tool

52 – Head Diameter shown as "D2"

Metric
- **7** = 6,60mm
- **8** = 8,18mm/8,20mm
- **10** = 9,78mm
- **13** = 12,70mm/ 12,95mm
- **45** = 4,57mm
- **48** = 4,80mm
- **52** = 5,16mm
- **53** = 5,30mm
- **64** = 6,60mm
- **66** = 6,55mm/6,60mm
- **82** = 8,15mm
- **95** = 9,50mm
- **99** = 9,91mm
- **159** = 15,88mm

10 – Shank Diameter shown as "D"

Metric
- **4** = 4,00mm
- **5** = 5,00mm
- **6** = 6,00mm
- **8** = 8,00mm
- **10** = 10,00mm
- **12** = 12,00mm
- **16** = 16,00mm



NOTE: Only shown on stepped-style bars.

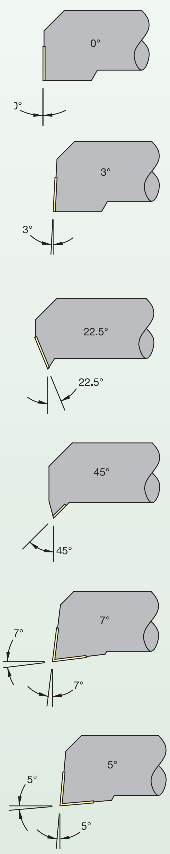
12 – Length/Depth shown as "L1/L4"

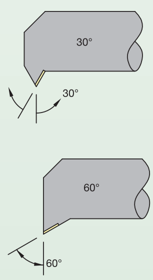
Bore Length for Step Bars
Thread Depth for Threading Bars
Overall Length for Straight Shank Bars

Metric
- **12** = 12,70mm
- **19** = 19,05mm
- **22** = 22,23mm
- **25** = 25,40mm
- **32** = 31,75mm
- **38** = 38,10mm
- **48** = 47,63mm
- **51** = 50,80mm
- **63** = 63,50mm
- **64** = 64,00mm
- **76** = 76,00mm
- **79** = 79,38mm
- **100** = 100,58mm/ 101,50mm/ 101,60mm
- **102** = 101,60mm
- **127** = 127,00mm
- **152** = 152,00mm 152,40mm
- **178** = 177,80mm 179,90mm
- **203** = 203,20mm
- **254** = 254,00mm

5 – Lead Angle*

- **0** = 90° Used for Threading/ Grooving Bars
- **3** = 3°
- **5** = 5°
- **7** = 7°
- **225** = 22.5°
- **30** = 30°
- **45** = 45°
- **60** = 60°





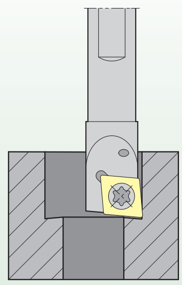
**NOTE: Shown as "KRI" for metric bars.*

R – Hand of Tool

- **R** = Right hand
- **L** = Left hand

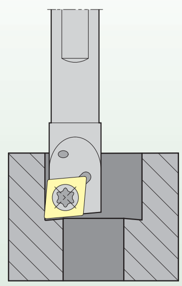
Right-hand boring bar

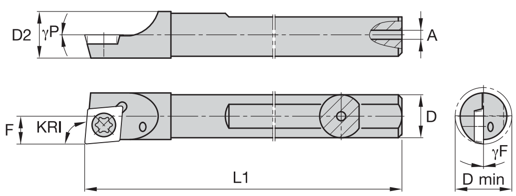
R



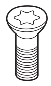
Left-hand boring bar

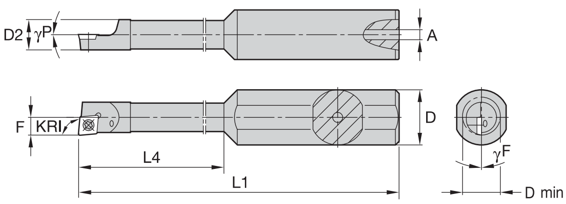
L



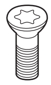


CSBM

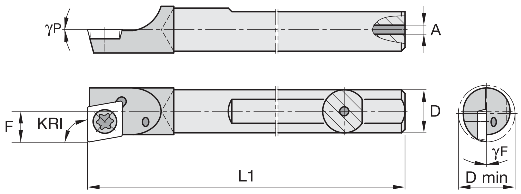
order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	 insert screw	Torx
right hand													
3896205	CSBM5650R	90	5,00	5,94	5,16	3,10	63,50	1,02	0.0°	5.0°	CD..S4T002	CC09	T6
2831676	CSBM6650R	90	6,00	7,09	6,20	3,73	63,50	1,02	0.0°	5.0°	CD..S4T002	CC11	T6
2831441	CSBM5655R	95	5,00	5,79	5,16	2,95	63,50	1,02	0.0°	5.0°	CD..S4T002	CC09	T6
2831687	CSBM6655R	95	6,00	7,09	6,21	3,73	63,50	1,02	0.0°	5.0°	CD..S4T002	CC11	T6
2831666	CSBM8765R	95	8,00	9,04	8,18	4,70	76,20	1,52	0.0°	5.0°	CD..S4T002	CC11	T6
2831701	CSBM4657R	97	4,00	4,57	4,22	2,41	63,50	1,02	0.0°	0.0°	CD..S4T002	CC09	T6
left hand													
3896204	CSBM5650L	90	5,00	5,94	5,16	3,10	63,50	1,02	0.0°	5.0°	CD..S4T002	CC09	T6
3896207	CSBM6650L	90	6,00	7,09	6,20	3,73	63,50	1,02	0.0°	5.0°	CD..S4T002	CC11	T6
3896209	CSBM8760L	90	8,00	9,05	8,18	4,70	76,00	2,40	0.0°	5.0°	CD..S4T002	CC11	T6
3896206	CSBM5655L	95	5,00	5,78	5,16	2,95	63,50	1,02	0.0°	5.0°	CD..S4T002	CC09	T6
3896208	CSBM6655L	95	6,00	7,09	6,20	3,73	63,50	1,02	0.0°	5.0°	CD..S4T002	CC11	T6
3517652	CSBM8765L	95	8,00	9,04	8,18	9,04	76,20	1,52	0.0°	5.0°	CD..S4T002	CC11	T6
2831695	CSBM4657L	97	4,00	4,57	4,22	2,41	63,50	1,02	0.0°	0.0°	CD..S4T002	CC09	T6



CSBM • STEPPED

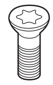


order number	catalogue number	KRI	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand														
2831606	**CSBM5210250R**	90	10,00	5,94	5,16	3,10	70,00	25,72	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831499	**CSBM5212250R**	90	12,00	5,94	5,16	3,10	70,00	25,40	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831477	**CSBM6412190R**	90	12,00	7,42	6,60	3,86	70,00	19,05	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831462	**CSBM6412320R**	90	12,00	7,42	6,60	3,86	70,00	31,75	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831661	**CSBM4510125R**	95	10,00	5,18	4,57	5,18	69,85	12,70	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831639	**CSBM5210125R**	95	10,00	5,78	5,16	2,95	70,00	12,30	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831615	**CSBM5210255R**	95	10,00	5,78	5,16	5,78	69,85	24,96	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831595	**CSBM6410195R**	95	10,00	7,24	6,60	3,68	70,00	19,05	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831548	**CSBM4512125R**	95	12,00	5,18	4,57	2,64	69,85	12,70	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831512	**CSBM5212255R**	95	12,00	5,78	5,16	2,95	70,00	25,40	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831490	**CSBM6412195R**	95	12,00	7,24	6,60	3,68	70,00	19,05	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831468	**CSBM6412325R**	95	12,00	7,24	6,60	3,68	70,00	31,75	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
left hand														
2831656	**CSBM4510125L**	95	10,00	5,18	4,57	2,64	70,00	12,70	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831588	**CSBM6410195L**	95	10,00	7,24	6,60	3,68	70,00	19,05	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
3890853	**CSBM4512125L**	95	12,00	5,18	4,57	2,64	69,85	12,70	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
3890854	**CSBM4512255L**	95	12,00	5,18	4,57	2,64	69,85	25,40	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831528	**CSBM5212125L**	95	12,00	5,78	5,16	2,95	70,00	12,70	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831483	**CSBM6412195L**	95	12,00	7,24	6,60	3,68	70,00	19,05	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
3890855	**CSBM6412325L**	95	12,00	7,24	6,60	3,68	70,00	31,75	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6

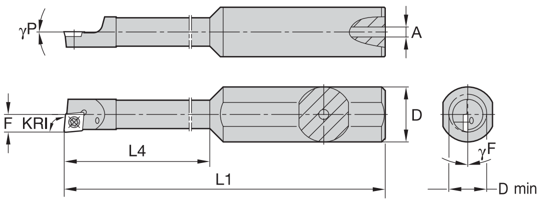


Tools for Small Hole Boring

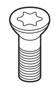
CCBM



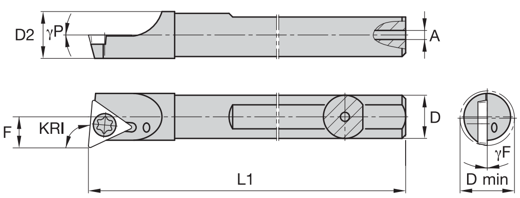
order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
2831801	**CCBM51000R**	90	5,00	5,94	3,18	100,58	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896025	**CCBM61000R**	90	6,00	7,08	3,73	100,33	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831277	**CCBM81520R**	90	8,00	9,04	4,70	152,15	2,36	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831826	**CCBM51005R**	95	5,00	5,94	3,02	100,58	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831311	**CCBM61525R**	95	6,00	7,08	3,73	152,15	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831821	**CCBM61005R**	95	6,00	7,09	3,73	100,33	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831289	**CCBM81525R**	95	8,00	9,04	4,70	152,15	2,36	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831832	**CCBM41007R**	97	3,96	4,57	2,41	100,33	1,02	0.0°	0.0°	CD..S4T002	**CC09**	T6
2831324	**CCBM41527R**	97	4,00	4,57	2,41	152,40	1,02	0.0°	0.0°	CD..S4T002	**CC09**	T6
left hand												
3896023	**CCBM51000L**	90	5,00	5,94	3,18	100,58	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896024	**CCBM61000L**	90	6,00	7,08	3,73	100,33	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896026	**CCBM61520L**	90	6,00	7,09	3,73	152,15	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896028	**CCBM81520L**	90	8,00	9,04	4,70	152,15	2,36	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831807	**CCBM51005L**	95	5,00	5,94	3,02	100,58	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831025	**CCBM51525L**	95	5,00	5,94	3,02	152,40	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831307	**CCBM61525L**	95	6,00	7,08	3,73	152,15	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831791	**CCBM61005L**	95	6,00	7,09	3,73	100,33	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896027	**CCBM81005L**	95	8,00	9,04	4,70	101,60	2,36	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831283	**CCBM81525L**	95	8,00	9,04	4,70	152,40	2,36	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831813	**CCBM41007L**	97	3,96	4,57	2,41	100,33	1,02	0.0°	0.0°	CD..S4T002	**CC09**	T6
3896002	**CCBM41527L**	97	4,00	4,57	2,41	152,40	1,02	0.0°	0.0°	CD..S4T002	**CC09**	T6



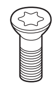
CCBM • STEPPED



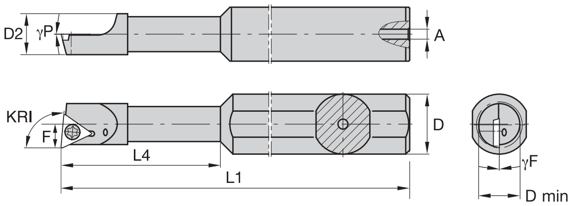
order number	catalogue number	KRI	D	D min	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
2831211	**CCBM5312510R**	90	12,00	5,94	3,18	88,90	50,80	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831188	**CCBM6612320R**	90	12,00	7,42	3,85	69,85	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831175	**CCBM6612630R**	90	12,00	7,42	3,86	101,60	63,50	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831127	**CCBM5316510R**	90	16,00	6,10	3,18	114,30	50,80	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831110	**CCBM6516320R**	90	16,00	7,42	3,86	95,25	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831265	**CCBM4812225R**	95	12,00	5,28	2,64	60,32	22,22	3,18	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831255	**CCBM4812485R**	95	12,00	5,28	2,64	85,73	47,63	3,18	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831244	**CCBM5312255R**	95	12,00	5,94	3,02	63,50	25,40	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831201	**CCBM6612325R**	95	12,00	7,24	3,68	69,85	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896019	**CCBM6612635R**	95	12,00	7,24	3,68	101,60	63,50	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896015	**CCBM4816225R**	95	16,00	5,28	2,64	85,72	22,23	3,18	0.0°	5.0°	CD..S4T002	**CC09**	T6
3896017	**CCBM4816485R**	95	16,00	5,28	2,64	111,12	47,62	3,18	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831162	**CCBM5316255R**	95	16,00	5,94	3,02	88,90	25,40	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831139	**CCBM5316515R**	95	16,00	5,94	3,02	114,30	50,80	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896018	**CCBM6516325R**	95	16,00	7,24	3,68	95,25	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
left hand													
2831194	**CCBM6612325L**	95	12,00	7,24	3,68	69,85	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896093	**CCBM6612635L**	95	12,00	7,24	3,68	101,60	63,50	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831157	**CCBM5316255L**	95	16,00	5,94	3,02	88,90	25,40	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831132	**CCBM5316515L**	95	16,00	5,94	3,02	114,30	50,80	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831117	**CCBM6516325L**	95	16,00	7,24	3,68	95,25	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6



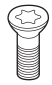
FSBM

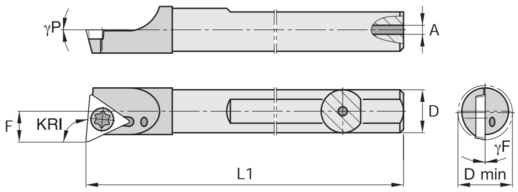


order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
2829554	**FSBM61000R**	90	6,00	7,06	6,20	3,71	101,60	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
2829566	**FSBM61005R**	95	6,00	7,06	6,20	3,71	101,60	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
left hand													
3896211	**FSBM61000L**	90	6,00	7,06	6,20	3,71	101,60	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
3896213	**FSBM81000L**	90	8,00	9,14	8,20	4,80	101,60	1,52	0.0°	5.0°	TD..07S102	**FC11**	T7
2829545	**FSBM81005L**	95	8,00	9,14	8,20	4,80	101,60	1,52	0.0°	5.0°	TD..07S102	**FC11**	T7

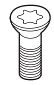


FSBM • STEPPED

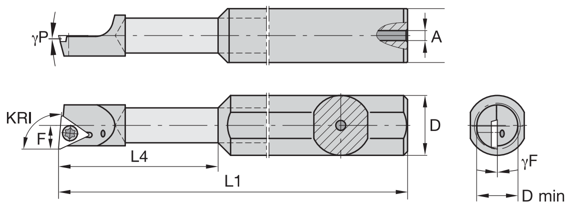
order number	catalogue number	KRI	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	 insert screw	Torx
right hand														
3890858	**FSBM6612320R**	90	12,00	7,52	6,58	3,96	76,20	31,75	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
2829472	**FSBM8212250R**	90	12,00	9,09	8,15	4,75	76,00	25,40	1,52	0.0°	5.0°	TD..07S102	**FC14**	T7
2829448	**FSBM8212380R**	90	12,00	9,09	8,15	4,75	76,20	38,10	1,52	0.0°	5.0°	TD..07S102	**FC14**	T7
3890860	**FSBM6616190R**	90	16,00	7,52	6,58	3,96	101,60	19,05	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
2829533	**FSBM5212125R**	95	12,00	6,99	5,16	3,20	76,20	12,70	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
3890857	**FSBM5212255R**	95	12,00	6,99	5,16	3,20	76,20	25,40	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
2829508	**FSBM6612195R**	95	12,00	7,52	6,58	3,96	76,00	19,05	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
2829459	**FSBM8212385R**	95	12,00	9,09	8,15	4,75	76,00	38,10	1,52	0.0°	5.0°	TD..07S102	**FC14**	T7
3897011	**FSBM5216125R**	95	16,00	6,99	5,16	3,20	101,60	12,70	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
3890862	**FSBM6616325R**	95	16,00	7,52	6,58	3,96	101,60	31,75	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
2829429	**FSBM6616195R**	95	16,00	7,52	6,60	3,96	102,00	19,05	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
left hand														
2829442	**FSBM8212380L**	90	12,00	9,09	8,15	4,75	76,00	38,10	1,52	0.0°	5.0°	TD..07S102	**FC14**	T7
3890861	**FSBM6616320L**	90	16,00	7,52	6,58	3,96	101,60	31,75	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
3890856	**FSBM5212125L**	95	12,00	6,99	5,16	3,20	76,20	12,70	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7



■ FCBM

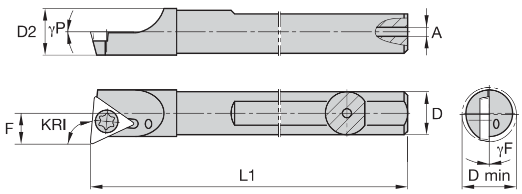


order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
3896036	**FCBM51000R**	90	5,00	6,98	3,40	100,58	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
3896031	**FCBM61520R**	90	6,00	7,06	3,70	152,40	1,19	0.0°	5.0°	TD..07S102	**FC11**	T7
2829356	**FCBM81520R**	90	8,00	9,16	4,80	152,40	2,36	0.0°	5.0°	TD..07S102	**FC14**	T7
2829390	**FCBM61525R**	95	6,00	7,06	3,71	152,40	1,19	0.0°	5.0°	TD..07S102	**FC11**	T7
2829368	**FCBM81525R**	95	8,00	9,16	4,80	152,40	2,36	0.0°	5.0°	TD..07S102	**FC14**	T7
left hand												
3896035	**FCBM51000L**	90	5,00	6,98	3,40	100,58	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
3896030	**FCBM61520L**	90	6,00	7,06	3,71	152,40	1,19	0.0°	5.0°	TD..130805	**FC11**	T7
3896032	**FCBM81520L**	90	8,00	9,16	4,80	152,40	2,36	0.0°	5.0°	TD..130805	**FC11**	T7
3896037	**FCBM51005L**	95	5,00	6,98	3,20	100,58	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
2829385	**FCBM61525L**	95	6,00	7,06	3,71	152,40	1,19	0.0°	5.0°	TD..07S102	**FC11**	T7

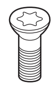


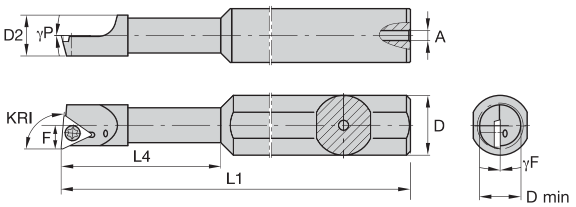
■ FCBM • STEPPED

order number	catalogue number	KRI	D	D min	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
3896072	FCBM6612630R	90	12,00	7,52	3,96	101,60	63,50	1,19	0.0°	5.0°	TD..07S102	FC14	T7
2829268	FCBM8212790R	90	12,00	9,09	4,75	117,48	79,38	3,18	0.0°	5.0°	TD..07S102	FC14	T7
3896069	FCBM5316250R	90	16,00	6,98	3,40	88,90	25,40	3,18	0.0°	5.0°	TD..07S102	FC11	T7
3896084	FCBM6616320R	90	16,00	7,52	3,96	95,25	31,75	3,18	0.0°	5.0°	TD..07S102	FC11	T7
3896086	FCBM8216380R	90	16,00	9,09	4,75	101,60	38,10	3,18	0.0°	5.0°	TD..07S102	FC14	T7
3896095	FCBM8216790R	90	16,00	9,09	4,75	142,87	79,37	3,18	0.0°	5.0°	TD..07S102	FC14	T7
2829350	FCBM5312255R	95	12,00	6,98	3,20	63,50	25,40	3,18	0.0°	5.0°	TD..07S102	FC11	T7
2829323	FCBM6612325R	95	12,00	7,52	3,96	69,85	31,75	3,18	0.0°	5.0°	TD..07S102	FC14	T7
3896083	FCBM6612635R	95	12,00	7,52	3,96	101,60	63,50	3,18	0.0°	5.0°	TD..07S102	FC11	T7
2829301	FCBM8212385R	95	12,00	9,09	4,75	76,20	38,10	3,18	0.0°	5.0°	TD..07S102	FC14	T7
2829279	FCBM8212795R	95	12,00	9,09	4,75	117,48	79,38	3,18	0.0°	5.0°	TD..07S102	FC14	T7
3897085	FCBM5316255R	95	16,00	6,98	3,20	88,90	25,40	3,18	0.0°	5.0°	TD..07S102	FC11	T7
3790247	FCBM6616325R	95	16,00	7,52	3,96	95,25	31,75	3,18	0.0°	5.0°	TD..07S102	FC14	T7
3786518	FCBM6616635R	95	16,00	7,52	3,96	127,00	63,50	3,18	0.0°	5.0°	TD..07S102	FC14	T7
3786519	FCBM8216795R	95	16,00	9,09	4,75	117,48	79,38	3,18	0.0°	5.0°	TD..07S102	FC14	T7
left hand													
3896067	FCBM5312510L	90	12,00	6,98	3,40	88,90	50,80	3,18	0.0°	5.0°	TD..07S102	FC11	T7
2829344	FCBM5312255L	95	12,00	6,98	3,20	63,50	25,40	3,18	0.0°	5.0°	TD..07S102	FC11	T7
3896068	FCBM5312515L	95	12,00	6,98	3,20	88,90	50,80	3,18	0.0°	5.0°	TD..07S102	FC11	T7
2829319	FCBM6612325L	95	12,00	7,52	3,96	69,85	31,75	3,18	0.0°	5.0°	TD..07S102	FC14	T7
2829295	FCBM8212385L	95	12,00	9,09	4,75	76,20	38,10	3,18	0.0°	5.0°	TD..07S102	FC14	T7
3896070	FCBM5316255L	95	16,00	6,98	3,20	88,90	25,40	3,18	0.0°	5.0°	TD..07S102	FC11	T7
3896085	FCBM6616325L	95	16,00	7,52	3,96	95,25	31,75	3,18	0.0°	5.0°	TD..07S102	FC11	T7
3896087	FCBM8216385L	95	16,00	9,09	4,75	101,60	38,10	3,18	0.0°	5.0°	TD..07S102	FC14	T7



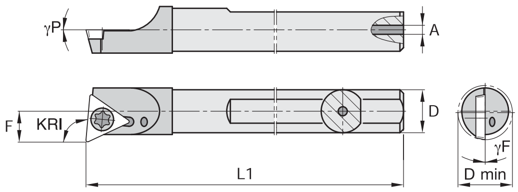
QSBM

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	 insert screw	Torx
right hand													
3886552	**QSBM101275R**	95	10,00	11,15	10,21	5,79	127,00	3,20	0.0°	5.0°	TP..110202	**QC21**	T9
left hand													
3886550	**QSBM101270L**	90	10,00	11,15	10,21	5,79	127,00	3,20	0.0°	5.0°	TP..110202	**QC21**	T9
3886943	**QSBM121520L**	90	12,00	13,16	12,19	6,81	152,40	4,00	0.0°	5.0°	TP..110202	**QC26**	T9
3886551	**QSBM101275L**	95	10,00	11,15	10,21	5,79	127,00	3,20	0.0°	5.0°	TP..110202	**QC21**	T9

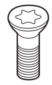


QSBM • STEPPED

order number	catalogue number	KRI	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand														
2825013	**QSBM9912480R**	90	12,00	11,12	9,91	5,61	95,25	47,63	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3890865	**QSBM9916480R**	90	16,00	11,12	9,91	5,61	107,95	47,63	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3886949	**QSBM15920630R**	90	20,00	17,47	15,88	8,97	114,30	63,50	2,49	0.0°	5.0°	TP..110202	**QC26**	T9
2825052	**QSBM9912295R**	95	12,00	11,12	9,91	5,61	95,25	28,58	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
2825024	**QSBM9912485R**	95	12,00	11,12	9,91	5,61	95,25	47,63	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3890864	**QSBM9916295R**	95	16,00	11,12	9,91	5,61	107,95	28,58	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
2824993	**QSBM9916485R**	95	16,00	11,12	9,91	5,61	107,95	47,63	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3886945	**QSBM1316385R**	95	16,00	14,30	12,95	7,52	107,95	38,10	2,03	0.0°	5.0°	TP..110202	**QC26**	T9
3886948	**QSBM1316635R**	95	16,00	14,30	12,95	7,52	107,95	63,50	2,03	0.0°	5.0°	TP..110202	**QC26**	T9
2824950	**QSBM9920385R**	95	20,00	11,12	9,91	5,61	101,60	38,10	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3886950	**QSBM15920635R**	95	20,00	17,47	15,88	8,97	114,30	63,50	2,49	0.0°	5.0°	TP..110202	**QC26**	T9
left hand														
2825019	**QSBM9912485L**	95	12,00	11,12	9,91	5,61	95,25	47,63	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3896089	**QSBM9916295L**	95	16,00	11,12	9,91	5,61	107,95	28,58	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3886944	**QSBM1316385L**	95	16,00	14,30	12,95	7,52	107,95	38,10	2,03	0.0°	5.0°	TP..110202	**QC26**	T9
3886947	**QSBM1316635L**	95	16,00	14,30	12,95	7,52	107,95	63,50	2,03	0.0°	5.0°	TP..110202	**QC26**	T9
2824945	**QSBM9920385L**	95	20,00	11,12	9,91	5,61	101,60	38,10	2,03	0.0°	5.0°	TP..110202	**QC21**	T9

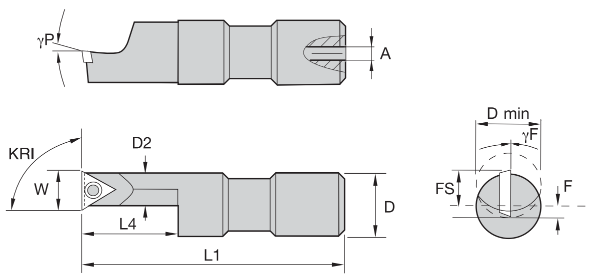


QCBM

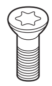


order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
3854445	**QCBM102540R**	90	10,00	11,15	5,79	254,00	3,20	0.0°	5.0°	TP..110202	**QC21**	T9
2824776	**QCBM102545R**	95	10,00	11,15	5,79	254,00	3,20	0.0°	5.0°	TP..110202	**QC21**	T9
2824747	**QCBM122545R**	95	12,00	13,16	6,81	254,00	4,70	0.0°	5.0°	TP..110202	**QC21**	T9
left hand												
3896043	**QCBM122540L**	90	12,00	13,16	6,81	254,00	4,70	0.0°	5.0°	TP..110202	**QC26**	T9
3896044	**QCBM122545L**	95	12,00	13,16	6,81	254,00	4,70	0.0°	5.0°	TP..110202	**QC26**	T9

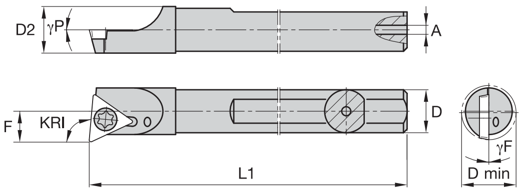
Clamping System S • Steel



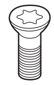
QSOM



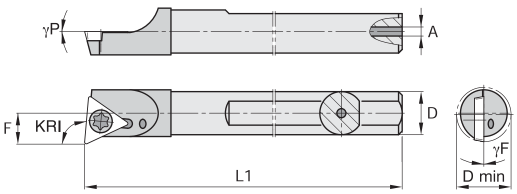
order number	catalogue number	KRI	D	D min	D2	F	L1	L4	FS	W	A	γF°	γP°	gage insert	insert screw	Torx
right hand																
2824819	**QSOM9516385R**	95	16,00	16,51	9,50	0,64	95,25	38,10	10,63	10,70	2,03	0.0°	5.0°	TP..110202	**QC26**	T9



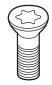
SSBM

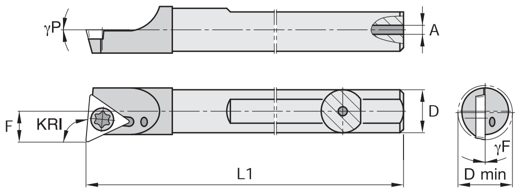
order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	 insert screw	Torx
right hand													
3886968	**SSBM202030R**	90	20,00	21,23	20,19	10,90	203,20	4,00	0.0°	5.0°	TP..160302	**SC30**	T10
left hand													
3886967	**SSBM202030L**	90	20,00	21,23	20,19	10,90	203,20	4,00	0.0°	5.0°	TP..160302	**SC30**	T10
3886969	**SSBM202035L**	95	20,00	21,23	20,19	10,90	203,20	4,00	0.0°	5.0°	TP..160302	**SC30**	T10

Clamping System S • Carbide

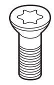


SCBM

order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	 insert screw	Torx
right hand												
3895892	**SCBM162540R**	90	16,00	17,25	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3896004	**SCBM162545R**	95	16,00	17,25	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3896006	**SCBM202545R**	95	20,00	21,25	10,90	254,00	7,11	0.0°	5.0°	TP..160302	**SC30**	T10
left hand												
3895891	**SCBM162540L**	90	16,00	17,25	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3896005	**SCBM202540L**	90	20,00	21,25	10,90	254,00	7,11	0.0°	5.0°	TP..160302	**SC30**	T10
3896003	**SCBM162545L**	95	16,00	17,25	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3896091	**SCBM202545L**	95	20,00	21,25	10,90	254,00	7,11	0.0°	5.0°	TP..160302	**SC30**	T10

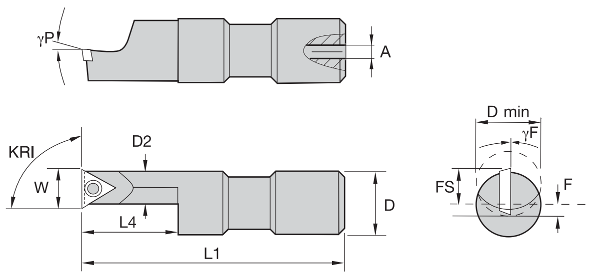


SDBM

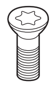


order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
3896011	SDBM162540R	90	16,00	17,25	—	8,89	254,00	5,51	0.0°	5.0°	TP..160302	SC30	T10
3896014	SDBM202540R	90	20,00	21,25	—	10,90	254,00	7,11	0.0°	5.0°	TP..160302	SC30	T10
2822085	SDBM162545R	95	16,00	17,25	16,13	8,89	254,00	5,54	0.0°	5.0°	TP..160302	SC30	T10
3896092	SDBM202545R	95	20,00	21,25	—	10,90	254,00	7,11	0.0°	5.0°	TP..160302	SC30	T10
left hand													
3896010	SDBM162540L	90	16,00	17,25	—	8,89	254,00	5,51	0.0°	5.0°	TP..160302	SC30	T10
3896013	SDBM202540L	90	20,00	21,25	—	10,90	254,00	7,11	0.0°	5.0°	TP..160302	SC30	T10
3896012	SDBM162545L	95	16,00	17,25	—	8,89	254,00	5,51	0.0°	5.0°	TP..160302	SC30	T10
3897084	SDBM202545L	95	20,00	21,25	—	10,90	254,00	7,11	0.0°	5.0°	TP..160302	SC30	T10

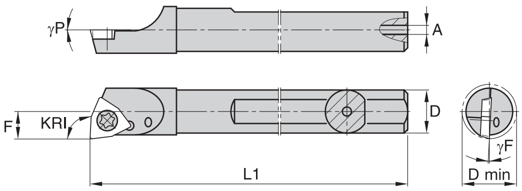
Clamping System S • Steel



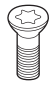
SSOM



order number	catalogue number	KRI	D	D min	D2	F	L1	L4	FS	W	A	γF°	γP°	gage insert	insert screw	Torx
right hand																
3896090	SSOM1325380R	90	24,99	24,61	12,70	1,78	95,25	38,10	14,46	16,24	3,00	0.0°	5.0°	TPHB160302	SC30	T10
3890867	SSOM1325630R	90	24,99	24,61	12,70	1,78	120,65	63,50	14,46	16,24	3,00	0.0°	5.0°	TPHB160302	SC30	T10
3890866	SSOM1325385R	95	24,99	24,61	12,70	1,78	95,25	38,10	14,40	16,18	3,00	0.0°	5.0°	TPHB160302	SC30	T10
3890868	SSOM1325635R	95	24,99	24,61	12,70	1,78	120,65	63,50	14,40	16,18	3,00	0.0°	5.0°	TPHB160302	SC30	T10

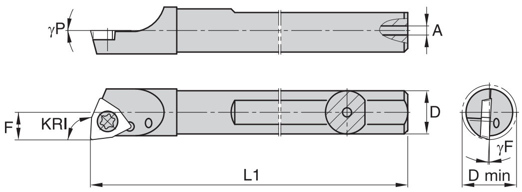


GSBMW

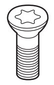


order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
2828122	GSBMW61003R	93	6,00	6,78	6,21	3,43	101,60	1,02	-3.0°	0.0°	WP..S30104	CT11	T6
3886549	GSBMW81003R	93	8,00	8,10	8,18	4,42	101,60	2,40	-3.0°	0.0°	WP..S30104	CT11	T6
left hand													
2828116	GSBMW61003L	93	6,00	6,78	6,21	3,43	101,60	1,02	-3.0°	0.0°	WP..S30104	CT11	T6
3886548	GSBMW81003L	93	8,00	8,10	8,18	4,42	101,60	2,40	-3.0°	0.0°	WP..S30104	CT11	T6

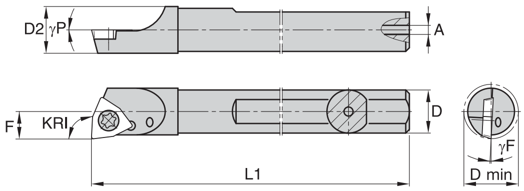
Clamping System S • Carbide



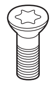
GCBMW



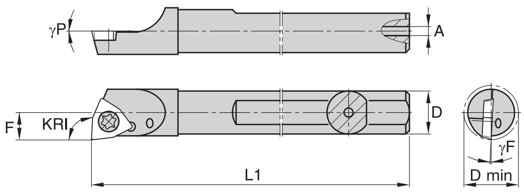
order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
3896040	GCBMW51523R	93	5,00	6,60	3,20	152,40	1,02	-3.0°	0.0°	WP..S30104	CT11	T6
2827711	GCBMW61523R	93	6,00	6,78	3,43	152,40	1,19	-3.0°	0.0°	WP..S30104	CT11	T6
left hand												
3896039	GCBMW51523L	93	5,00	6,60	3,20	152,40	1,02	-3.0°	0.0°	WP..S30104	CT11	T6
2827705	GCBMW61523L	93	6,00	6,78	3,43	152,40	1,19	-3.0°	0.0°	WP..S30104	CT11	T6
3897012	GCBMW81523L	93	8,00	8,80	4,42	152,40	2,36	-3.0°	0.0°	WP..S30104	CT11	T6



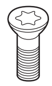
QSBMW

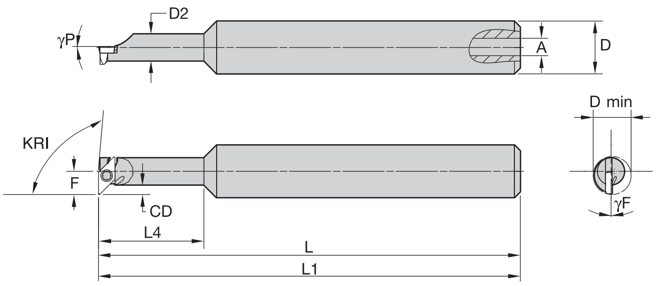
order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw 	Torx
right hand													
3393828	**QSBMW121523R**	93	12,00	12,90	12,19	6,55	152,40	4,00	-3.0°	0.0°	WP..040204	**QTM20**	T7
left hand													
3886952	**QSBMW101273L**	93	10,00	10,94	10,70	5,59	127,00	3,20	-3.0°	0.0°	WP..040204	**QTM20**	T7

Clamping System S • Carbide

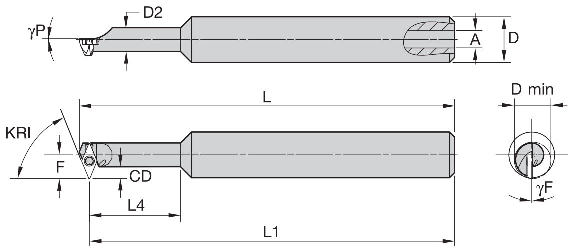


QCBMW

order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw 	Torx
right hand												
3782378	**QCBMW102543R**	93	10,00	10,95	5,59	254,00	3,20	-3.0°	0.0°	WP..040204	**QTM20**	T7
left hand												
3896045	**QCBMW102543L**	93	10,00	10,95	5,59	254,00	3,20	-3.0°	0.0°	WP..040204	**QTM20**	T7
3896046	**QCBMW122543L**	93	12,00	12,90	6,55	254,00	4,70	-3.0°	0.0°	WP..040204	**QTM20**	T7



NOTE: KRI shown as 95°.

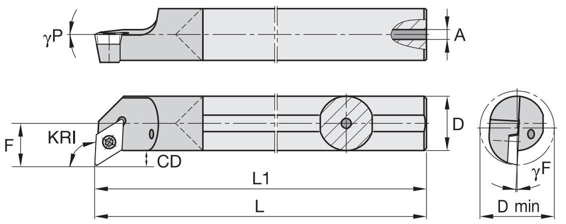


NOTE: KRI shown as 67,5°.

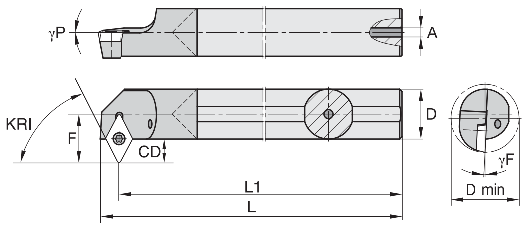
CSPM

order number	catalogue number	KRI	D	D min	D2	F	CD	L	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand																
2831399	**CSPM71225225R**	67.5	12,00	10,16	6,60	6,60	3,30	104,00	101,60	25,40	1,02	0.0°	0.0°	GC..050102	**CT15**	T6
3758942	**CSPM81232225R**	67.5	12,00	11,37	8,18	7,01	2,92	105,16	101,60	31,75	1,02	0.0°	0.0°	GC..050102	**CT15**	T6
2831411	**CSPM712255R**	95.0	12,00	9,14	6,60	5,59	2,29	101,60	101,60	25,40	1,02	0.0°	0.0°	GC..050102	**CT15**	T6
left hand																
2831394	**CSPM71225225L**	67.5	12,00	10,16	6,60	6,60	3,30	104,00	101,60	25,40	1,02	0.0°	0.0°	GPHW050102	**CT15**	T6
2831378	**CSPM81232225L**	67.5	12,00	11,38	8,18	7,01	2,92	104,10	101,60	31,75	1,02	0.0°	0.0°	GC..050102	**CT15**	T6
2831405	**CSPM712255L**	95.0	12,00	9,14	6,60	5,59	2,29	101,60	101,60	25,40	1,02	0.0°	0.0°	GP..050102	**CT15**	T6
2831383	**CSPM812325L**	95.0	12,00	10,74	8,20	6,38	2,27	101,60	101,60	31,75	1,02	0.0°	0.0°	GP..050102	**CT15**	T6

Tools for Small Hole Boring

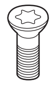


NOTE: KRI shown as 95°.



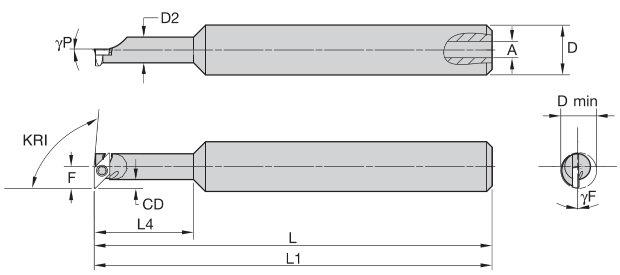
NOTE: KRI shown as 67,5°.

CCPM

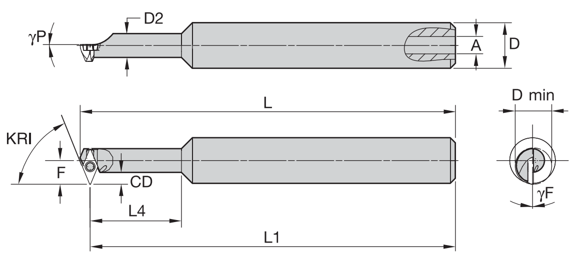


order number	catalogue number	KRI	D	D min	F	CD	L	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand														
2831010	CCPM6152225R	67.5	6,00	10,16	6,60	3,51	154,61	152,40	1,19	0.0°	0.0°	GP..050102	CT15	T6
2831020	CCPM61525R	95.0	6,00	9,14	5,59	2,49	152,40	152,40	1,19	0.0°	0.0°	GP..050102	CT15	T6
left hand														
2831004	CCPM6152225L	67.5	6,00	10,15	6,60	3,51	152,61	152,40	1,19	0.0°	0.0°	GP..050102	CT15	T6
2830980	CCPM8152225L	67.5	8,00	11,38	7,01	2,92	155,96	152,40	2,36	0.0°	0.0°	GP..050102	CT15	T6
3897899	CCPM61525L	95.0	6,00	9,14	5,59	2,49	152,40	152,40	1,19	0.0°	0.0°	GP..050102	CT15	T6
3896022	CCPM81525L	95.0	8,00	10,74	6,38	2,28	152,40	152,40	2,23	0.0°	0.0°	GP..050102	CT15	T6

Clamping System S • Steel

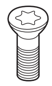


NOTE: KRI shown as 95°.

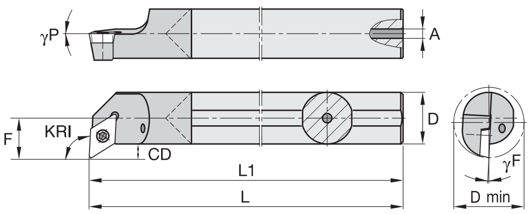


NOTE: KRI shown as 67,5°.

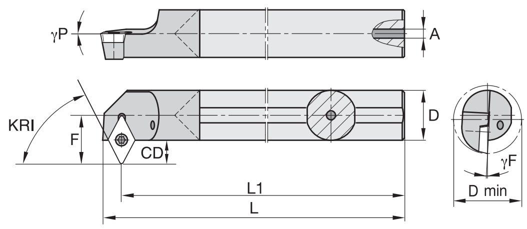
GSPM



order number	catalogue number	KRI	D	D min	D2	F	CD	L	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand																
3518694	GSPM1316515R	95.0	16,00	16,00	12,95	9,50	3,02	127,00	127,00	50,80	2,49	0.0°	0.0°	GC..060202	GT21	T7
left hand																
3897894	GSPM101638225L	67.5	16,00	13,72	9,78	8,59	3,70	105,01	101,60	38,10	2,49	0.0°	0.0°	GC..060202	GT21	T7
3897896	GSPM131651225L	67.5	16,00	16,89	12,95	10,16	3,68	130,90	127,00	50,80	2,49	0.0°	0.0°	GC..060202	GT21	T7
3897895	GSPM1016385L	95.0	16,00	13,08	9,78	7,93	3,04	114,30	114,30	38,10	2,49	0.0°	0.0°	GC..060202	GT21	T7
3896052	GSPM1316515L	95.0	16,00	16,00	12,95	9,50	3,02	127,00	127,00	50,80	2,49	0.0°	0.0°	GC..060202	GT21	T7

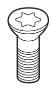


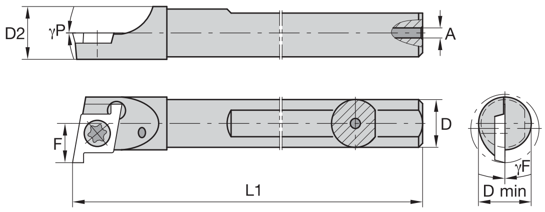
NOTE: KRI shown as 95°.



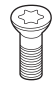
NOTE: KRI shown as 67,5°.

■ GCPM

order number	catalogue number	KRI	D	D min	F	CD	L	L1	A	γF°	γP°	gage insert	 insert screw	Torx
right hand														
2827656	**GCPM10254225R**	67.5	10,00	14,20	8,81	3,68	258,47	254,00	3,20	0.0°	0.0°	GC..060202	**GT21**	T7
3897906	**GCPM12254225R**	67.5	12,00	16,18	9,80	3,71	257,86	254,00	4,70	0.0°	0.0°	GC..060202	**GT21**	T7
3896073	**GCPM16254225R**	67.5	16,00	20,09	11,76	3,67	258,01	254,00	5,51	0.0°	0.0°	GC..060202	**GT21**	T7
3897904	**GCPM102545R**	95.0	10,00	13,54	8,15	3,06	254,00	254,00	3,20	0.0°	0.0°	GC..060202	**GT21**	T7
3759184	**GCPM122545R**	95.0	12,00	15,52	9,14	3,05	254,00	254,00	4,70	0.0°	0.0°	GC..060202	**GT21**	T7
3897909	**GCPM162545R**	95.0	16,00	19,43	11,10	3,01	254,00	254,00	5,51	0.0°	0.0°	GC..060202	**GT21**	T7
left hand														
3897903	**GCPM10254225L**	67.5	10,00	14,20	8,81	3,72	257,49	254,00	3,20	0.0°	0.0°	GC..060202	**GT21**	T7
3897905	**GCPM12254225L**	67.5	12,00	16,18	9,80	3,71	257,86	254,00	4,70	0.0°	0.0°	GC..060202	**GT21**	T7
3897908	**GCPM16254225L**	67.5	16,00	20,07	11,76	3,67	258,02	254,00	5,51	0.0°	0.0°	GC..060202	**GT21**	T7
3782377	**GCPM102545L**	95.0	10,00	13,54	8,15	3,02	254,00	254,00	3,20	0.0°	0.0°	GC..060202	**GT21**	T7
3897907	**GCPM122545L**	95.0	12,00	15,52	9,14	3,05	254,00	254,00	4,70	0.0°	0.0°	GC..060202	**GT21**	T7
2827644	**GCPM162545L**	95.0	16,00	19,43	11,10	3,01	254,00	254,00	5,51	0.0°	0.0°	GC..060202	**GT21**	T7

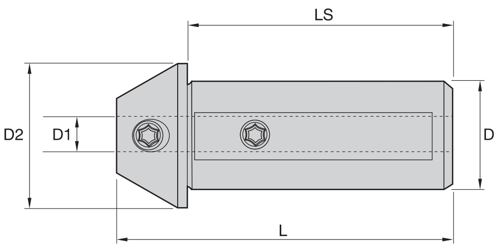


CSMM



order number	catalogue number	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
2831048	**CSMM6760R**	6,00	7,92	6,60	4,44	76,20	1,02	0.0°	0.0°	CD.50302R	**CC11**	T6

NOTE: Refer to insert design for cutting depth, cutting width, and blind hole limitations.



CSM

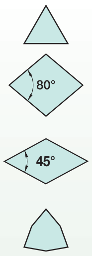
order number	catalogue number	D1	D	D2	LS	L
2832838	**CSM22156**	3,96	22,00	27,94	50,80	63,50
2832832	**CSM22187**	4,75	22,00	27,94	50,80	63,50
2832827	**CSM22250**	6,36	22,00	27,94	50,80	63,50
2832820	**CSM22312**	7,93	22,00	27,94	50,80	63,50
2832813	**CSM22375**	9,53	22,00	27,94	50,80	63,50
2832809	**CSM22500**	12,70	22,00	27,94	50,80	63,50

How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.

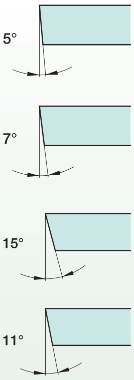
CDHBS4T002

C
Insert Shape



- **T** 60°
- **C** 80°
- **G** 45°
- **W** 80°

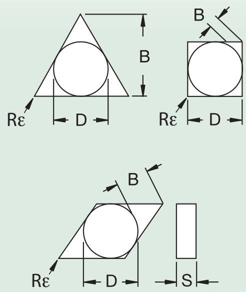
D
Insert Clearance Angle



- **B** 5°
- **C** 7°
- **D** 15°
- **P** 11°

H
Tolerance Class

Tolerances apply prior to edge prep and coating.



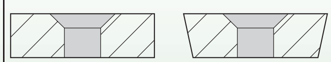
D = Theoretical diameter of the insert inscribed circle
S = Thickness
B = See figures below

tolerance class	tolerance on "D"	tolerance on "B"	tolerance on "S"
C	±0,025	±0,013	±0,025
H	±0,013	±0,013	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,025	±0,013
M	See tables on next page		±0,013
U	See tables on next page		±0,013

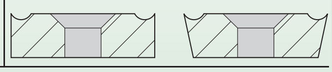
B
Insert Features

Partly cylindrical hole, 40–60° countersink, single-sided

W without chipbreaker

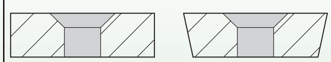


T with chipbreaker

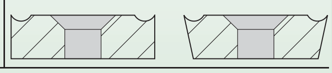


Partly cylindrical hole, 70–90° countersink, single-sided

B without chipbreaker



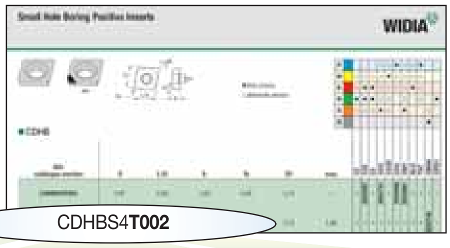
H with chipbreaker



S4
Size

"D" mm	Code for metric cutting edge length "L10" C	G	T	W
3,97	S4	05	06	—
4,06	—	—	07	—
4,76	04	06	08	S3
6,35	06	—	11	04
9,53	09	—	16	06
9,80	—	—	17	—

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



T0	02			
Thickness	Corner Radius “Rε”	Hand of Insert *(optional)*	Cutting Edge Condition or Chip Control Features *(optional)*	Tip Style *(optional)*

Thickness

symbol mm	thickness mm
T0	1,00; 1,02
01	1,59; 1,58
T1	1,98; 1,91
02	2,38; 2,36
03	3,18
T3	3,97
S1	1,19

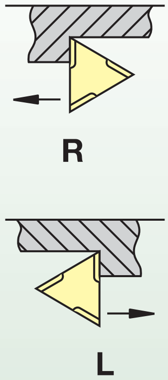
Corner Radius “Rε”

symbol mm	corner radius mm
X0	0,04; 0,05
01	0,1
02	0,2; 0,18
04	0,4; 0,38
05	0,5
08	0,8
09	0,9
12	1,2
16	1,6

Hand of Insert

R = Right hand

L = Left hand



Cutting Edge Condition or Chip Control Features

HP = High positive

LF = Light finishing

Tip Style

Symbol

M

Usage

Mini tip

± Tolerance on “D”

“D” mm	Class M Tolerance: Shapes S, T, C, R, & W mm	Class M Tolerance: Shape D mm	Class M Tolerance: Shape V mm	Class U Tolerance: Shapes S, T, & C mm
3,97	0,05	–	–	–
4,76	0,05	–	–	0,08
5,56	0,05	0,05	0,05	0,08
6,35	0,05	0,05	0,05	0,08
7,94	0,05	0,05	0,05	0,08
9,52	0,05	0,05	0,05	0,08
11,11	0,08	0,08	0,08	0,13
12,70	0,08	0,08	0,08	0,13
14,29	0,08	0,08	0,08	0,13
15,88	0,10	0,10	0,10	0,18
17,46	0,10	0,10	0,10	0,18
19,05	0,10	0,10	0,10	0,18
22,22	0,13	–	–	0,25
25,40	0,13	–	–	0,25
31,75	0,15	–	–	0,25

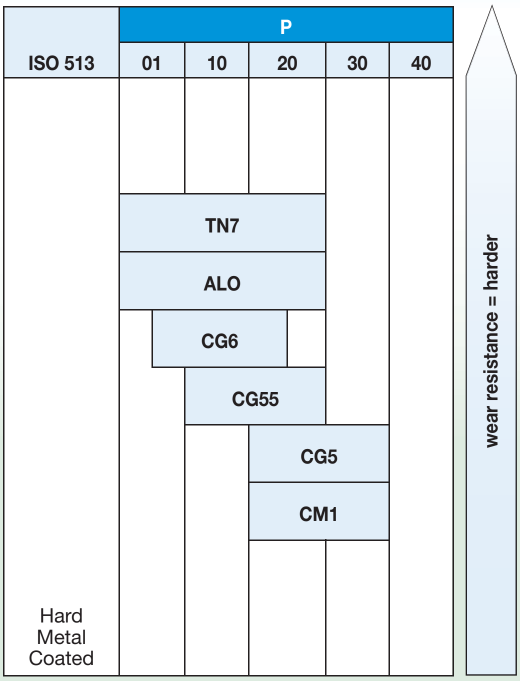
± Tolerance on “B”

“D” mm	Class M Tolerance: Shapes S, T, C, R, & W mm	Class M Tolerance: Shape D mm	Class M Tolerance: Shape V mm	Class U Tolerance: Shapes S, T, & C mm
3,97	0,08	–	–	–
4,76	0,08	–	–	0,13
5,56	0,08	0,11	–	0,13
6,35	0,08	0,11	–	0,13
7,94	0,08	0,11	–	0,13
9,52	0,08	0,11	0,18	0,13
11,11	0,13	0,15	–	–
12,70	0,13	0,15	0,25	0,20
14,29	0,13	0,15	–	–
15,88	0,15	0,18	–	0,27
17,46	0,15	0,18	–	0,27
19,05	0,15	0,18	–	0,27
22,22	0,15	–	–	0,38
25,40	0,18	–	–	0,38
31,75	0,20	–	–	0,38

The WIDIA™ three-step insert selection system makes choosing and applying the most productive tool easy. Tool recommendations are based on six workpiece material groups.

1. **Select the Insert Geometry:**
   Based on the needed depth of cut and feed rate, choose the geometry that best matches your needs.
2. **Select the Grade:**
   Determine your cutting conditions, and choose the proper grade.

TN7–CM1 for Steel



TN7 — High edge strength and wear-resistant cermet. Finishing to semi-finishing of carbon, alloy, and stainless steels at medium to high speeds.

ALO — Can withstand light interruptions. Alumina coating enables higher cutting speeds.

CG6 — High-speed, general-purpose grade for all kinds of steel and cast iron.

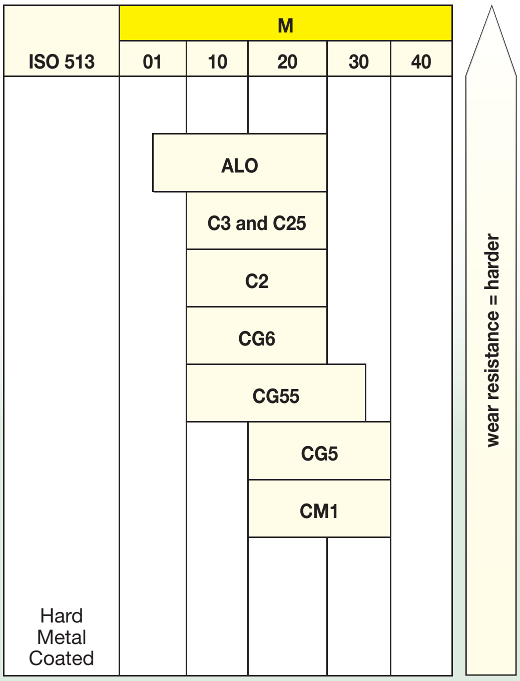
CG55 — High edge strength and wear resistance. Reduces problems with built-up edge. Superior thermal deformation resistance and depth-of-cut notch resistance.

CG5 — Best at low speeds. Will handle interruptions and high feed rates.

CM1 — For heavy turning and heavily interrupted cuts.

toughness = softer

ALO–CM1 for Stainless Steel



ALO — Can withstand light interruptions. Alumina coating enables higher cutting speeds.

C3 and C25—Good wear resistance with some toughness.

C2 — Excellent abrasion resistance for machining cast irons, austenitic stainless steels,non-ferrous metals, non-metals, and most high-temperature alloys.

CG6 — High-speed, general-purpose grade for all kinds of steel and cast iron.

CG55 — High edge strength and wear resistance. Reduces problems with built-up edge.Superior thermal deformation resistance and depth-of-cut notch resistance.

CG5 — Best at low speeds. Will handle interruptions and high feed rates.

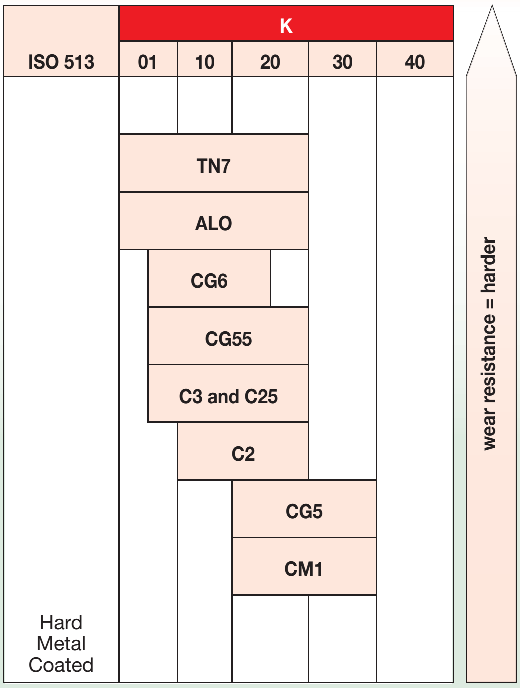
CM1 — For heavy turning and heavily interrupted cuts.

toughness = softer

3 Select the Cutting Speed:
In the foldout speed and feed chart, establish your cutting speed and obtain your optimal starting conditions and range.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

TN7–CM1 for Cast Iron



TN7 — High edge strength and wear-resistant cermet.

ALO — Can withstand light interruptions. Alumina coating enables higher cutting speeds.

CG6 — High-speed, general-purpose grade for all kinds of steel and cast iron.

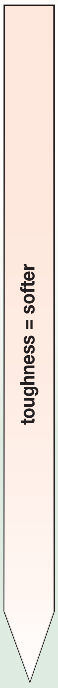
CG55 — High edge strength and wear resistance. Reduces problems with built-up edge. Superior thermal deformation resistance and depth-of-cut notch resistance.

C3 and C25 — Good wear resistance with some toughness.

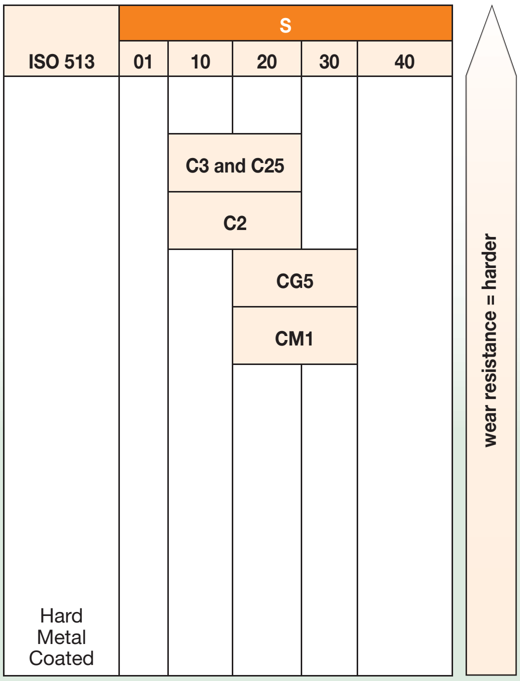
C2 — Excellent abrasion-resistance for machining cast irons, austenitic stainless steels, non-ferrous metals, non-metals, and most high-temperature alloys.

CG5 — Best at low speeds. Will handle interruptions and high feed rates.

CM1 — For heavy turning and heavily interrupted cuts.



C3–CM1 for High-Temperature Alloys



C3 and C25 — Good wear resistance with some toughness.

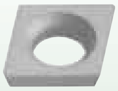
C2 — Excellent abrasion resistance for machining cast irons, austenitic stainless steels, non-ferrous metals, non-metals, and most high-temperature alloys.

CG5 — Best at low speeds. Will handle interruptions and high feed rates.

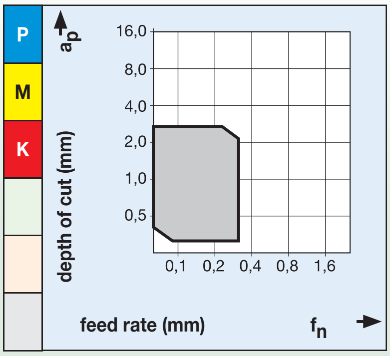
CM1 — For heavy turning and heavily interrupted cuts.

Single-Sided, Positive Inserts

..HB

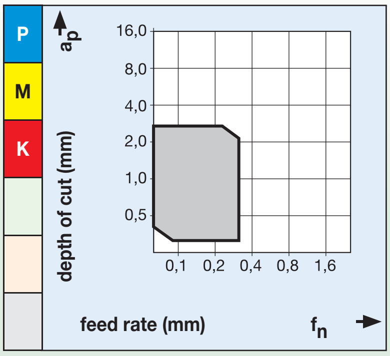


Flat inserts. Peripheral ground for best surface quality and reduced cutting pressure. Very stable cutting edge offers maximum rigidity.



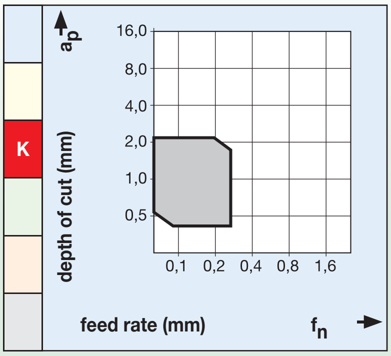
..HT

Peripheral ground insert chipbreaker. Good chip control. Geometry for general-purpose applications.

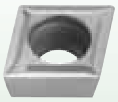


..HB-M

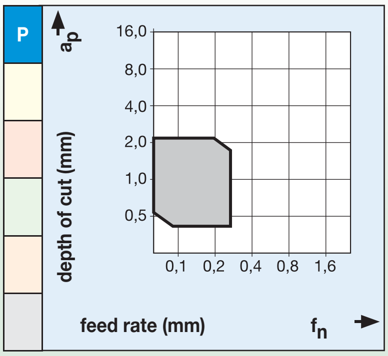
Cubic Boron Nitride (CBN) or Polycrystalline Diamond (PCD) tip for high-temp alloys and non-ferrous machining. Very stable cutting edge offers maximum rigidity.



..LF



Geometry for general-purpose applications. Very good chip control. Recommended for general finish machining.



Geometry Selection Criteria

Flat Top-Type Inserts

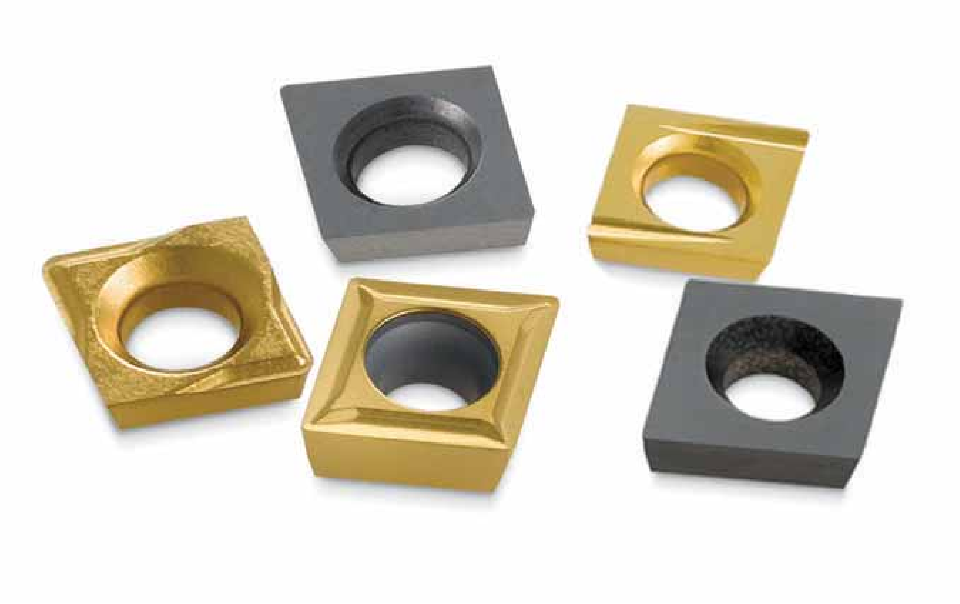
Chipbreaker Geometry ..HB, ..HB-M, ..HW

- Suitable for interrupted cuts.
- Use when chip control is not critical.

Pressed Chipbreaker-Type Inserts

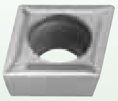
Chipbreaker Geometry ..LF

- Suitable for moderate interruption of cuts.
- Use when chip control is a concern.

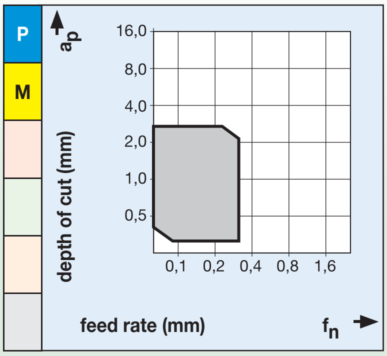


Single-Sided, Positive Inserts

..HH

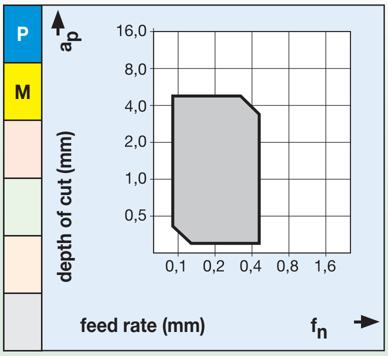


Peripheral ground for best surface quality and reduced cutting pressure.
For fine to medium finishes.

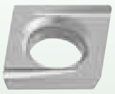


HP

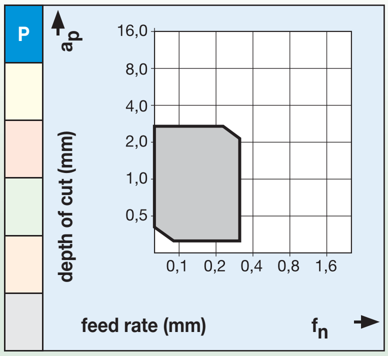
High positive-type chipbreaker. Peripheral ground for best surface quality and reduced cutting pressure. Recommended for high-temp alloys and non-ferrous machining.



..HH-R/L

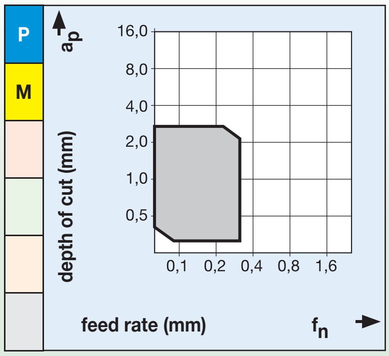


Ground-in chipbreaker. Peripheral ground for best surface quality and reduced cutting pressure.
*Right-hand inserts used in left-hand bars ONLY. Left-hand inserts used in right-hand bars ONLY.



..HW

Flat insert for profiling. Very stable cutting edge offers maximum rigidity.



Geometry Selection Criteria

Pressed Chipbreaker-Type Inserts with Ground Periphery

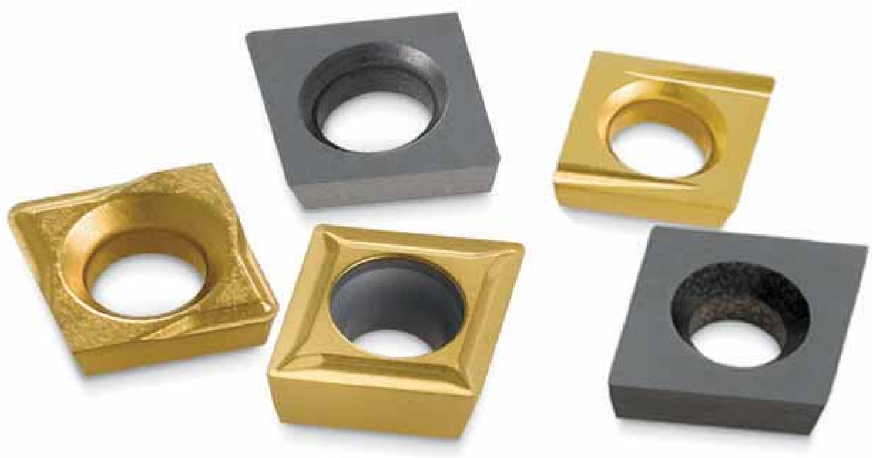
Chipbreaker Geometry ..HH, ..HT, HP

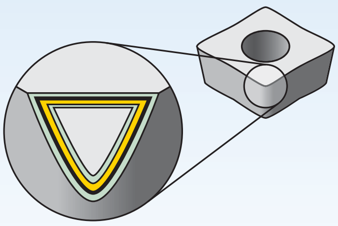
- Suitable for light to moderate interruption of cuts.
- Use when chip control is a concern.
- Superior surface finish and closer tolerance on workpiece.

Ground-In Chipbreaker-Type Inserts

Chipbreaker Geometry ..HH-R/L

- Suitable for smooth cuts.
- Use when chip control is a concern.
- Superior surface finish and closer tolerance on workpiece.

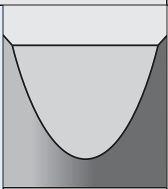
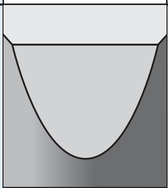
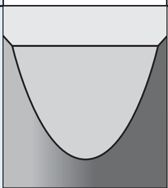
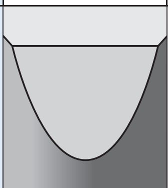
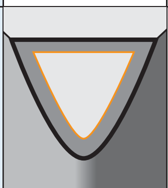


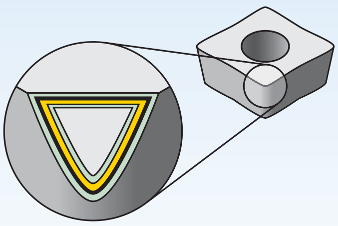


Coatings provide high-speed capability and are engineered for finishing to light roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ←→ toughness

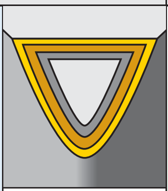
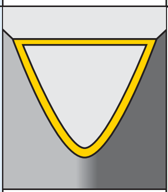
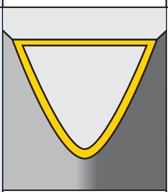
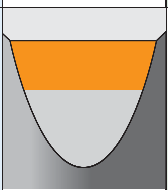
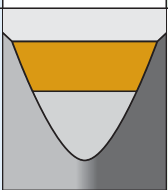
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
CM1	 HW-S25	Uncoated carbide. A very tough, ultra-fine grain unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates. Use when C2, C3, or C25 fail due to chipping or breaking.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
C2	 HW-N15	Uncoated carbide. A hard, low binder content, unalloyed WC/Co fine-grained grade. General-purpose grade for non-ferrous materials. Has excellent abrasion resistance for machining cast irons, austenitic stainless steels, non-ferrous metals, non-metals, and most high-temperature alloys.										
			M		■	■	■					
			K	■	■	■	■					
			N		■	■	■					
			S		■	■	■					
C3 and C25	 HW-K15	Uncoated carbide. Has excellent abrasion resistance for machining cast irons, aluminium, and non-ferrous metals. Good wear resistance with some toughness. Harder than C2, resulting in greater edge wear resistance. Suitable for finishing operations.										
			M		■	■	■					
			K	■	■	■	■					
			N		■	■	■					
			S		■	■	■					
TN7	 HT-P15	A highly wear-resistant (TiC/TiN-based) cermet grade. High edge strength and wear-resistant cermet offers improved tool life over uncoated/coated carbides and resists material build-up on cutting edge. Finishing to semi-finishing of carbon, alloy, and stainless steels at medium to high speeds. Can also be used on non-ferrous materials.	P	■	■	■	■					
			K	■	■	■	■					
ALO	 HC-K15	Coated carbide. CVD — TiCN-TiC-Al_2O_3. A thin alumina coating over a hard, deformation-resistant substrate. High-speed finishing of grey cast irons and medium-speed finishing of alloy steels that are in a hardness range of 35–50 HRC. Can withstand light interruptions. Alumina coating enables higher cutting speeds.	P	■	■	■	■					
			M	■	■	■	■					
			K	■	■	■	■					



Coatings provide high-speed capability and are engineered for finishing to light roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

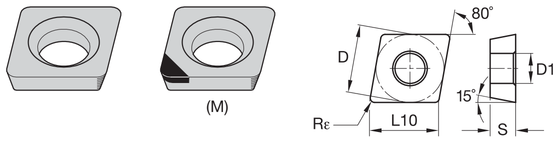
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
CG6	 HC-P10	Coated carbide. CVD — TiC-TiCN-TiN. Tri-phase coating on a hard, low binder content, fine-grained grade. High-speed, general-purpose grade for all kinds of steel. Gold in colour.	P	■	■	■						
			M		■	■	■					
			K	■	■	■						
CG5	 HC-S25	A PVD-TiN-coated grade. Straight 9.5% Co substrate. Submicron grain. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
CG55	 HC-M20	A PVD-TiN coating over a very wear-resistant, unalloyed carbide substrate. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Grade provides combination of high edge strength and wear resistance. Coating increases wear resistance and reduces problems with built-up edge. The substrate offers superior thermal deformation resistance and depth-of-cut notch resistance.	P		■	■	■					
			M		■	■	■	■				
			K	■	■	■	■					
			S		■	■	■					
CBN6	 BN-H25	PcBN tip brazed onto a carbide insert. Recommended for machining hardened steel (45–65 HRC). Use on bearing steel, hot and cold work tool steels, high-speed steels, die steels, case-hardened steels, carburised and nitrided irons, and some hard coatings. Can be run both dry and wet.	H			■	■	■	■			
CPD1	 DP-N10	Polycrystalline diamond (PCD) compact grade provides exceptional hardness and abrasion resistance. CPD1 is a superior finish boring grade that will significantly improve workpiece tolerances, surface finishes, and insert tool life in high-silicon aluminium, copper, aluminium carbon graphite, hard rubber, plastics, and/or wood.	N	■	■	■						

Material Group		Cutting Speed — vc m/min																	
		C2			C25			C3			CG5			CG55			CG6		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [mm]	–	–	–	–	–	–	–	–	–	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300
	f [mm/rev]	–	–	–	–	–	–	–	–	–	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300
	0/1	–	–	–	–	–	–	–	–	–	95	**115**	140	105	**130**	155	125	**155**	190
	2	–	–	–	–	–	–	–	–	–	60	**75**	90	65	**85**	100	80	**100**	125
	3	–	–	–	–	–	–	–	–	–	60	**75**	90	65	**85**	100	80	**100**	125
	4	–	–	–	–	–	–	–	–	–	45	**60**	70	50	**65**	80	65	**80**	95
	5	–	–	–	–	–	–	–	–	–	60	**75**	90	65	**85**	100	80	**100**	125
	6	–	–	–	–	–	–	–	–	–	40	**50**	60	45	**55**	70	55	**65**	80
M	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300
	1	55	**70**	80	60	**80**	95	60	**80**	95	75	**90**	110	80	**100**	120	95	**115**	140
	2	50	**60**	75	55	**70**	85	55	**70**	85	65	**80**	100	75	**90**	110	85	**105**	125
	3	35	**45**	55	45	**50**	65	45	**50**	65	50	**60**	75	55	**65**	80	60	**80**	95
K	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300
	1	50	**65**	80	60	**70**	85	60	**70**	85	60	**75**	90	65	**80**	100	75	**90**	110
	2	65	**80**	100	75	**90**	110	75	**90**	110	75	**95**	115	85	**105**	125	95	**115**	140
	3	50	**60**	75	55	**65**	80	55	**65**	80	55	**70**	80	60	**75**	90	65	**85**	100
N	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	–	–	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	–	–	–
	1	400	**505**	605	400	**505**	605	400	**505**	605	400	**505**	605	445	**555**	665	–	–	–
	2	295	**370**	440	295	**370**	445	295	**370**	445	295	**370**	445	325	**405**	490	–	–	–
	3	70	**85**	105	70	**85**	105	70	**85**	105	85	**105**	125	90	**115**	135	–	–	–
	4	310	**380**	465	310	**385**	465	310	**385**	465	140	**175**	210	155	**190**	230	–	–	–
	5	145	**185**	220	145	**185**	220	145	**185**	220	175	**220**	265	195	**240**	290	–	–	–
	6	140	**175**	210	140	**175**	210	140	**175**	210	170	**210**	255	185	**235**	280	–	–	–
	7	240	**295**	355	240	**300**	360	240	**300**	360	245	**305**	365	265	**335**	400	–	–	–
S	ap [mm]	0,025	–	0,200	0,025	–	0,200	0,025	–	0,200	0,025	–	0,200	0,025	–	0,200	–	–	–
	f [mm/rev]	0,025	–	0,127	0,025	–	0,127	0,025	–	0,127	0,025	–	0,127	0,025	–	0,127	–	–	–
	1	30	**35**	45	30	**35**	45	30	**35**	45	30	**35**	45	35	**40**	50	–	–	–
	2	25	**30**	35	25	**30**	35	25	**30**	35	25	**30**	35	25	**35**	40	–	–	–
	3	25	**30**	35	25	**30**	35	25	**30**	35	30	**40**	50	35	**45**	55	–	–	–
	4	25	**30**	35	25	**30**	35	25	**30**	35	–	–	–	–	–	–	–	–	–
H	ap [mm]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	f [mm/rev]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

NOTE: Speed and feed rates and depth of cut may vary depending on materials and machining conditions including, but not limited to, tool overhang, tool size, and finished surface requirements.

	Material Group	Cutting Speed — vc m/min														
		CM1			ALO			TN7			CBN6			CPD1		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	–	–	–	–	–	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	–	–	–	–	–	–
	0/1	55	**65**	80	165	**205**	245	200	**245**	295	–	–	–	–	–	–
	2	35	**45**	55	105	**135**	160	130	**160**	190	–	–	–	–	–	–
	3	35	**45**	55	105	**135**	160	130	**160**	190	–	–	–	–	–	–
	4	25	**35**	40	85	**105**	125	100	**125**	150	–	–	–	–	–	–
	5	35	**45**	55	105	**135**	160	130	**160**	190	–	–	–	–	–	–
	6	25	**30**	35	70	**90**	105	85	**105**	130	–	–	–	–	–	–
M	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	–	–	–	–	–	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	–	–	–	–	–	–
	1	55	**65**	80	105	**130**	160	105	**130**	155	–	–	–	–	–	–
	2	50	**60**	75	95	**120**	145	95	**115**	140	–	–	–	–	–	–
	3	35	**45**	55	70	**90**	110	70	**85**	105	–	–	–	–	–	–
K	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	–	–	–	–	–	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	–	–	–	–	–	–
	1	45	**60**	70	125	**155**	185	80	**105**	125	–	–	–	–	–	–
	2	60	**75**	90	160	**200**	240	105	**130**	160	–	–	–	–	–	–
	3	45	**55**	65	115	**145**	170	80	**95**	115	–	–	–	–	–	–
N	ap [mm]	0,051	–	0,300	–	–	–	0,051	–	0,300	–	–	–	0,051	–	0,300
	f [mm/rev]	0,025	–	0,300	–	–	–	0,025	–	0,300	–	–	–	0,025	–	0,300
	1	400	**505**	605	–	–	–	400	**505**	605	–	–	–	855	**1065**	1280
	2	295	**370**	445	–	–	–	295	**370**	445	–	–	–	650	**810**	975
	3	70	**85**	105	–	–	–	80	**100**	120	–	–	–	365	**455**	550
	4	100	**125**	150	–	–	–	195	**240**	290	–	–	–	325	**405**	490
	5	145	**185**	220	–	–	–	195	**245**	295	–	–	–	340	**425**	510
	6	140	**175**	210	–	–	–	175	**220**	265	–	–	–	335	**420**	505
	7	240	**295**	360	–	–	–	240	**300**	365	–	–	–	525	**660**	790
S	ap [mm]	0,025	–	0,200	–	–	–	–	–	–	0,025	–	0,200	–	–	–
	f [mm/rev]	0,025	–	0,127	–	–	–	–	–	–	0,025	–	0,127	–	–	–
	1	25	**30**	40	–	–	–	–	–	–	90	**110**	135	–	–	–
	2	20	**25**	30	–	–	–	–	–	–	70	**85**	105	–	–	–
	3	25	**35**	40	–	–	–	–	–	–	100	**120**	145	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
H	ap [mm]	–	–	–	–	–	–	–	–	–	0,025	–	0,200	–	–	–
	f [mm/rev]	–	–	–	–	–	–	–	–	–	0,025	–	0,127	–	–	–
	1	–	–	–	–	–	–	–	–	–	110	**135**	165	–	–	–
	2	–	–	–	–	–	–	–	–	–	105	**130**	155	–	–	–
	3	–	–	–	–	–	–	–	–	–	100	**120**	145	–	–	–
	4	–	–	–	–	–	–	–	–	–	90	**110**	135	–	–	–

NOTE: Speed and feed rates and depth of cut may vary depending on materials and machining conditions including, but not limited to, tool overhang, tool size, and finished surface requirements.



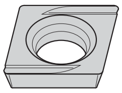
● first choice
○ alternate choice

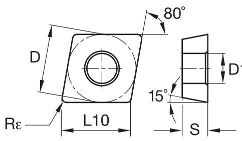
		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

CDHB

ISO catalogue number	D	L10	S	Rε	D1	max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CDHBS4T0X0	3,97	4,03	1,02	0,05	2,13	–	–	2830897	–	3884731	–	2830888	2830881	–	–	–	–
CDHBS4T0X0M	3,97	4,03	1,02	0,05	2,13	1,90	–	–	–	–	–	–	–	–	–	2830746	–
CDHBS4T002	3,97	4,03	1,02	0,18	2,13	–	–	2830864	–	3884732	–	2830853	2830848	2830870	2830843	–	–
CDHBS4T002M	3,97	4,03	1,02	0,18	2,13	0,96	–	–	–	–	–	–	–	–	–	2830741	2830774
CDHBS4T004M	3,97	4,03	1,02	0,38	2,13	0,96	–	–	–	–	–	–	–	–	–	–	2830769
CDHBS4T004	3,97	4,03	1,02	0,38	2,13	–	–	2830830	–	2830788	–	2830817	2830813	–	2830803	–	–

NOTE: Max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.





● first choice
○ alternate choice

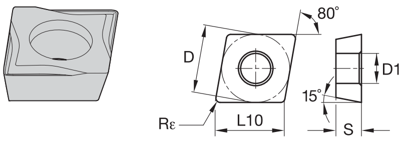
		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

CDHH-R/L

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																
CDHHS4T002R	3,97	4,03	1,02	0,18	2,13	-	-	-	2830731	-	-	2830706	-	-	-	-
CDHHS4T004R	3,97	4,03	1,02	0,38	2,13	-	-	-	2830682	-	-	-	-	-	-	-
left hand																
CDHHS4T002L	3,97	4,03	1,02	0,18	2,13	-	-	-	2830724	-	2830712	2830700	-	-	-	-
CDHHS4T004L	3,97	4,03	1,02	0,38	2,13	-	-	-	2830678	-	-	-	-	-	-	-

NOTE: Right-hand inserts used in left-hand bars only.

WIDIA

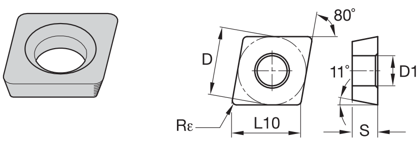


● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

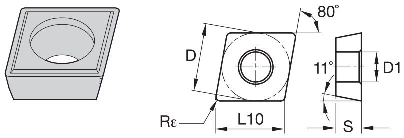
CDHH

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CDHHS4T002	3,97	4,03	1,02	0,18	2,13	-	-	-	2830632	-	-	2830638	-	-	-	-
CDHHS4T002L	3,97	4,03	1,02	0,18	2,13	-	-	-	2830724	-	2830712	2830700	-	-	-	-
CDHHS4T002R	3,97	4,03	1,02	0,18	2,13	-	-	-	2830731	-	-	2830706	-	-	-	-
CDHHS4T004L	3,97	4,03	1,02	0,38	2,13	-	-	-	2830678	-	-	-	-	-	-	-
CDHHS4T004R	3,97	4,03	1,02	0,38	2,13	-	-	-	2830682	-	-	-	-	-	-	-
CDHHS4T004	3,97	4,10	1,02	0,38	2,13	-	-	-	2830619	-	-	-	-	-	-	-



CPHB

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CPHB06T102	6,35	6,45	1,91	0,18	2,80	-	-	-	2824583	-	-	-	-	-	-	-
CPHB06T104	6,35	6,45	1,91	0,38	2,80	-	-	-	2824562	-	-	-	-	-	-	-

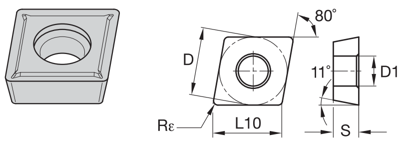


● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

■ CPHH

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CPHH06T102	6,35	6,45	1,91	0,18	2,79	-	-	-	2824461	-	2824454	2824468	-	-	-	-
CPHH06T104	6,35	6,45	1,91	0,38	2,80	-	-	-	2824441	-	-	-	-	-	-	-

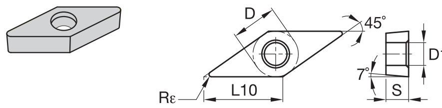


■ CPMT-LF

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CPMT09T302LF	9,53	9,67	3,97	0,20	4,40	-	-	-	2821519	-	-	-	-	-	-	-
CPMT09T304LF	9,53	9,67	3,97	0,40	4,40	-	-	-	2821499	-	-	-	-	-	-	-
CPMT09T308LF	9,52	9,67	3,97	0,79	4,40	-	-	-	2821484	-	-	-	-	-	-	-

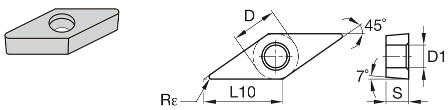
● first choice
○ alternate choice

	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P				●	○	●	○	○	●		
M	○	○	○	●	●	○	○	○	○		
K	○	●	●	○	○	○	○	●	○		
N	●	●	●	●	○		○		○		●
S	○	○	○	●	○		●			○	
H										●	



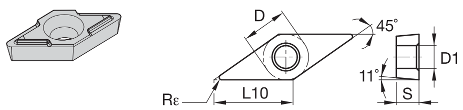
GCHW

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
GCHW060202	4,76	6,73	2,36	0,18	2,39	–	–	–	2827596	–	–	2827601	–	–	–	–
GCHW060204	4,76	6,73	2,36	0,38	2,39	–	–	–	2827577	–	–	2827584	–	–	–	–



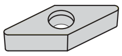
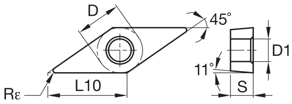
GCHT

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
GCHT060202	4,83	6,83	2,36	0,18	2,39	–	–	–	2827537	–	–	–	–	–	–	–
GCHT060204	4,76	6,83	2,36	0,38	2,39	–	–	–	2827525	–	–	2827531	–	–	–	–



GPHW

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
GPHW050102	3,97	5,61	1,59	0,18	2,13	–	–	–	2827631	–	2827625	2827637	–	–	–	–
GPHW050104	3,97	5,61	1,59	0,38	2,13	–	–	–	2827615	–	2827608	2827621	–	–	–	–

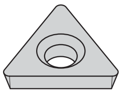
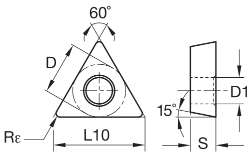



● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

GPHT

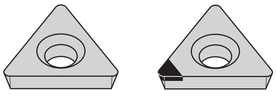
ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
GPHT050102	3,97	5,76	1,57	0,18	2,13	-	-	-	2827560	-	-	2827566	-	-	-	-
GPHT050104	4,08	5,76	1,57	0,38	2,13	-	-	-	2827548	-	-	2827554	-	-	-	-

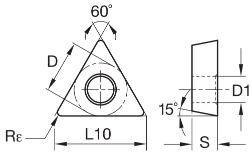



TBHB

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TBHB07S1X0	4,06	7,04	1,19	0,05	2,39	-	-	-	2828556	-	-	-	-	-	-	-
TBHB110201	6,35	11,00	2,38	0,10	3,33	-	-	-	2824266	-	-	-	-	-	-	-

Tools for Small Hole Boring





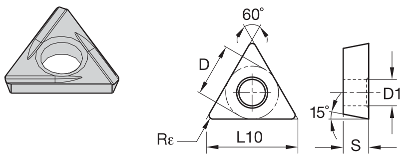
● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

■ TDHB

ISO catalogue number	D	L10	S	Rε	D1	max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TDHB07S1X0M	4,06	7,04	1,19	0,05	2,39	1,27	–	–	–	–	–	–	–	–	–	–	2828622
TDHB07S102M	4,06	7,04	1,19	0,18	2,39	1,27	–	–	–	–	–	–	–	–	–	2828579	–
TDHB07S104M	4,06	7,04	1,19	0,38	2,39	1,27	–	–	–	–	–	–	–	–	–	2828634	–
TDHB07S1X0	4,06	7,04	1,19	0,05	2,41	—	–	2828784	–	2828796	–	–	2828778	–	–	–	–
TDHB07S102	4,06	7,04	1,19	0,18	2,41	—	–	2828732	–	2828755	–	2828749	2828727	2828763	2828720	–	–
TDHB07S104	4,06	7,04	1,19	0,38	2,41	—	–	2828697	–	2828708	–	2828702	2828693	–	2828688	–	–
TDHB07S108	4,06	7,04	1,19	0,79	2,41	—	–	–	–	2828682	–	–	–	–	–	–	–

NOTE: Max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.



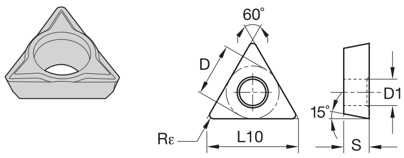
● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

■ TDHH-R/L

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																
TDHH07S102R	4,06	7,04	1,19	0,18	2,41	–	–	–	2828547	–	–	–	–	–	–	–
TDHH07S104R	4,06	7,04	1,19	0,38	2,41	–	–	–	2828499	–	–	–	–	–	–	–
left hand																
TDHH07S102L	4,06	7,04	1,19	0,18	2,41	–	–	–	2828541	–	2828529	2828516	–	2828508	–	–
TDHH07S104L	4,06	7,04	1,19	0,38	2,41	–	–	–	2828494	–	–	2828472	–	2828460	–	–

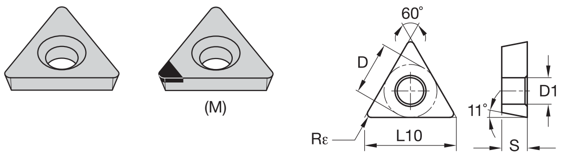
NOTE: Right-hand inserts used in left-hand bars only.



■ TDHH

ISO catalogue number	D	L10	S	Rε	D1	max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TDHH07S102	4,06	7,04	1,19	0,18	2,41	—	–	–	–	2828398	–	–	–	–	–	–	–
TDHH07S102L	4,06	7,04	1,19	0,18	2,41	4,52	–	–	–	2828541	–	2828529	2828516	–	2828508	–	–
TDHH07S102R	4,06	7,04	1,19	0,18	2,41	4,52	–	–	–	2828547	–	–	–	–	–	–	–
TDHH07S104L	4,06	7,04	1,19	0,38	2,41	4,36	–	–	–	2828494	–	–	2828472	–	2828460	–	–
TDHH07S104R	4,06	7,04	1,19	0,38	2,41	4,36	–	–	–	2828499	–	–	–	–	–	–	–
TDHH07S104	4,06	7,18	1,19	0,38	2,41	—	–	–	–	2828386	–	–	–	–	–	–	–

NOTE: Max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.



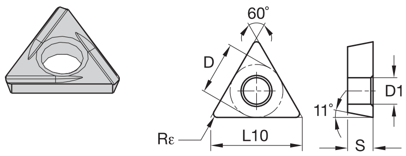
● first choice
○ alternate choice

	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P				●	○	●	○	○	●		
M	○	○	○	●	●	○	○	○	○		
K	○	●	●	○	○	○	○	●	○		
N	●	●	●	●	○		○		○		●
S	○	○	○	●	○		●			○	
H										●	

TPHB

ISO catalogue number	D	L10	S	Rε	D1	max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPHB1102X0	6,35	11,00	2,38	0,05	3,30	–	–	–	2824236	2824251	–	–	2824220	–	–	–	–
TPHB1102X0M	6,35	11,00	2,38	0,05	3,30	1,62	–	–	–	–	–	–	–	–	–	2823954	–
TPHB110202	6,35	11,00	2,38	0,18	3,30	–	–	–	2824191	2824200	–	2824195	2824168	–	2824148	–	–
TPHB110202M	6,35	11,00	2,38	0,18	3,30	1,62	–	–	–	–	–	–	–	–	–	2823949	2824022
TPHB110204	6,35	11,00	2,38	0,38	3,30	–	–	–	2824122	2824136	–	2824129	2824104	–	2824090	–	–
TPHB110204M	6,35	11,00	2,38	0,40	3,30	1,62	–	–	–	–	–	–	–	–	–	2823942	2824015
TPHB110208	6,35	11,00	2,38	0,79	3,30	–	–	–	–	2824077	–	–	2824044	–	2824037	–	–
TPHB1603X0	9,53	16,50	3,18	0,05	3,30	–	–	–	–	2821402	–	–	2821844	–	–	–	–
TPHB160302	9,53	16,50	3,18	0,18	3,30	–	2821834	–	–	2821397	–	–	2821816	–	–	–	–
TPHB160304	9,53	16,50	3,18	0,38	3,30	–	2821799	–	–	2821392	–	2821778	2821772	–	2821749	–	–
TPHB160308	9,53	16,50	3,18	0,79	3,30	–	2821371	–	–	2821381	–	2821377	2821349	–	2821331	–	–
TPCB160302	9,53	–	3,23	0,18	3,30	–	–	–	–	–	–	2821822	–	–	–	–	–

NOTE: Max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.



● first choice
○ alternate choice

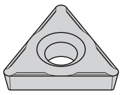
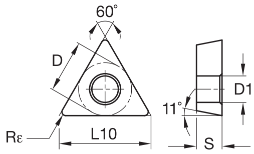
		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

■ TPHH-R/L

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																
TPHH110202R	6,35	11,00	2,38	0,18	3,33				2823812							
TPHH160302R	9,53	16,50	3,18	0,18	3,33				2821213							
TPHH160304R	9,53	16,50	3,18	0,38	3,33				2821168							
TPHH160308R	9,53	16,50	3,18	0,79	3,33				2821121							
left hand																
TPHH110202L	6,35	11,00	2,38	0,18	3,33				2823805					2823767		
TPHH110204L	6,35	11,00	2,38	0,38	3,33				2823753		2823739					
TPHH160302L	9,53	16,50	3,18	0,18	3,33				2821208							
TPHH160304L	9,53	16,50	3,18	0,38	3,33				2821162		2821150					
TPHH160308L	9,53	16,50	3,18	0,79	3,33				2821115							

NOTE: Right-hand inserts used in left-hand bars only.

Tools for Small Hole Boring

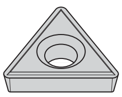
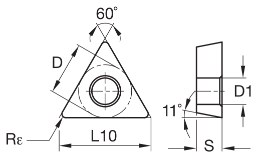



● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

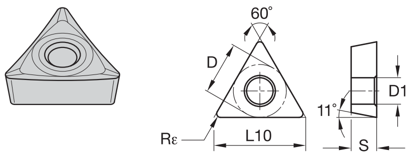
TPHH

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPHH110202	6,35	11,00	2,38	0,18	3,30	-	-	-	2823914	-	2823908	-	-	-	-	-
TPHH110204	6,35	11,00	2,38	0,38	3,30	-	-	-	2823858	-	-	-	-	-	-	-
TPCH110204	6,50	11,26	2,38	0,38	3,30	-	-	-	-	-	2823851	-	-	-	-	-

TPHH-LF

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPHH160304	9,53	16,50	3,18	0,40	3,33	-	-	-	2821070	-	2821705	-	-	-	-	-
TPHH160304LF	9,53	16,50	3,18	0,40	3,33	-	2821718	-	-	-	-	-	-	-	-	-
TPHH160308	9,53	16,50	3,18	0,79	3,33	-	-	-	-	-	2821670	-	2821688	-	-	-
TPHH160308	9,53	16,50	3,18	0,79	3,33	-	-	-	2821067	-	-	-	-	-	-	-
TPHH17T309LF	9,80	16,98	3,97	0,94	3,33	-	-	-	2821319	-	-	-	-	-	-	-

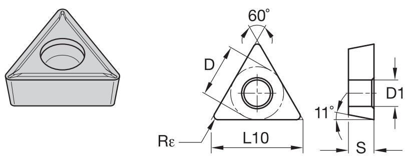


● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

TPGT-HP

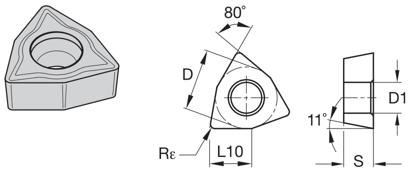
ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPGT110202HP	6,35	11,00	2,38	0,20	2,90	–	–	–	2823605	–	–	–	–	–	–	–
TPGT110204HP	6,35	11,00	2,38	0,40	2,90	–	–	–	2823592	–	–	2823595	–	–	–	–
TPGT16T304HP	9,53	16,50	3,97	0,40	4,40	–	–	–	2821536	–	–	–	–	–	–	–



TPMT-LF

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPMT110202LF	6,35	11,00	2,38	0,20	2,80	–	–	–	2823646	–	–	–	–	–	–	–
TPMT110204LF	6,35	11,00	2,38	0,40	2,80	–	–	–	2823625	–	2823619	–	–	–	–	–
TPMT160304LF	9,53	16,50	3,18	0,40	4,40	–	–	–	2821577	–	2821571	–	–	–	–	–
TPMT160308LF	9,53	16,50	3,18	0,79	4,40	–	–	–	2821566	–	–	–	–	–	–	–

Tools for Small Hole Boring



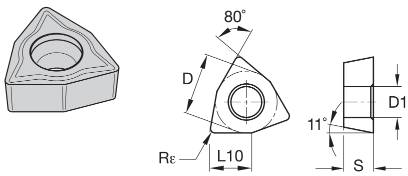
● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

Tools for Small Hole Boring

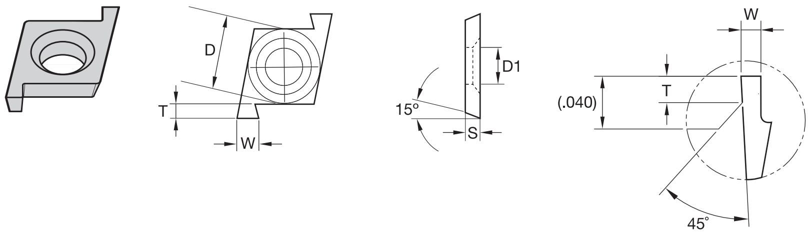
WPHT

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
WPHTS30101	4,76	3,26	1,59	0,10	2,16	-	-	-	2827496	-	-	-	-	-	-	-
WPHTS30102	4,76	3,26	1,59	0,20	2,16	-	-	-	2827483	-	-	2827490	-	-	-	-
WPHTS30104	4,76	3,26	1,59	0,40	2,16	-	-	-	2827471	-	-	2827477	-	-	-	-
WPGT040202UF	6,35	4,34	2,38	0,20	2,79	-	-	-	2824331	-	-	-	-	-	-	-
WPHT040201	6,35	4,34	2,38	0,10	2,80	-	-	-	2824344	-	-	-	-	-	-	-
WPHT040204	6,35	4,34	2,38	0,40	2,80	-	-	-	2824316	-	-	-	-	-	-	-



WPMT-LF

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
WPMTS3T104LF	4,76	3,25	1,98	0,40	2,15	-	-	-	-	2827521	-	-	-	-	-	-
WPMT040204LF	6,35	4,34	2,38	0,40	2,90	-	-	-	-	2824362	-	-	-	-	-	-
WPMT06T304LF	9,53	6,52	3,97	0,40	4,40	-	-	-	-	2821036	-	-	-	-	-	-
WPMT06T308LF	9,53	6,52	3,97	0,80	4,40	-	-	-	-	2821023	-	-	-	-	-	-



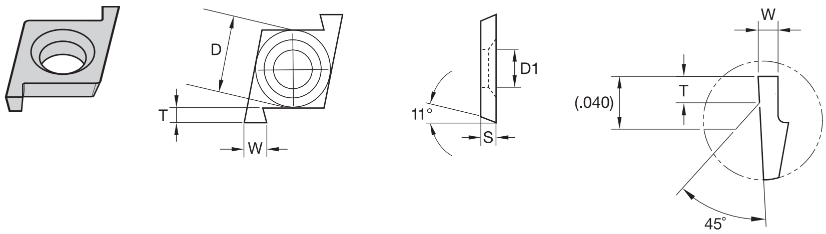
Detail of 0,38mm (.015") insert.

● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

CDG-R/L

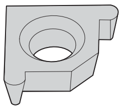
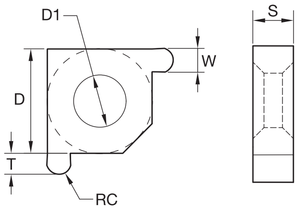
ISO catalogue number	D	S	T	W	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																
CDG50252R	3,97	1,27	1,02	0,64	2,13	ı	ı	ı	2830541	ı	ı	ı	ı	ı	ı	ı
CDG50302R	3,97	1,27	1,02	0,76	2,13	ı	ı	ı	2830529	ı	ı	2830535	ı	ı	ı	ı



Detail of 0,38mm (.015") insert.

CPG-R/L

ISO catalogue number	D	S	T	W	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																
CPG2032R	6,35	1,91	1,65	0,76	2,79	ı	ı	ı	2824546	ı	ı	ı	ı	ı	ı	ı
CPG2062R	6,35	1,91	1,65	1,52	2,79	ı	ı	ı	2824531	ı	ı	ı	ı	ı	ı	ı

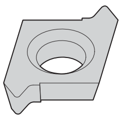
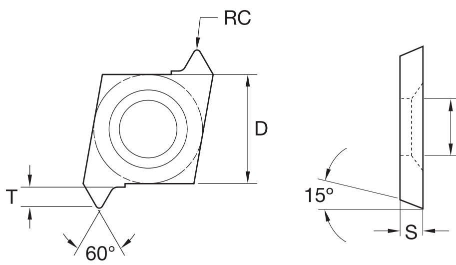



● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

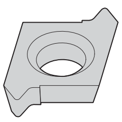
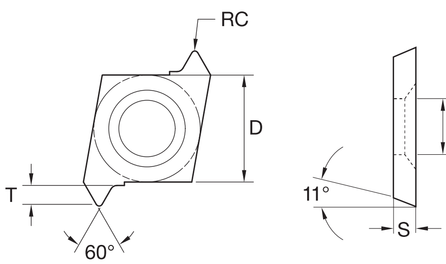
■ FNR-R/L

ISO catalogue number	D	S	T	W	RC	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																	
FNR150472R	5,00	1,85	1,00	1,20	0,60	2,50	-	-	-	2820783	-	-	-	-	-	-	-

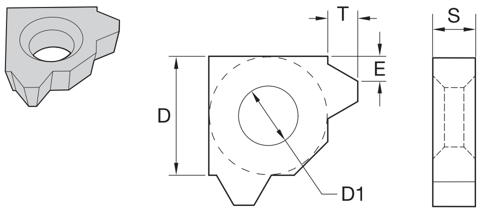
■ CDT-R/L

ISO catalogue number	D	S	T	RC	D1	TPI min	TPI max	TP min	TP max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																				
CDT50022R	3,97	1,27	0,76	0,05	2,11	24	48	0,5	1,0	-	-	-	2830567	-	-	-	-	-	-	-

■ CPT-R/L

ISO catalogue number	D	S	T	RC	D1	TPI min	TPI max	TP min	TP max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																				
CPT20052R	6,35	1,91	1,65	0,13	2,79	10	24	1,0	2,5	-	-	-	2824516	-	-	2824523	-	-	-	-

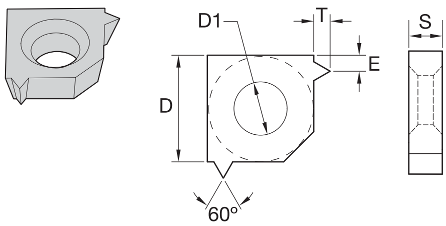


● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

■ FNT-ACME-R/L

ISO catalogue number	D	S	T	E	D1	TPI min	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																	
FNT1512ACME2R	5,00	2,35	1,26	1,05	2,50	12	-	-	-	2820829	-	-	-	-	-	-	-



■ FNT-UN-R/L

ISO catalogue number	D	S	T	E	D1	TPI min	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																	
FNT1528UN2R	5,00	1,85	0,61	0,65	2,50	28	-	-	-	2820865	-	-	-	-	-	-	-

WIDIA-CIRCLE™ catalogue number	New ISO catalogue number
CDCD	CDHB
CDCG	CDHH
CDCT	CDHH
CPCA	CPHB
CPCM	CPHH
GCCD	GCHW
GCCT	GCHT
GPCD	GPHW
GPCT	GPHT
TD6P	TPHB
TDAB	TDHB
TDAT	TDHH
TDCG	TDHH
TPCB	TPHB
TPCG	TPHH
TPCH	TPHH
TPGH	TPHH
TPMT	TPMT
WPGT	WPHT

Insert Screws

order number	ISO catalogue number	Torx/hex	internal thread
2840098	MSM46	2 mm	M4X0.7
2840186	AS832/AS-8-32	5/64	#8-32
2892513	BS832	5/64	–
2820981	LTM16	T5	M2X0.4
2832647	CC11	T6	#1-72
2832635	CT11	T6	#1-72
2830477	FC11	T7	–
2828337	GT21	T7	#2-56
2825941	QTM20	T7	M2.5X0.45
2825948	QTM26	T7	M2.5X0.45
2826005	QC15	T8	#3-48
2826038	QC21	T9	#4-40
2823227	SC30	T10	#4-40
2823203	STM31	T15	M3.5 X 0.6
2832641	CT15	T16	#1-72

Wrenches

order number	ISO catalogue number	Torx/hex
2840094	MKEY	2.0 mm
2840174	AKEY	5/64
2828318	GTKEY	T5
2832628	CKEY	T6
2830492	FKEY	T7
2825973	Q8KEY	T8
2825982	QKEY	T9
2823182	SKEY	T10

Drive Bits

order number	ISO catalogue number	Torx/hex
2840089	MBIT	2 mm
2832661	CBIT	T6
2830497	FBIT	T7
2825963	QTBIT	T7
2825964	Q8BIT	T8
2826045	QBIT	T9
2823236	SBIT	T10
2823196	STBIT	T15

Wedges

order number	ISO catalogue number
2840192	AW250/AW-250
2836024	BW312

A/B Series Small Hole Tooling

Available in steel and carbide shanks, the WIDIA™ line of micro boring bars is an excellent, economical choice for a wide range of applications — from creating small holes in small parts to precision micro boring typically found in large workpieces — manufactured in the aerospace, heavy equipment, and automotive industries.

A/B Series

A/B Series Micro Boring Bar

Features

- 1,56–3,96mm diameter boring range.
- Unique locking system enables quick, accurate insert changes.
- Insert repeatability guaranteed within ±0,013mm.

Benefits

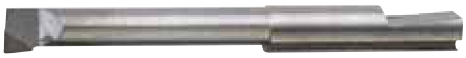
- Quick, accurate insert setups.
- Available in multiple styles for machining a wide range of materials.
- Elliptical, ground insert shanks for maximum strength and rigidity.

ABD Type

Replaceable boring insert with coolant slot.

ABD Type

Replaceable boring insert available in coated and uncoated carbide, CBN, and PCD tip. A series has a coolant slot.

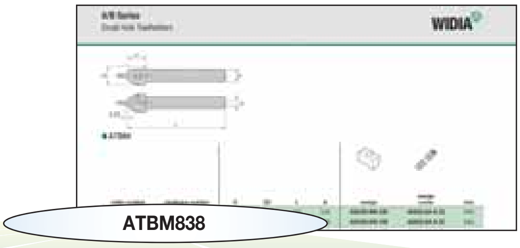


BB Type

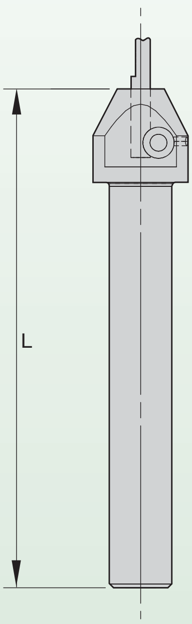
Replaceable boring insert.

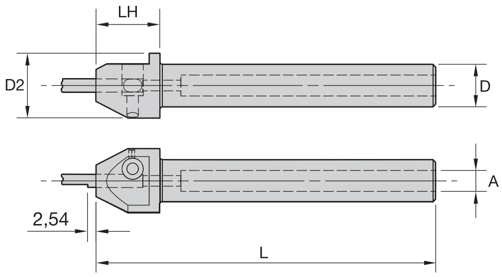
A/B Series Boring Bar Identification System

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.

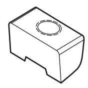


AT	B	M	8	38
Series Style and Bar Type *Construction Features of the Boring Bar*	Boring Bar	Type	Shank Diameter *shown as "D"*	Length *shown as "L"*
AT = Through Coolant **BS** = No Coolant		**M** = Metric	**Metric** **8** = 8,00mm **10** = 10,00mm **12** = 12,00mm **16** = 16,00mm **20** = 20,00mm	**Metric** **38** = 38,0mm **100** = 100,0mm **102** = 102,0mm **152** = 152,0mm



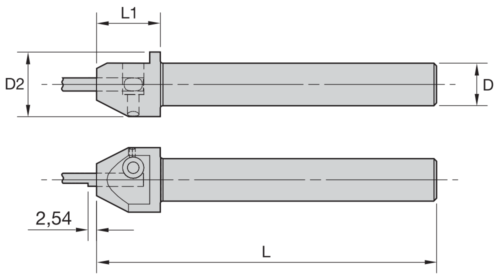


ATBM

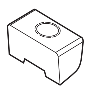



order number	catalogue number	D	D2	L	A	wedge	wedge screw	hex
3896121	**ATBM12100**	12,00	19,30	102	6,35	**AW250/AW-250**	**AS832/AS-8-32**	5/64
2839192	**ATBM1638**	16,00	19,30	38	6,35	**AW250/AW-250**	**AS832/AS-8-32**	5/64
3896193	**ATBM16100**	16,00	19,30	102	6,35	**AW250/AW-250**	**AS832/AS-8-32**	5/64
3896194	**ATBM20102**	20,00	19,30	102	6,35	**AW250/AW-250**	**AS832/AS-8-32**	5/64
3896195	**ATBM25102**	25,00	19,30	102	6,35	**AW250/AW-250**	**AS832/AS-8-32**	5/64

NOTE: These tools will accept any A-Series solid carbide insert (ABD, ABD-M, AGD, APD, and ATD).

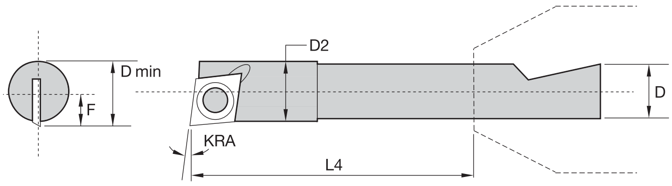


BSBM

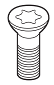



order number	catalogue number	D	D2	L	L1	wedge	wedge screw	hex
3896196	**BSBM20152**	20,00	25,65	152	29	**BW312**	**BS832**	5/64

NOTE: These tools will accept any B-Series solid carbide insert (BB and BP).



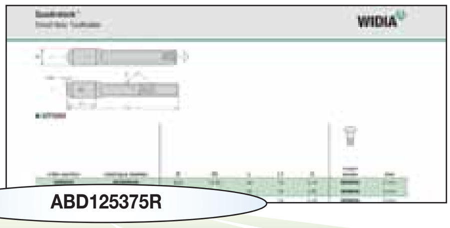
■ ABC



order number	catalogue number	KRA	D	D min	D2	F	L4	gage insert	insert screw	Torx
right hand										
2836656	**ABC1000R**	-7	3,96	4,57	4,16	2,41	25,40	CD..120605	**CC09**	T6
2836651	**ABC1250R**	-7	3,96	4,57	4,16	2,41	31,75	CD..120605	**CC09**	T6
2836645	**ABC1500R**	-7	3,96	4,57	4,16	2,41	38,10	CD..120605	**CC09**	T6
2836667	**ABC500R**	-7	3,96	4,57	4,16	2,41	12,70	CD..120605	**CC09**	T6
2836660	**ABC750R**	-7	3,96	4,57	4,16	2,41	19,05	CD..120605	**CC09**	T6

WIDIA

A/B Series Boring Bar Identification System



ABD125375R

ABD	125	375	R	
Insert Style	Minimum Bore *shown as "D min"*	Bore Depth, Groove Width, Flat on Thread *shown as "L4, W"*	Hand of Tool	Tip Style *(optional)*

Insert Style

A Series = Through Coolant

- **ABC** = Indexable Boring
- **ABD** = Boring
- **AGD** = Grooving
- **APD** = Profiling
- **ATD** = Threading

B Series = Without Coolant

- **BB** = Boring
- **BP** = Profiling

Minimum Bore

A Series

- **06** = 1,58mm
- **09** = 2,39mm
- **125** = 3,18mm
- **156** = 3,96mm

(AGD style only)

- **095** = 2,79mm
- **125** = 3,56mm
- **156** = 4,45mm

(ATD style only)

- **095** = 2,79mm
- **125** = 3,56mm
- **156** = 4,45mm

B Series

- **187** = 4,75mm
- **250** = 6,35mm
- **312** = 7,93mm

Bore Depth, Groove Width, Flat on Thread

Bore Depth

- **187** = 4,75mm
- **281** = 7,14mm
- **312** = 7,93mm
- **375** = 9,53mm
- **500** = 12,70mm
- **600** = 15,24mm
- **625** = 15,88mm
- **750** = 19,05mm
- **825** = 20,96mm
- **875** = 22,23mm
- **1000** = 25,40mm
- **1250** = 31,75mm
- **1500** = 38,10mm
- **1750** = 44,45mm
- **2125** = 53,98mm

A Series

Groove Width
(AGD style only)

- **03** = 0,76mm
- **04** = 1,02mm
- **05** = 1,27mm

Thread
(ATD style only)

- **F2** = 0,05mm

Flat on thread

Hand of Tool

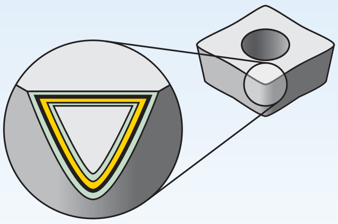
R =
Right hand

L =
Left hand

Tip Style

Symbol
M

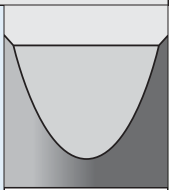
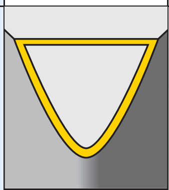
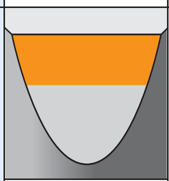
Usage
Mini tip



Coatings provide high-speed capability and are engineered for finishing to light roughing.

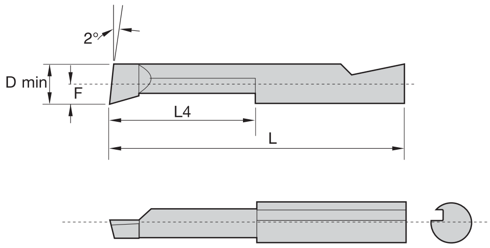
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
CM1	 HW-S25	Uncoated carbide. A very tough, ultra-fine grain unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates. Use when C2, C3, or C25 fail due to chipping or breaking.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
CG5	 HC-S25	A PVD-TiN-coated grade. Straight 9.5% Co substrate. Submicron grain. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
CBN6	 BN-H25	PcBN tip brazed onto a carbide insert. Recommended for machining hardened steel (45–65 HRC). Use on bearing steel, hot and cold work tool steels, high-speed steels, die steels, case-hardened steels, carburised and nitrided irons, and some hard coatings. Can be run both dry and wet.										
			H			■	■	■	■			

Material Group		Cutting Speed — vc m/min								
		CG5			CM1			CBN6		
		min	Start	max	min	Start	max	min	Start	max
P	ap [mm]	0,025	-	0,200	0,025	-	0,203	–	–	–
	f [mm/rev]	0,013	-	0,178	0,013	-	0,178	–	–	–
	0/1	95	**120**	145	55	**70**	85	–	–	–
	2	65	**80**	90	40	**45**	55	–	–	–
	3	65	**80**	90	40	**45**	55	–	–	–
	4	50	**60**	75	30	**35**	45	–	–	–
	5	65	**80**	95	40	**45**	55	–	–	–
	6	45	**55**	65	25	**30**	40	–	–	–
M	ap [mm]	0,025	-	0,200	0,025	-	0,200	–	–	–
	f [mm/rev]	0,013	-	0,178	0,013	-	0,178	–	–	–
	1	75	**95**	110	55	**70**	85	–	–	–
	2	70	**85**	100	50	**65**	75	–	–	–
	3	55	**65**	80	40	**50**	55	–	–	–
K	ap [mm]	0,001	-	0,010	0,001	-	0,010	–	–	–
	f [mm/rev]	0,0005	-	0,007	0,0005	-	0,007	–	–	–
	1	65	**80**	95	50	**60**	75	–	–	–
	2	80	**95**	115	60	**75**	90	–	–	–
	3	55	**70**	85	45	**55**	65	–	–	–
N	ap [mm]	0,025	–	0,640	0,025	–	0,640	–	–	–
	f [mm/rev]	0,013	–	0,178	0,013	–	0,178	–	–	–
	1	405	**505**	605	405	**505**	605	–	–	–
	2	300	**370**	445	300	**370**	445	–	–	–
	3	75	**95**	110	70	**90**	105	–	–	–
	4	140	**175**	210	105	**125**	155	–	–	–
	5	100	**125**	150	80	**100**	120	–	–	–
	6	100	**125**	150	80	**100**	120	–	–	–
	7	240	**300**	360	240	**300**	360	–	–	–
S	ap [mm]	0,025	-	0,200	0,025	-	0,200	–	–	–
	f [mm/rev]	0,013	-	0,178	0,013	-	0,178	–	–	–
	1	30	**35**	40	55	**70**	85	–	–	–
	2	20	**30**	35	45	**55**	65	–	–	–
	3	35	**40**	50	30	**35**	45	–	–	–
	4	–	–	–	–	–	–	–	–	–
H	ap [mm]	–	–	–	–	–	–	0,025	-	0,200
	f [mm/rev]	–	–	–	–	–	–	0,0005	-	0,004
	1	–	–	–	–	–	–	110	**140**	165
	2	–	–	–	–	–	–	105	**130**	155
	3	–	–	–	–	–	–	100	**125**	150
	4	–	–	–	–	–	–	100	**125**	150

NOTE: Speed and feed rates and depth of cut may vary depending on materials and machining conditions including, but not limited to, tool overhang, tool size, and finished surface requirements.

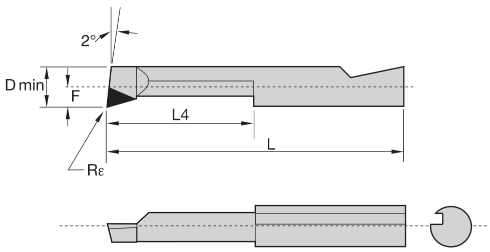


● first choice
○ alternate choice

		CG5	CM1	CBN6
P		●	○	
M		●	○	
K		○	●	
N		○	●	
S		●	○	
H				●

ABD

ISO catalogue number	D min	L4	L	F	CG5	CM1	CBN6
right hand							
ABD06187R	1,58	5,41	21,92	0,66	2836639	2836632	-
ABD06312R	1,58	7,93	24,44	0,66	2836627	2836621	-
ABD09281R	2,39	7,14	23,65	1,04	2836614	2836608	-
ABD09500R	2,39	12,70	29,21	1,04	2836604	2836599	-
ABD125375R	3,18	9,53	26,04	1,45	2836593	2836588	-
ABD125625R	3,18	15,88	32,39	1,45	2836582	2836579	-
ABD156500R	3,96	12,70	29,21	1,85	2836573	-	-
ABD156875R	3,96	22,23	38,74	1,85	2836561	-	-



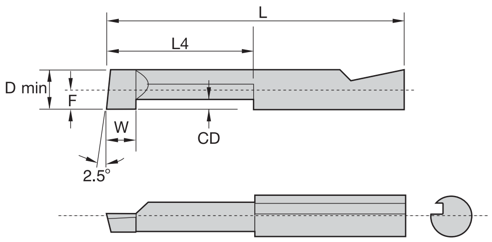
ABD-M

ISO catalogue number	D min	L4	L	F	Rε	CG5	CM1	CBN6
right hand								
ABD156875RM	3,96	22,23	38,74	1W,85	0,18	-	-	2836679

Tools for Small Hole Boring

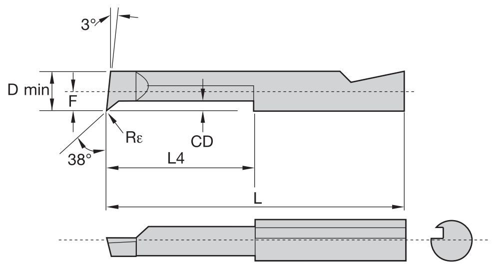
		CG5	CM1	CBN6
P		●	○	
M		●	○	
K		○	●	
N		○	●	
S		●	○	
H				●

● first choice
○ alternate choice



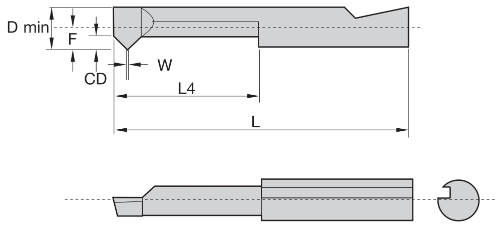
AGD

ISO catalogue number	D min	L4	L	F	CD	W	CG5	CM1	CBN6
right hand									
AGD09503	2,79	7,93	24,44	1,17	0,76	0,76	2836550	2836545	–
AGD12504	3,56	9,53	26,04	1,55	0,89	1,02	2836537	–	–
AGD15605	4,45	12,70	29,21	1,93	1,27	1,27	2836524	–	–



APD

ISO catalogue number	D min	L4	L	F	CD	Rε	CG5	CM1	CBN6
right hand									
APD06187R	1,58	4,75	21,26	0,66	0,43	0,18	2836511	–	–
APD09281R	2,39	7,14	23,65	1,07	0,71	0,18	–	2836495	–
APD125375R	3,18	9,53	26,04	1,45	1,02	0,18	2836489	–	–
APD156500R	3,96	12,70	29,21	1,85	1,27	0,18	–	2836473	–



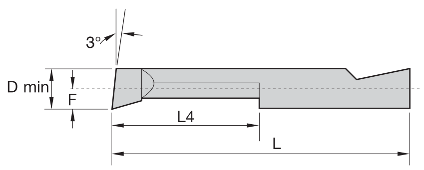
● first choice
○ alternate choice

	CG5	CM1	CBN6
P	●	○	
M	●	○	
K	○	●	
N	○	●	
S	●	○	
H			●

Tools for Small Hole Boring

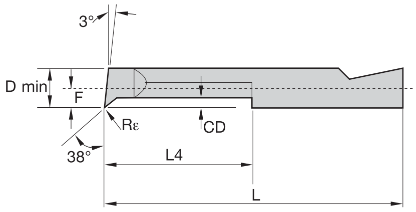
ATD

ISO catalogue number	D min	L4	L	F	CD	W	TP min	TP max	TPI min	TPI max	CG5	CM1	CBN6
right hand													
ATD12560F2	3,56	9,53	26,04	1,55	0,69	0,05	1,06	0,53	24	48	-	2836450	-
ATD15660F2	4,45	12,70	29,21	1,93	0,81	0,05	1,27	0,53	20	48	2836443	2836436	-



BB

ISO catalogue number	D min	L4	L	F	CG5	CM1	CBN6
right hand							
BB187750R	4,75	19,05	45,72	2,24	2832769	-	-
BB1871250R	4,75	31,75	58,42	2,24	2832758	-	-
BB2501000R	6,35	25,40	52,07	3,05	2832747	2832742	-
BB3121250R	7,93	53,98	80,65	3,84	2832724	2832719	-



● first choice
○ alternate choice

		CG5	CM1	CBN6
P		●	○	
M		●	○	
K		○	●	
N		○	●	
S		●	○	●
H				

BP

ISO catalogue number	D min	L4	L	F	CD	Rε	CG5	CM1	CBN6
right hand									
BP187600R	4,75	15,24	41,91	2,24	1,58	0,18	2832702	–	–
BP250825R	6,35	20,96	47,63	3,05	1,98	0,18	2832689	–	–

Insert Screws

order number	ISO catalogue number	Torx/hex	internal thread
2840098	MSM46	2 mm	M4X0.7
2840186	AS832/AS-8-32	5/64	#8-32
2892513	BS832	5/64	–
2820981	LTM16	T5	M2X0.4
2832647	CC11	T6	#1-72
2832635	CT11	T6	#1-72
2830477	FC11	T7	–
2828337	GT21	T7	#2-56
2825941	QTM20	T7	M2.5X0.45
2825948	QTM26	T7	M2.5X0.45
2826005	QC15	T8	#3-48
2826038	QC21	T9	#4-40
2823227	SC30	T10	#4-40
2823203	STM31	T15	M3.5 X 0.6
2832641	CT15	T16	#1-72

Wrenches

order number	ISO catalogue number	Torx/hex
2840094	MKEY	2.0 mm
2840174	AKEY	5/64
2828318	GTKEY	T5
2832628	CKEY	T6
2830492	FKEY	T7
2825973	Q8KEY	T8
2825982	QKEY	T9
2823182	SKEY	T10

Drive Bits

order number	ISO catalogue number	Torx/hex
2840089	MBIT	2 mm
2832661	CBIT	T6
2830497	FBIT	T7
2825963	QTBIT	T7
2825964	Q8BIT	T8
2826045	QBIT	T9
2823236	SBIT	T10
2823196	STBIT	T15

Wedges

order number	ISO catalogue number
2840192	AW250/AW-250
2836024	BW312

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High-Precision Products for I.D. Applications

Easy access, quick-change toolholders and inserts perform multiple I.D. applications for maximum productivity with one toolholder.

The unique cutting tip of the Quadralock™ I.D. Quick-Change Tooling System can be locked in four different positions, enabling operation in both Swiss-style and conventional machines. Four quick, easy setup steps and guaranteed insert repeatability within ±0,013mm ensures superior performance.

Quadralock

Quadralock Ultra-Precision Tooling

Features

- Fixed-limit stop for precise and repeatable cutting edge positioning.
- Tight insert seat pocket ensures secure hold.
- V-slots and limit-stop bolts for increased indexability.

Benefits

- Internal coolant supply directly lubricates cutting edge.
- Ability to rotate tool at 90° increments.
- For all boring, grooving, profiling, and threading applications.

Boring

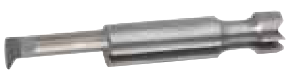
Bore holes as small as 0,25mm.

Grooving

Groove in a 2,79mm diameter hole.

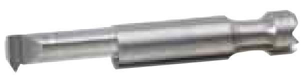
Profiling

Profile in diameters as small as 1,57mm.

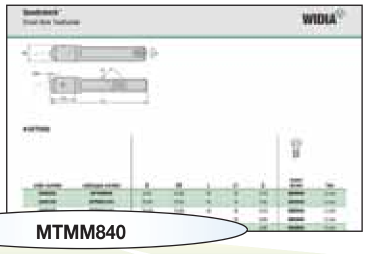


Threading

Thread down to a No. 5; 2,54mm.



Quadralock Boring Bar Identification System



MTMM840

MTM	M	8	40
Quadralock Boring System	Type	Shank Diameter *shown as "D"*	Length *shown as "L"*

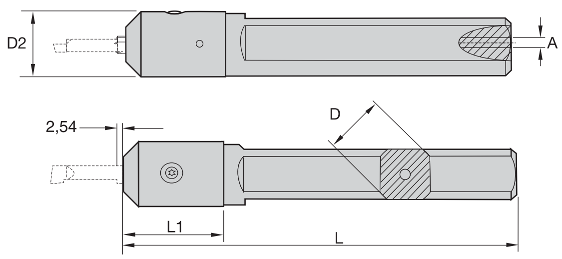
M = Metric

Metric (Shank Diameter)

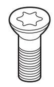
8	=	8,00mm
10	=	10,00mm
12	=	12,00mm
16	=	16,00mm
22	=	22,00mm

Metric (Length)

40	=	38,10mm
100	=	101,60mm
127	=	127,00mm



MTMM



order number	catalogue number	D	D2	L	L1	A	insert screw	hex
3896202	MTMM840	8,00	12,95	38	19	3,18	MSM46	2 mm
3896198	MTMM1040	10,00	12,95	38	19	3,00	MSM46	2 mm
3896200	MTMM1240	12,00	12,95	38	19	3,18	MSM46	2 mm
3896199	MTMM12100	12,00	12,95	102	19	3,00	MSM46	2 mm
3896201	MTMM22127	22,00	12,95	127	19	3,00	MSM46	2 mm

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Customer Application Support (CAS)

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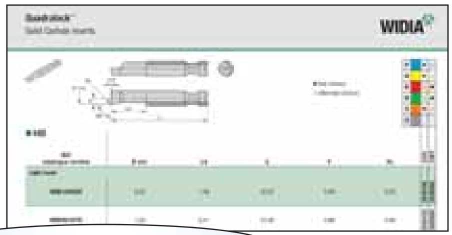
Quadralock Boring Bar Insert Identification System

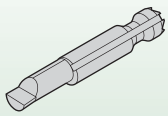


MB125625R

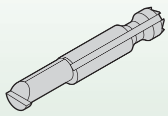
MB

Insert Style

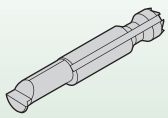
MB = Boring



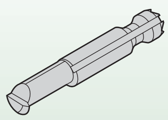
MG = Grooving



MP = Profiling



MT = Threading



125

Minimum Bore
shown as "D min"

Metric

010	=	0,25mm
030	=	0,76mm
062	=	1,58mm
094	=	2,39mm
125	=	3,18mm
156	=	3,96mm

(for MG and MT style only)

095	=	2,79mm
125	=	3,56mm
156	=	4,45mm

625

Bore Depth, Groove Width,
Flat on Thread
shown as "L4, W"

Metric
Bore Depth

062	=	1,58mm
187	=	4,75mm
281	=	7,14mm
312	=	7,93mm
375	=	9,53mm
500	=	12,70mm
625	=	15,88mm
875	=	22,23mm

Groove Width
(for MG style only)

030	=	0,76mm
040	=	1,02mm
050	=	1,27mm

Thread
(for MT style only)

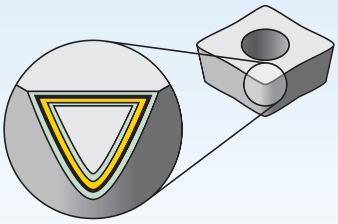
60F2 = 0,05mm
Flat on 60° thread

R

Hand
of Tool

R =
Right hand

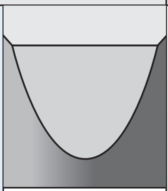
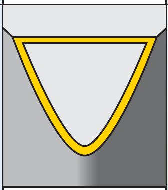
L =
Left hand



Coatings provide high-speed capability and are engineered for finishing to light roughing.

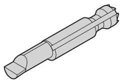
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

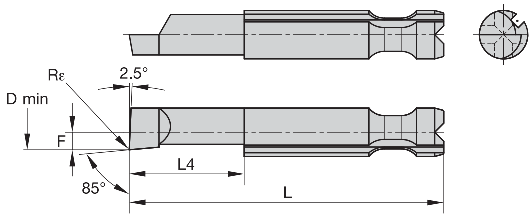
wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
CM1	 HW-S25	Uncoated carbide. A very tough, ultra-fine grain unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates. Use when C2, C3, or C25 fail due to chipping or breaking.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
CG5	 HC-S25	A PVD-TiN-coated grade. Straight 9.5% Co substrate. Submicron grain. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			

Material Group		Cutting Speed — vc m/min					
		CG5			CM1		
		min	Start	max	min	Start	max
P	ap [mm]	.001	-	.008	.001	-	.008
	f [mm/rev]	.0005	-	.007	.0005	-	.007
	0/1	105	**130**	155	65	**80**	100
	2	70	**90**	105	45	**55**	65
	3	70	**90**	105	45	**55**	65
	4	55	**70**	85	40	**45**	55
	5	70	**90**	105	45	**55**	70
	6	50	**60**	70	35	**40**	45
M	ap [mm]	.001	-	.008	.001	-	.008
	f [mm/rev]	.0005	-	.007	.0005	-	.007
	1	75	**95**	110	55	**70**	85
	2	70	**85**	100	50	**65**	75
	3	55	**65**	80	40	**50**	55
K	ap [mm]	.001	-	.010	.001	-	.010
	f [mm/rev]	.0005	-	.007	.0005	-	.007
	1	65	**80**	95	50	**60**	75
	2	80	**95**	115	60	**75**	90
	3	55	**70**	85	45	**55**	65
N	ap [mm]	.001	–	.025	.001	–	.025
	f [mm/rev]	.0005	–	.007	.0005	–	.007
	1	405	**505**	605	405	**505**	605
	2	300	**370**	445	300	**370**	445
	3	75	**95**	110	70	**90**	105
	4	140	**175**	210	105	**125**	155
	5	100	**125**	150	80	**100**	120
	6	100	**125**	150	80	**100**	120
	7	240	**300**	360	240	**300**	360
S	ap [mm]	.001	-	.008	.001	-	.008
	f [mm/rev]	.001	-	.007	.001	-	.007
	1	30	**35**	40	55	**70**	85
	2	20	**30**	35	45	**55**	65
	3	35	**40**	50	30	**35**	45
	4	–	–	–	–	–	–
H	ap [mm]	–	–	–	–	–	–
	f [mm/rev]	–	–	–	–	–	–
	1	–	–	–	–	–	–
	2	–	–	–	–	–	–
	3	–	–	–	–	–	–
	4	–	–	–	–	–	–

NOTE: Speed and feed rates and depth of cut may vary depending on materials and machining conditions including, but not limited to, tool overhang, tool size, and finished surface requirements.





● first choice
○ alternate choice

		CG5	CM1
P		●	○
M		●	○
K		○	●
N		○	●
S		●	○
H			

MB

ISO catalogue number	D min	L4	L	F	Rε	CG5	CM1
right hand							
MB010062R	0,25	1,58	20,57	0,09	0,03	2836098	2836085
MB062187R	1,58	5,41	21,92	0,66	0,05	2836423	3885985
MB062312R	1,58	7,93	24,44	0,66	0,05	2836418	2836263
MB094281R	2,39	7,14	23,65	1,04	0,05	-	3857732
MB094500R	2,39	12,70	29,21	1,04	0,05	2836405	2836251
MB125625R	3,18	15,88	32,39	1,45	0,10	-	2836240
MB156500R	3,96	12,70	29,21	1,85	0,10	2836388	3885997
MB156875R	3,96	22,23	38,74	1,85	0,10	-	2836229

(continued)

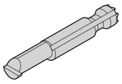
(MB — continued)

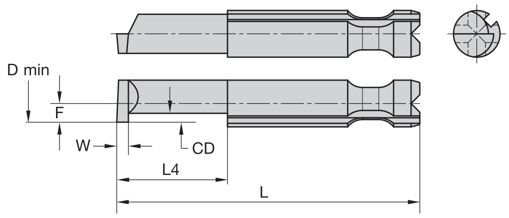
P	●	○
M	●	○
K	○	●
N	○	●
S	●	○
H		

● first choice
○ alternate choice

ISO catalogue number	D min	L4	L	F	Rε	CG5	CM1
MB010062L	0,25	1,58	20,57	0,09	0,03	3885960	3885959
MB030187L	0,76	4,75	21,26	0,34	0,03	3885961	3885962
MB062187L	1,58	5,41	21,92	0,66	0,05	3885983	3885984
MB062312L	1,58	7,93	24,44	0,66	0,05	3885986	3885987
MB094281L	2,39	7,14	23,65	1,04	0,05	-	3885989
MB094500L	2,39	12,70	29,21	1,04	0,05	3885990	3885991
MB125375L	3,18	9,53	26,04	1,45	0,10	3885992	3885993
MB125625L	3,18	15,88	32,39	1,45	0,10	3885994	3885995
MB156500L	3,96	12,70	29,21	1,85	0,10	3027643	3885996
MB156875L	3,96	22,23	38,74	1,85	0,10	3885998	3885999

NOTE: Actual bore depth for MB062187R and MB062187L equals 5,41mm.
ANSI Catalogue Number MB062187R and ANSI Catalogue Number MB062187L have an actual bore depth of .213".



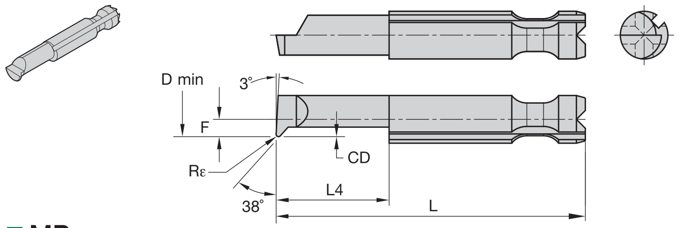


● first choice
○ alternate choice

		CG5	CM1
P		●	○
M		●	○
K		○	●
N		○	●
S		●	○
H			

MG

ISO catalogue number	D min	L4	L	F	CD	W	CG5	CM1
right hand								
MG095030R	2,79	7,93	24,44	1,17	0,76	0,76	–	2836223
MG125040R	3,56	9,53	26,04	1,55	0,89	1,02	3897442	–
MG156050R	4,45	12,70	29,21	1,93	1,27	1,27	–	2836210
left hand								
MG095030L	2,79	7,93	24,44	1,17	0,76	0,76	3886000	3886001
MG125040L	3,56	9,53	26,04	1,55	0,89	1,02	3886002	3886003
MG156050L	4,45	12,70	29,21	1,93	1,27	1,27	3897483	3897484

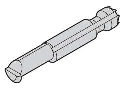


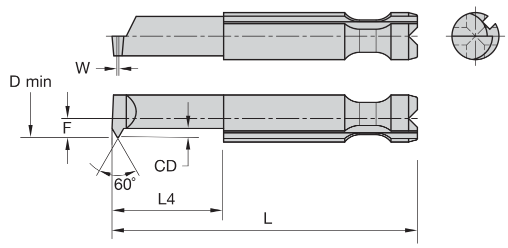
	CG5	CM1
P	●	○
M	●	○
K	○	●
N	○	●
S	●	○
H		

● first choice
○ alternate choice

MP

ISO catalogue number	D min	L4	L	F	CD	Rε	CG5	CM1
right hand								
MP062187R	1,58	4,75	21,26	0,66	0,43	0,10	2836357	-
MP094281R	2,39	7,14	23,65	1,07	0,71	0,10	2836351	3897488
MP125375R	3,18	9,53	26,04	1,45	1,02	0,20	2836345	2836190
MP156500R	3,96	12,70	29,21	1,85	1,27	0,20	2836339	2836184
left hand								
MP062187L	1,58	4,75	21,26	0,66	0,43	0,10	-	3897486
MP094281L	2,39	7,14	23,65	1,07	0,71	0,10	3644074	3897487
MP125375L	3,18	9,53	26,04	1,45	1,02	0,20	-	3897490
MP156500L	3,96	12,70	29,21	1,85	1,27	0,20	3897491	3897492





● first choice
○ alternate choice

		CG5	CM1
P		●	○
M		●	○
K		○	●
N		○	●
S		●	○
H			

■ MT

ISO catalogue number	D min	L4	L	F	CD	W	CG5	CM1
right hand								
MT09560F2R	2,79	7,93	24,44	1,17	0,56	0,05	-	2836180
MT12560F2R	3,56	9,53	26,04	1,55	0,69	0,05	2836328	3897497
MT15660F2R	4,45	12,70	29,21	1,93	0,81	0,05	-	2836168
left hand								
MT09560F2L	2,79	7,93	24,44	1,17	0,56	0,05	3897493	3897494
MT12560F2L	3,56	9,53	26,04	1,55	0,69	0,05	3897496	3897495
MT15660F2L	4,45	12,70	29,21	1,93	0,81	0,05	3897498	3897499

Insert Screws

order number	ISO catalogue number	Torx/hex	internal thread
2840098	MSM46	2 mm	M4X0.7
2840186	AS832/AS-8-32	5/64	#8-32
2892513	BS832	5/64	–
2820981	LTM16	T5	M2X0.4
2832647	CC11	T6	#1-72
2832635	CT11	T6	#1-72
2830477	FC11	T7	–
2828337	GT21	T7	#2-56
2825941	QTM20	T7	M2.5X0.45
2825948	QTM26	T7	M2.5X0.45
2826005	QC15	T8	#3-48
2826038	QC21	T9	#4-40
2823227	SC30	T10	#4-40
2823203	STM31	T15	M3.5 X 0.6
2832641	CT15	T16	#1-72

Wrenches

order number	ISO catalogue number	Torx/hex
2840094	MKEY	2.0 mm
2840174	AKEY	5/64
2828318	GTKEY	T5
2832628	CKEY	T6
2830492	FKEY	T7
2825973	Q8KEY	T8
2825982	QKEY	T9
2823182	SKEY	T10

Drive Bits

order number	ISO catalogue number	Torx/hex
2840089	MBIT	2 mm
2832661	CBIT	T6
2830497	FBIT	T7
2825963	QTBIT	T7
2825964	Q8BIT	T8
2826045	QBIT	T9
2823236	SBIT	T10
2823196	STBIT	T15

Wedges

order number	ISO catalogue number
2840192	AW250/AW-250
2836024	BW312

WMT™ System

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

The WMT platform is the economical and reliable option for all your grooving, cut-off, turning, and profiling applications. Trust the WMT system to ensure precise insert positioning and provide only the most accurate machining with exceptionally fast cycle times and superior performance.

Versatile and Well-Constructed

- Specifically designed to increase speeds and feeds.
- Excellent geometry for even your most demanding deep grooving applications.
- The WMT system enables heavy stock removal in turning applications.
- Ensures finer surface finishes and a long, reliable tool life.

WMT Toolholders

- Outstanding system rigidity and clamping capabilities.
- Guarantees fast cycle times and limited turret indexes.
- Precise insert positioning for accurate machining.
- Double-V shape means operator-friendly insert indexing and optimum insert positioning.
- Choice of integral or modular holders.

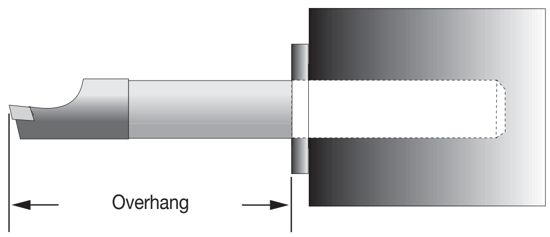
To learn more, contact your local Authorised Distributor or visit **widia.com**.

WIDIA™

Setup Recommendations for Bar Overhang

WIDIA-CIRCLE™ cutting tools are the finest quality boring, grooving, profiling, and threading tools available. For more than 50 years, WIDIA-CIRCLE has been the industry leader in solving small-diameter hole machining problems in major manufacturing plants worldwide.

A common problem associated with any cutting tool is extending the tool beyond its support point. This condition of excessive overhang can cause chatter, poor finishes, or inadequate tool life.



We recommend a 4:1 ratio (4 times bar diameter) overhang when using steel shank bars and up to a 10:1 (10 times bar diameter) overhang when using carbide shank bars. The overhang ratios are affected by many factors:

- Type(s) of material(s) being machined.
- Depth of cut(s).
- Feed rate(s).

Recommended conditions may still be unsatisfactory because of chatter. Chatter can be induced by non-rigid setups or harmonics from the machine or machining conditions. In many cases, changing the RPM of the machine can reduce chatter.

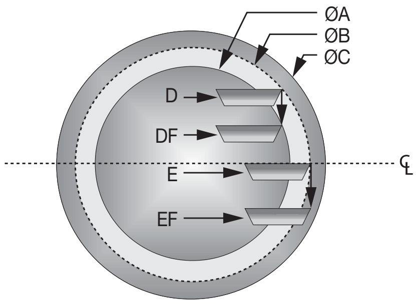
shank diameter (mm)	steel shank ratio 4:1 (mm)	carbide shank ratio 10:1 (mm)
4,00mm	16,00mm	40,00mm
5,00mm	20,00mm	50,00mm
6,00mm	24,00mm	60,00mm
8,00mm	32,00mm	80,00mm
10,00mm	40,00mm	100,00mm
12,00mm	48,00mm	120,00mm
16,00mm	64,00mm	160,00mm
20,00mm	80,00mm	200,00mm
25,00mm	100,00mm	250,00mm
32,00mm	128,00mm	320,00mm

Setup Information and Recommendations

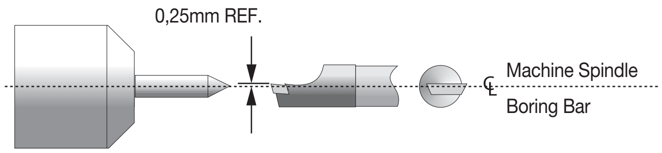
Tool “D” (above centreline)
Set ØB is deflected to position “DF,” relieving the load by deflecting to a smaller bore, ØA. Tool “D” cannot “dig in” because the cut (load) becomes lighter as it deflects.

Tool “E” (on centreline or below)
Set ØB “digs in” and is deflected toward position “EF” and bore ØC. The larger the load, the larger the deflection.

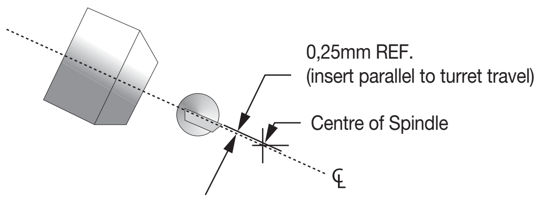
Tip of the Insert
This enables the end user to hold closer tolerances, produce a better finish, and avoid chatter.



Built-in geometries of WIDIA-CIRCLE™ precision boring bars are based on the concept that the boring bar shank will always be positioned on the machine spindle centreline. The cutting point will be slightly high (against direction of rotation) except when facing centreline or cutting on outside diameters.



Slant Bed Machines

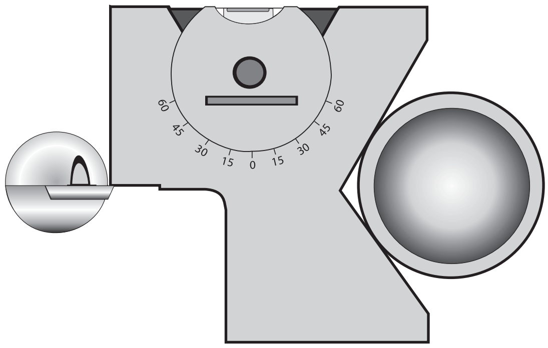


Use WIDIA-CIRCLE precision setup level or:

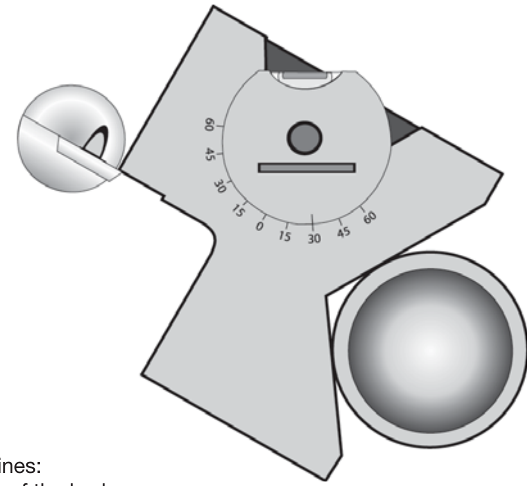
1. Use centre height gage and position insert as shown in illustration.
2. If centre point is unavailable, mark the centre of the bar stock with a centring punch or square. Position the insert as shown in illustration.
3. Lay a straight edge on the insert to help position the insert parallel to the travel or centreline.

NOTE: In some cases, to help reduce chatter or taper, the insert may need to be rotated less than 0,25mm but more than 0,05mm above centre.

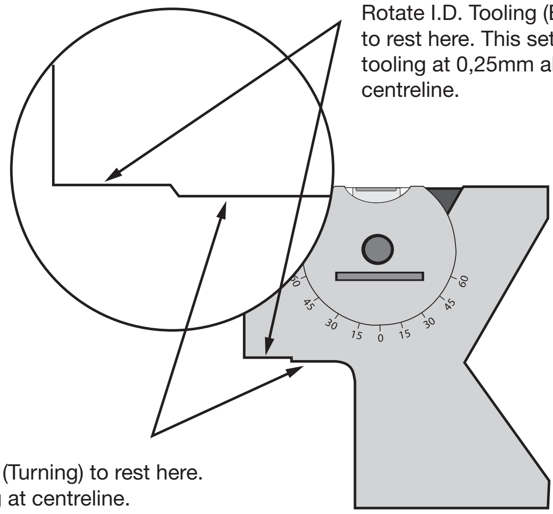
Uni-Level Precision Setup Level



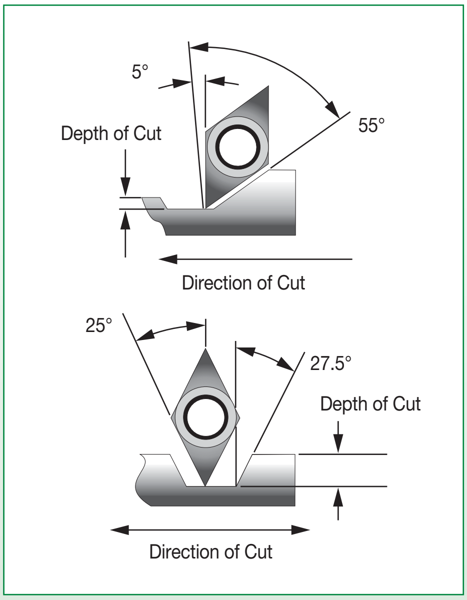
For most machines:
Set the dial to the 0° mark.



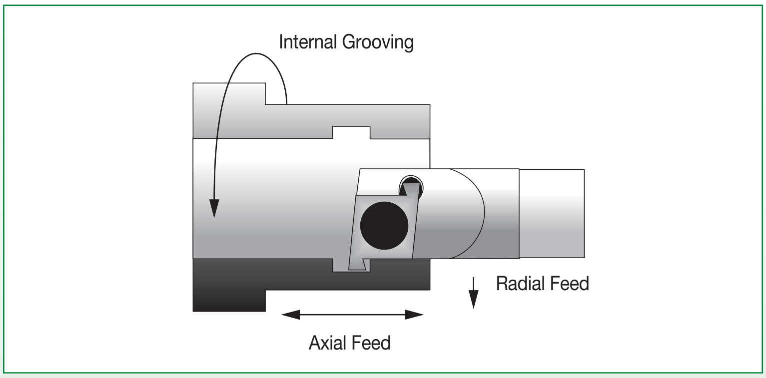
For slant bed-type machines:
Set the dial to the degree of the bed.



Setup Information and Recommendations for Boring and Profiling



Setup Information and Recommendations for Grooving

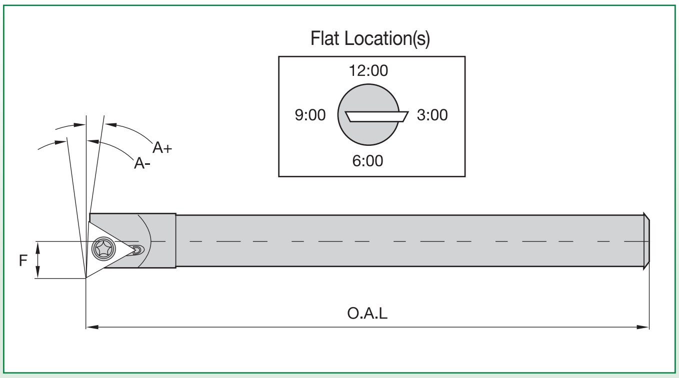


CDG Indexable-Type Grooving Inserts

safe overhang conditions:	steel ratio 4:1 (mm)	carbide ratio 10:1 (mm)
surface footage(s):	see pages D40–D41	
radial feeds:	C-Series = 0,008–0,025mm Q-Series = 0,008–0,051mm	
axial feeds:	C-Series = 0,013–0,051mm Q-Series = 0,013–0,127mm	

For more than 50 years, WIDIA-CIRCLE™ has offered the most reliable, highest-quality small hole boring bars available.

Although our extensive product line covers most machining applications, we understand that a custom solution tool may be required.



Straight Shank-Type Boring Bars

Steel or Carbide

Date ______

Customer-Specified Dimensions

______	=	**O.A.L. (Overall Length)**	From 3x bar diameter to catalogue length.
______	=	**"F" Dimension**	0,254mm from basic dimension shown in catalogue triangle insert bars only.
______	=	**"A" Dimension**	+10° to -10° triangle insert bars only.
______	=	**Flat Location(s)**	1 Flat — no charge (see illustration above).

Special Instructions
(please make any necessary notes or sketches in the box at right)

Closest Catalogue Standard

Customer

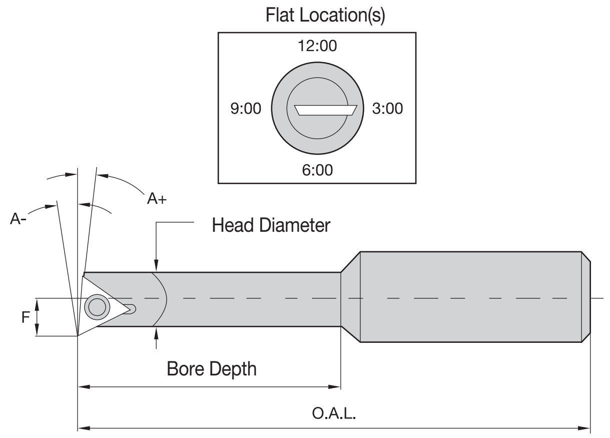
Distributor

Shipping Requirements

❒ Ground ❒ Next Day Air ❒ 2nd Day Air ❒ 3rd Day Air

Attention Distributors: Use this worksheet to collect information for your customer.

Use this worksheet to modify any of our existing products to meet your own specifications. If your special requirements do not fit any of these categories, contact us directly.



Step-Down Shank-Type Boring Bars

Steel or Carbide

Date

Customer-Specified Dimensions

=	**Bore Depth**	19,05mm to 6x diameter steel; 19,05mm to 10x diameter carbide.
=	**O.A.L. (Overall Length)**	Steel; smaller than O.A.L. listed in catalogue carbide, bore depth, and standard sleeve length.
=	**"F" Dimension**	0,254mm from basic dimension shown in catalogue triangle insert bars only.
=	**"A" Dimension**	+10° to -10° triangle insert bars only.
=	**Flat Location(s)**	1 Flat — no charge (see illustration above).

Special Instructions
(please make any necessary notes or sketches in the box at right)

Closest Catalogue Standard

Customer

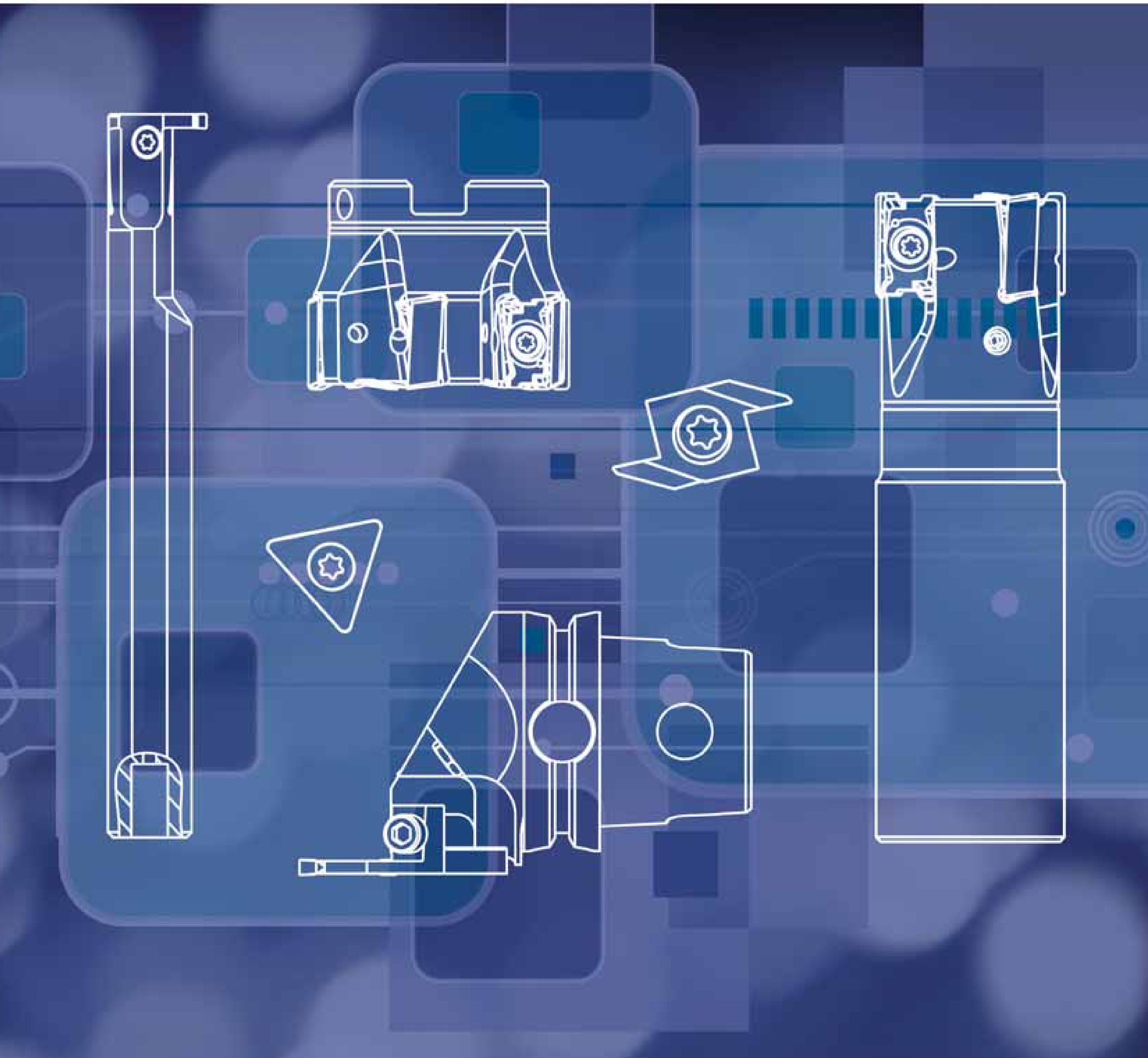
Distributor

Shipping Requirements

❒ Ground ❒ Next Day Air ❒ 2nd Day Air ❒ 3rd Day Air

Attention Distributors: Use this worksheet to collect information for your customer.

WIDIA™



01

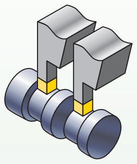
THE DIGITAL SOURCE FOR DELIVERING
SMART MACHINING SOLUTIONS

widia.com/novo

NOVO™

Turning • Grooving and Cut-Off

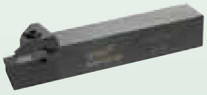
Grooving



WMT™

- Insert cutting widths: 2–8mm.
- O.D. cutting depths: 16,5–25,4mm.
- I.D. boring bar minimum bore diameter: 57,15mm.
- Screw-clamping integral shank/cartridge toolholders available.
- Geometry for deep grooving.

Pages: E4–E39



TopGroove™

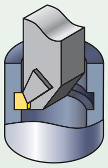
- Insert cutting widths: 0,5–6,35mm.
- Insert cutting depths: 0,64–12,7mm.
- I.D. boring bar minimum bore diameter: 11,2mm.
- Integral shank toolholders available.

Pages: E40–E91

ProGroove™

- Insert cutting depths: 10–40mm.
- Inserts enable precision sintered execution, good tolerances, and repeatability.
- Screw-clamping integral shank toolholders available.
- Grooving and O.D. turning.

Pages: E92–E104

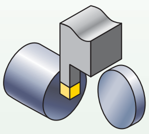


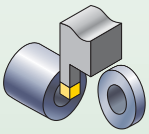
LG

- Insert cutting widths: 8–16mm.
- O.D. cutting depths: 20–32mm.
- Wedge-clamping integral shank tooling available.

Pages: E105–E107

Cut-Off

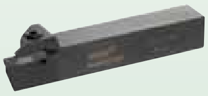




WMT

- Cut-off widths: 1,5–4mm.
- Maximum cutting depth: 22,2mm.
- Screw-clamping integral shank/cartridge toolholders available.
- Economical double-sided inserts for rigidity and dimensional accuracy.
- Right-/left-hand styles: 5˚ and 12˚ lead angles.

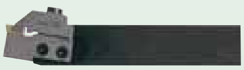
Pages: E4–E39



Separator™

- Cut-off widths: 2–4mm.
- Positive mechanical, self-clamping blades.
- Right-/left-hand style toolholders available.
- Single-edge inserts for maximum depth capacity.

Pages: E108–E133

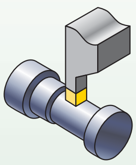


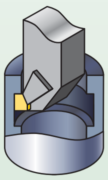
ProGroove

- Cut-off widths: 2–8mm.
- Single-edge inserts for maximum depth capacity.
- Right-/left-hand styles with 6˚ lead angles.
- Self-clamping blades/screw-clamping integral shank toolholders available.

Pages: E92–E104

Plunge and Turn



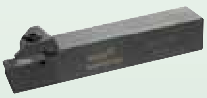


WMT

Heavy Stock Removal in Turning Applications

- Double-sided inserts, cutting widths: 2–8mm.
- O.D. cutting depths: 16,5–25,4mm.
- I.D. boring bar minimum bore diameter: 57,15mm.
- Screw-clamping integral shank/cartridge toolholders available.

Pages: E4–E39



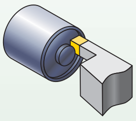
ProGroove

For Light-Cutting Inserts

- Cutting widths: 2–8mm.
- O.D. cutting depths: 10–40mm.
- Single-edge inserts for maximum depth capacity.
- Screw-clamping integral shank toolholders available.

Pages: E92–E104

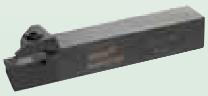
Face Grooving



WMT™

- Cutting widths: 3–6,35mm.
- Cutting depths: 13–25,4mm.
- Minimum face groove diameter: 38–205mm.

Pages:
E4–E39

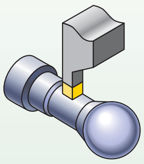


TopGroove™

- NF/NFD face groove insert range: 24–57mm.
- Cutting width range for standard inserts: 0,8–9,5mm.
- Cutting depth range for standard inserts: 1,27–12,70mm.
- Cutting width range for NF/NFD face grooving inserts: 2–6,35mm.
- Standard insert minimum face groove diameter range: 54–330mm.
- Cutting depth range for NF/NFD face grooving inserts: 1,52–12,70mm.
- Cutting depth range for NF: 1,52–3,81mm.
- Cutting depth range for NFD: 6,35–12,7mm.

Pages:
E40–E91

Profiling

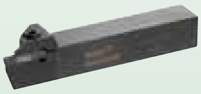


WMT

For Heavy Stock Removal

- Full-radius insert cutting widths: 3–8mm.
- O.D. cutting depths: 16,5–25,4mm.
- Screw-clamping integral shank/cartridge toolholders available.

Pages:
E4–E39



TopGroove

Moderate/Heavy Stock Removal at Shallow Profile Depths

- Full-radius insert cutting widths: 1,57–6,35mm.
- Insert cutting depths: 2,39–6,35mm.
- Integral shank toolholders and ERICKSON™ heads available.

Pages:
E40–E91

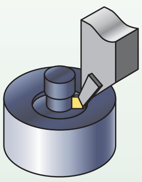
ProGroove™

For Light Cutting

- Full-radius insert cutting widths: 3–6mm.
- O.D. cutting depths: 10–32mm.
- Screw-clamping integral shank/cartridge toolholders available.

Pages:
E92–E104

Undercutting



TopGroove

- Undercutting insert widths: 2,4–4mm.
- Economical double-ended inserts.

Pages:
E40–E91

WMT™ System •

One Platform for Grooving, Face Grooving, Cut-Off, and Profiling

WMT

The WMT platform is the economical and reliable option for all your grooving, cut-off, turning, and profiling applications. Trust the WMT system to ensure precise insert positioning and provide only the most accurate machining with exceptionally fast cycle times and superior performance.

Versatile and Well-Constructed

- Specifically designed to increase speeds and feeds.
- Excellent geometry for even your most demanding deep grooving applications.
- The WMT system enables heavy stock removal in turning applications.
- Ensures finer surface finishes and a long, reliable tool life.

WMT™ Toolholders

- Outstanding system rigidity and clamping capabilities.
- Guarantees fast cycle times and limited turret indexes.
- Precise insert positioning for accurate machining.
- Double-V shape means operator-friendly insert indexing and optimum insert positioning.
- Choice of integral or modular holders.

The Most Advanced Turning Solutions in the Industry

For unsurpassed quality, value, and performance, look no further than the WIDIA™ comprehensive line of specially engineered and dependable grooving and cut-off solutions. All the tools you need from the reliable name you can trust!

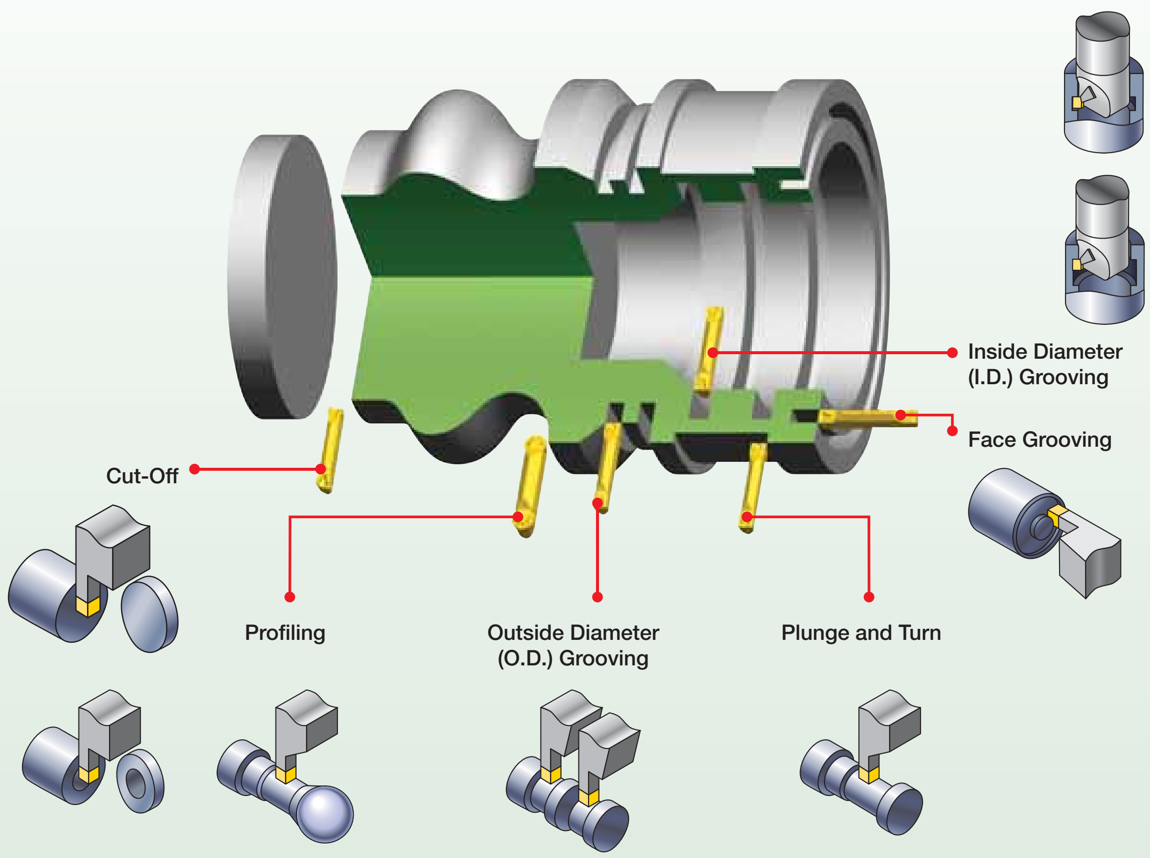
The WMT system, with its extra-long clamping area and precise insert positioning, ensures exceptionally fast and accurate machining, all-in-one tool, for your most demanding grooving, cut-off, turning, and profiling applications.

It is perfect for all general-purpose operations, including both shallow and deep grooving.

Utilise this handy, easy-to-use guide to identify and select the appropriate grooving and cut-off tools for your specific needs.

1 Choose the application to be performed:

Groove depth, width, and profile.



2 Identify the material to be machined:

Each tool has a material grid marked with a letter indicating the materials that can be machined.

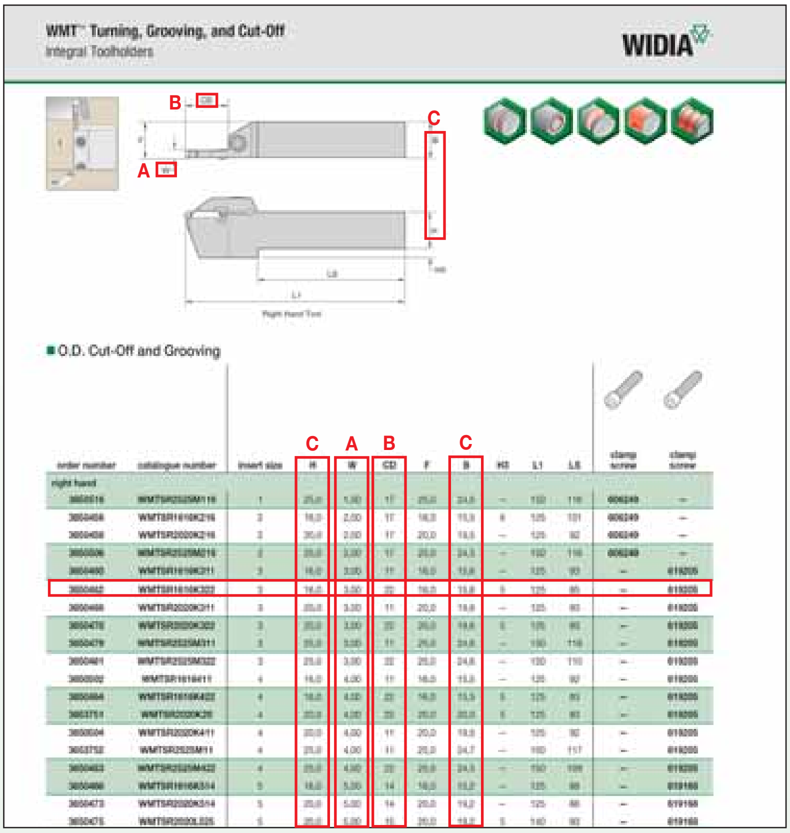
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

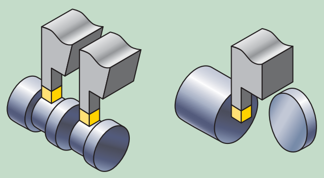
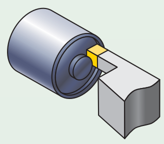
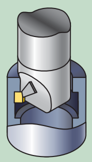
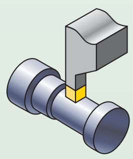
3 Select your toolholder based on the application:

A Choose the appropriate width "W" required for the application.

B Choose the shortest cutting depth "CD" dimension for increased tool rigidity.

C Select the largest toolholder shank "H" and "B" dimensions for maximum rigidity.

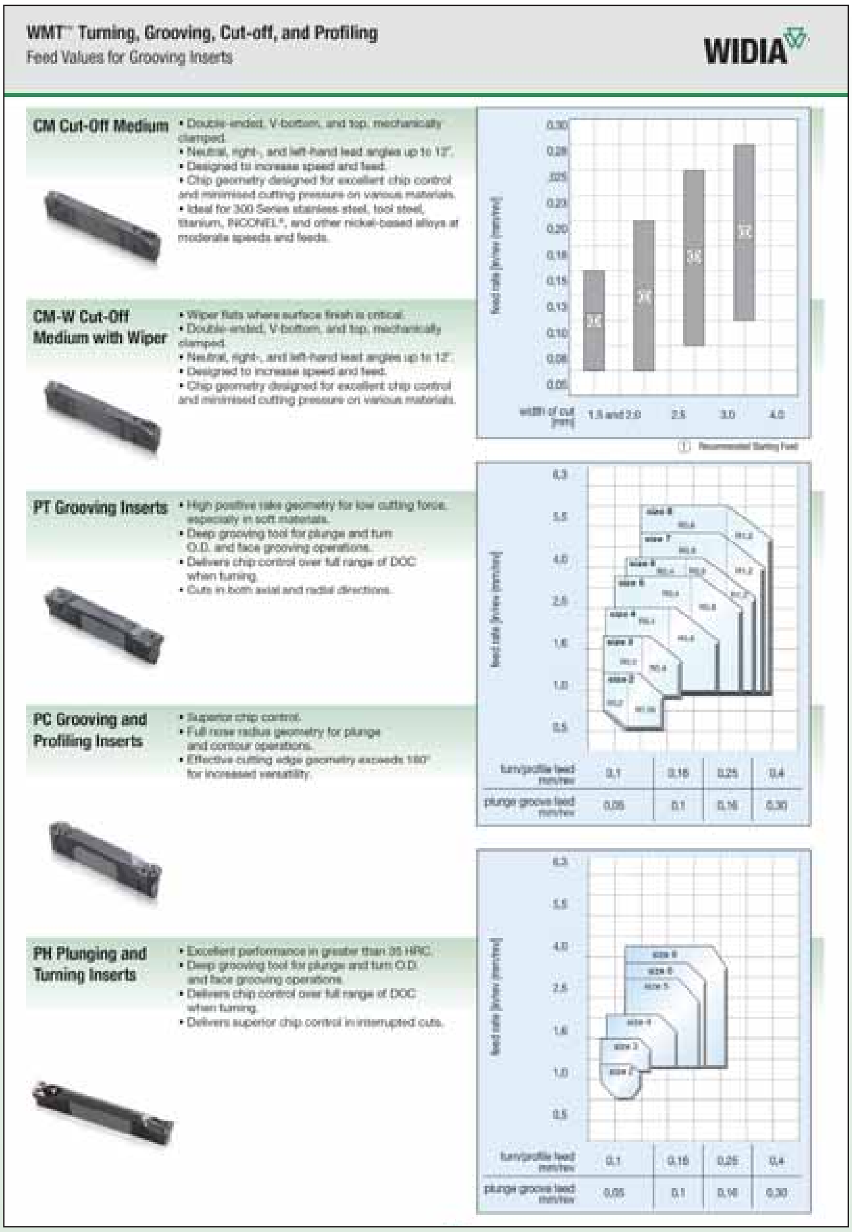


	application	conventional toolholders	modular blades
	O.D. Grooving and Cut-Off	pages E30–E32	page E38
	Face Grooving	pages E33–E34	page E39
	I.D. Grooving	page E35	–
	Plunge and Turn	pages E30–E32	page E38

4 Select chipbreaker style for the application:

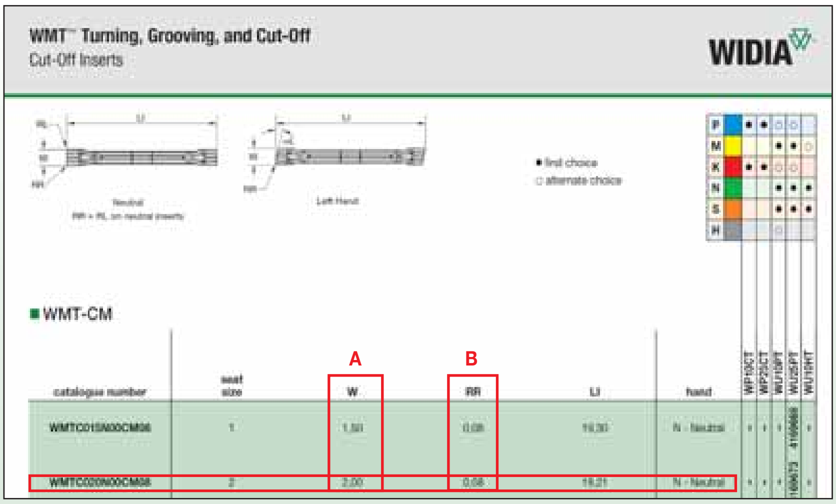
CM	Cut-Off Medium
CM-W	Cut-Off Medium with Wiper
PT	Groove, Plunge, and Turn
PC	Plunge and Contour
PH	Groove, Plunge, and Turn

NOTE: Chart shows recommended starting feed rates.

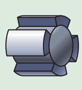
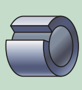
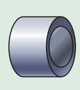
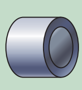


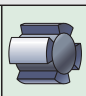
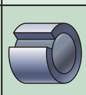
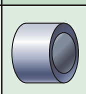
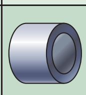
A Choose the appropriate insert width “W” for your specific application.

B Select the required corner radius value “RR”.



5 Select grade:

Grooving cutting condition		Recommended Grades: steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
heavily interrupted cut		WU25PT	WU25PT	WU25PT	WU25PT	WU25PT	–
lightly interrupted cut		WP25CT/ WU25PT	WU25PT	WP25CT/ WU25PT	WU25PT	WU25PT	–
varying depth of cut, casting, or forging skin		WU10PT	WU10PT	WP10CT/ WU10PT	WU10PT	WU10HT/ WU10PT	WU10PT
smooth cut, pre-turned surface		WP10CT/ WU10PT	WU10PT	WP10CT/ WU10PT	WU10PT	WU10HT/ WU10PT	WU10PT

Cut-Off cutting condition		Recommended Grades: steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
heavily interrupted cut		WU25PT	WU25PT	WU25PT	WU25PT	WU25PT	–
lightly interrupted cut		WU25PT	WU25PT	WU25PT	WU25PT	WU25PT	–
varying depth of cut, casting, or forging skin		WU25PT	WU25PT	WU25PT	WU25PT	WU25PT	WU25PT
smooth cut, pre-turned surface		WU25PT	WU25PT	WU25PT	WU25PT	WU25PT	WU25PT

NOTE: See page E11 for Grades and Grade Descriptions.

6 Determine cutting data:

A Based on material group and grade, identify starting speed (vc).

B First choice starting speed is in **bold**.

NOTE: See page E13 for cutting data.

WIDIA

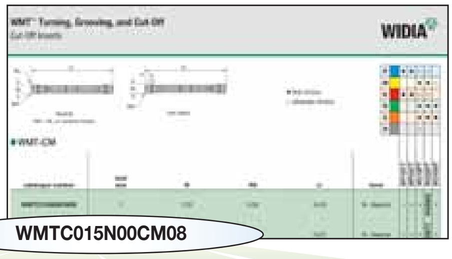
WMT™ Turning, Grooving, and Cut-Off
Recommended Cutting Speeds • Metric

Cutting Speed — vc m/min

Material Group		WU10HT min	WU10HT Start	WU10HT max	WU10PT min	WU10PT Start	WU10PT max	WU25PT min	WU25PT Start	WU25PT max	WP10CT min	WP10CT Start	WP10CT max	WP25CT min	WP25CT Start	WP25CT max
P	0/1	100	**100**	110	190	**200**	210	170	**175**	180	210	**225**	240	170	**175**	180
	2	95	**95**	105	180	**185**	190	150	**160**	170	210	**220**	230	185	**195**	205
	3	95	**95**	105	180	**185**	190	150	**160**	170	210	**220**	230	185	**195**	205
	4	70	**70**	75	165	**170**	175	135	**145**	155	140	**145**	155	125	**125**	135
	5	85	**90**	95	170	**175**	180	140	**150**	160	180	**190**	195	155	**165**	170
	6	50	**50**	50	140	**150**	160	120	**125**	130	70	**75**	80	70	**75**	80
M	1	70	**75**	80	120	**125**	130	120	**125**	130	–	–	–	–	–	–
	2	50	**50**	50	100	**100**	110	70	**75**	80	–	–	–	–	–	–
	3	50	**50**	50	95	**100**	105	85	**90**	95	–	–	–	–	–	–
K	1	85	**90**	95	190	**200**	210	155	**165**	170	215	**225**	235	180	**190**	195
	2	75	**75**	80	185	**190**	200	155	**165**	175	205	**215**	225	175	**185**	195
	3	70	**75**	80	170	**175**	180	140	**150**	160	210	**225**	240	190	**200**	210
N	1	70	**75**	80	140	**150**	160	110	**120**	130	–	–	–	–	–	–
	2	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	3	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	4	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	5	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	6	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	7	70	**75**	80	140	**150**	120	110	**120**	105	–	–	–	–	–	–
S	1	20	**25**	30	70	**75**	80	60	**65**	65	–	–	–	–	–	–
	2	20	**25**	30	65	**65**	70	50	**50**	60	–	–	–	–	–	–
	3	50	**50**	50	100	**100**	110	70	**75**	80	–	–	–	–	–	–
	4	–	–	–	70	**75**	80	50	**50**	50	–	–	–	–	–	–
H	1	–	–	–	15	**30**	60	15	**30**	60	–	–	–	–	–	–

WMT Identification System

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



WMTC015N00CM08

Cut-Off

WMT	C	015	N	00	CM	08
Tooling System	Cut-Off	W in mm* 10	Hand of Insert	Main Cutting Edge Lead Angle	Chipbreaker Geometry **CM** = Cut-Off Medium **CM-W** = Cut-Off Medium with Wiper	Corner Radius in mm* 10

WMTS205M2U02PT

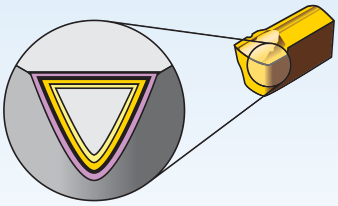
Groove, Plunge, Turn, and Contour Inserts

WMT	S	205	M	2	U	02	PT
Tooling System	Square	mm* 10 inch* 1000	Unit of Measurement for Width **M** = mm **I** = inch	Seat Size	Insert Tolerance	Corner Radius in mm* 10	Chipbreaker Geometry **PT** = Groove, Plunge, and Turn **PH** = Groove, Plunge, and Turn **PC** = Plunge and Contour

P = Precision ground grooving width tolerance: ± .001" (0,025mm)

U = Utility moulded grooving width tolerance:

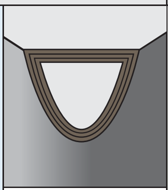
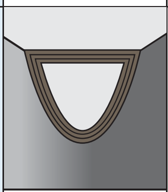
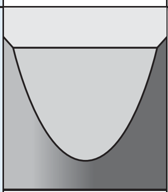
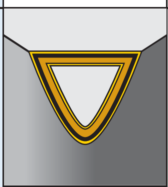
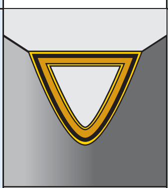
3,05–4,05:	+ .006" / -0	(+0,15mm) / -0
5,05–10,05:	+ .010" / -0	(+0,25mm) / -0



Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟵⟶ toughness

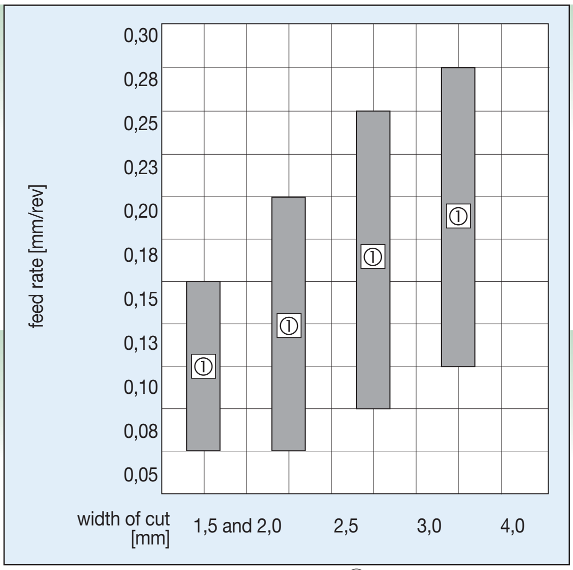
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WU10PT	 HC-P15	An advanced PVD-TiAlN coating over a very deformation-resistant unalloyed carbide substrate. The WU10PT™ grade's new and improved coating enables speeds to be increased by 50–100%. The WU10PT grade is ideal for finishing to general machining of most workpiece materials at higher speeds. Excellent for machining most steels, stainless steels, cast irons, non-ferrous materials, and super alloys under stable conditions. It also performs well machining hardened and short chipping materials.	P			■	■	■				
			M			■	■	■				
			K			■	■	■				
			N			■	■	■				
			S			■	■	■				
			H			■						
WU25PT	 HC-P30	An advanced PVD-TiAlN-coated grade with a tough, ultra-fine-grain, unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Speeds may vary from low to medium and will handle interruptions and high feed rates.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
			H			■	■					
WU10HT	 HW-K15	A hard, low binder content, unalloyed WC/Co fine-grained uncoated grade. Exceptional edge wear resistance combined with very high strength for machining titanium, cast irons, austenitic stainless steels, non-ferrous metals, non-metals, and most high-temperature alloys. Superior thermal deformation and depth of cut notch resistance. The grain structure is well controlled for minimal pits and flaws, which contributes to long, reliable service.										
			M		■	■	■					
			K	■	■	■	■					
			N		■	■	■					
			S		■	■	■					
WP10CT	 HC-P10	A specially engineered, proprietary, cobalt-enriched carbide grade with thick K-MTCVD-TiCN coating layer, an Al_2O_3 layer of controlled grain size, and outer layers of TiCN and TiN for maximum wear resistance. An excellent finishing to medium machining grade for a variety of workpiece materials including most steels, ferritic and martensitic stainless steels, and cast irons. The specially engineered cobalt-enriched substrate offers a balanced combination of deformation resistance and edge toughness, while the thick coating layers offer outstanding abrasion resistance and crater wear resistance for high-speed machining. The smooth coating provides good resistance to edge build-up and microchipping and produces excellent surface finishes.	P		■	■	■					
			K			■	■					
WP25CT	 HC-P25	A tough cobalt-enriched carbide grade with a newly designed multilayer K-MTCVD TiCN-Al_2O_3-TiCNTiN coating with superior interlayer adhesion. This is the industry's best general-purpose turning grade for most steels and ferritic and martensitic stainless steels. The substrate design, with cobalt-enrichment, ensures adequate deformation resistance along with excellent bulk toughness and insert edge strength. The coating layers offer good wear resistance over a wide range of machining conditions. The smoothness of the coating leads to reduced frictional heat, minimises microchipping, and improves workpiece surface finishes.	P				■	■	■			
			K					■	■	■		

CM Cut-Off Medium

- Double-ended, V-bottom, and top, mechanically clamped.
- Neutral, right-, and left-hand lead angles up to 12°.
- Designed to increase speed and feed.
- Chip geometry designed for excellent chip control and minimised cutting pressure on various materials.

CM-W Cut-Off Medium with Wiper

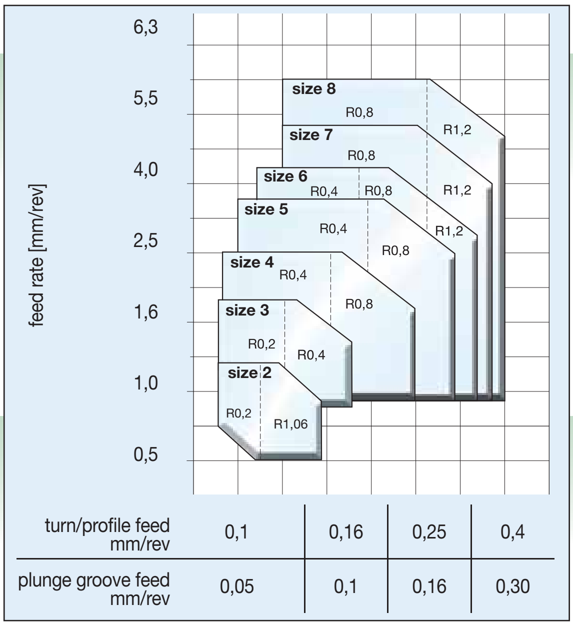
- Wiper flats where surface finish is critical.
- Double-ended, V-bottom, and top, mechanically clamped.
- Neutral, right-, and left-hand lead angles up to 12°.
- Designed to increase speed and feed.
- Chip geometry designed for excellent chip control and minimised cutting pressure on various materials.
- Ideal for 300 Series stainless steel, tool steel, titanium, INCONEL®, and other nickel-based alloys at moderate speeds and feeds.



① Recommended Starting Feed

PT Plunge, Groove, and Turn Inserts

- High positive rake geometry for low cutting force, especially in soft materials.
- Deep grooving tool for plunge and turn O.D. and face grooving operations.
- Delivers chip control over full range of DOC when turning.
- Cuts in both axial and radial directions.

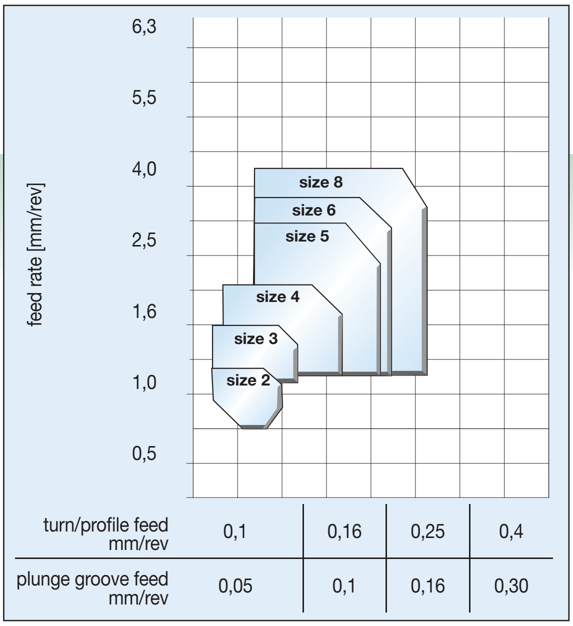


PC Grooving and Profiling Inserts

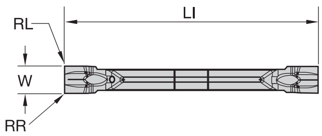
- Superior chip control.
- Full nose radius geometry for plunge and contour operations.
- Effective cutting edge geometry exceeds 180° for increased versatility.

PH Plunge, Groove, and Turn Inserts

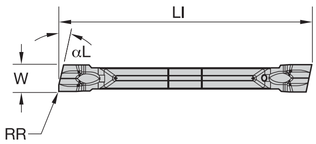
- Excellent performance in greater than 35 HRC.
- Deep grooving tool for plunge and turn O.D. and face grooving operations.
- Delivers chip control over full range of DOC when turning.
- Delivers superior chip control in interrupted cuts.



Material Group		WU10HT			WU10PT			WU25PT			WP10CT			WP25CT		
		Cutting Speed — vc m/min														
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	0/1	100	**100**	110	190	**200**	210	170	**175**	180	210	**225**	240	170	**175**	180
	2	95	**95**	105	180	**185**	190	150	**160**	170	210	**220**	230	185	**195**	205
	3	95	**95**	105	180	**185**	190	150	**160**	170	210	**220**	230	185	**195**	205
	4	70	**70**	75	165	**170**	175	135	**145**	155	140	**145**	155	125	**125**	135
	5	85	**90**	95	170	**175**	180	140	**150**	160	180	**190**	195	155	**165**	170
	6	50	**50**	50	140	**150**	160	120	**125**	130	70	**75**	80	70	**75**	80
M	1	70	**75**	80	120	**125**	130	120	**125**	130	–	–	–	–	–	–
	2	50	**50**	50	100	**100**	110	70	**75**	80	–	–	–	–	–	–
	3	50	**50**	50	95	**100**	105	85	**90**	95	–	–	–	–	–	–
K	1	85	**90**	95	190	**200**	210	155	**165**	170	215	**225**	235	180	**190**	195
	2	75	**75**	80	185	**190**	200	155	**165**	175	205	**215**	225	175	**185**	195
	3	70	**75**	80	170	**175**	180	140	**150**	160	210	**225**	240	190	**200**	210
N	1	70	**75**	80	140	**150**	160	110	**120**	130	–	–	–	–	–	–
	2	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	3	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	4	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	5	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	6	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	7	70	**75**	80	140	**150**	120	110	**120**	105	–	–	–	–	–	–
S	1	20	**25**	30	70	**75**	80	60	**65**	65	–	–	–	–	–	–
	2	20	**25**	30	65	**65**	70	50	**50**	50	–	–	–	–	–	–
	3	50	**50**	50	100	**100**	110	70	**75**	80	–	–	–	–	–	–
	4	-	–	–	70	**75**	80	50	**50**	50	–	–	–	–	–	–
H	1	–	–	–	15	**30**	60	15	**30**	60	–	–	–	–	–	–
	2	–	–	–	15	**30**	60	15	**30**	60	–	–	–	–	–	–
	3	–	–	–	15	**30**	60	15	**30**	60	–	–	–	–	–	–
	4	–	–	–	15	**30**	60	15	**30**	60	–	–	–	–	–	–



Neutral
RR = RL on neutral inserts



Left Hand

● first choice
○ alternate choice

	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P	●	●	○	○	
M			●	●	○
K	●	●	○	○	
N			●	●	●
S			●	●	●
H			○		

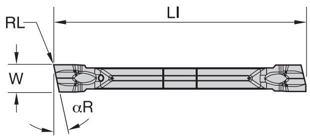
WMT-CM

catalogue number	seat size	W	RR	LI	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC015N00CM08	1	1,50	0,08	19,30	N - Neutral	–	–	–	4169668	–
WMTC020N00CM08	2	2,00	0,08	19,21	N - Neutral	–	–	–	4169673	–
WMTC094N00CM13	2B	2,39	0,13	22,32	N - Neutral	–	–	–	4169576	–
WMTC030N00CM17	3	3,00	0,17	25,40	N - Neutral	–	–	–	4169682	–
WMTC125N00CM17	3	3,17	0,17	25,41	N - Neutral	–	–	–	4169582	–
WMTC040N00CM17	4	4,00	0,17	25,40	N - Neutral	–	–	–	4169692	–

catalogue number	seat size	W	RR	LI	αL	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC015L05CM08	1	1,50	0,08	19,31	5	L - Left	–	–	–	4169671	–
WMTC020L05CM08	2	1,99	0,08	19,21	5	L - Left	–	–	–	4169677	–
WMTC020L12CM08	2	2,00	0,08	19,25	12	L - Left	–	–	–	4169680	–
WMTC030L12CM17	3	3,00	0,17	25,40	12	L - Left	–	–	–	4169690	–
WMTC030L05CM17	3	3,00	0,17	25,40	5	L - Left	–	–	–	4169686	–
WMTC040L12CM17	4	4,00	0,17	25,40	12	L - Left	–	–	–	4169697	–
WMTC040L05CM17	4	4,00	0,17	25,40	5	L - Left	–	–	–	4169695	–

(continued)

(WMT-CM — continued)

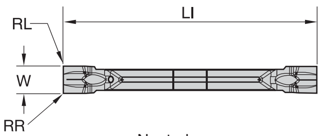


Right Hand

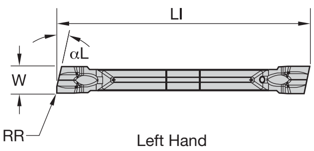
● first choice
○ alternate choice

	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P	●	●	○	○	
M			●	●	○
K	●	●	○	○	
N			●	●	●
S			●	●	●
H			○		

catalogue number	seat size	W	RL	LI	αR	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC015R12CM08	1	1,50	0,08	19,28	12	R - Right	ı	ı	ı	4169672	ı
WMTC015R05CM08	1	1,50	0,08	19,31	5	R - Right	ı	ı	ı	4169670	ı
WMTC020R05CM08	2	2,00	0,08	19,26	5	R - Right	ı	ı	ı	4169675	ı
WMTC020R12CM08	2	2,00	0,08	19,26	12	R - Right	ı	ı	ı	4169678	ı
WMTC094R12CM13	2B	2,39	0,13	22,28	12	R - Right	ı	ı	ı	4169580	ı
WMTC094R05CM13	2B	2,39	0,13	22,32	5	R - Right	ı	ı	ı	4169578	ı
WMTC030R05CM17	3	3,00	0,17	25,40	5	R - Right	ı	ı	ı	4169684	ı
WMTC030R12CM17	3	3,00	0,17	25,40	12	R - Right	ı	ı	ı	4169688	ı
WMTC125R05CM17	3	3,17	0,17	25,40	5	R - Right	ı	ı	ı	4169664	ı
WMTC125R12CM17	3	3,18	0,17	25,40	12	R - Right	ı	ı	ı	4169666	ı
WMTC040R12CM17	4	4,00	0,17	25,40	12	R - Right	ı	ı	ı	4169696	ı
WMTC040R05CM17	4	4,00	0,17	25,40	5	R - Right	ı	ı	ı	4169694	ı



Neutral
RR = RL on neutral inserts



Left Hand

● first choice
○ alternate choice

	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P	●	●	○	○	
M			●	●	○
K	●	●	○	○	
N			●	●	●
S			●	●	●
H			○		

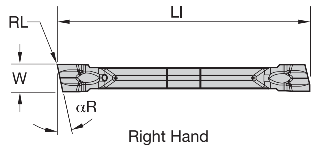
WMT-CM-W

catalogue number	seat size	W	RR	LI	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC015N00CMW08	1	1,50	0,08	19,30	N - Neutral	-	-	-	4169669	-
WMTC020N00CMW08	2	2,00	0,08	19,21	N - Neutral	-	-	-	4169674	-
WMTC094N00CMW13	2B	2,39	0,13	22,32	N - Neutral	-	-	-	4169577	-
WMTC030N00CMW17	3	3,00	0,17	25,40	N - Neutral	-	-	-	4169683	-
WMTC125N00CMW17	3	3,18	0,17	25,41	N - Neutral	-	-	-	4169663	-
WMTC040N00CMW17	4	4,00	0,17	25,40	N - Neutral	-	-	-	4169693	-

catalogue number	seat size	W	RR	LI	αL	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC020L12CMW08	2	2,00	0,08	19,27	12	L - Left	-	-	-	4169681	-
WMTC030L12CMW17	3	3,00	0,17	25,40	12	L - Left	-	-	-	4169691	-
WMTC030L05CMW17	3	3,00	0,17	25,40	5	L - Left	-	-	-	4169687	-

(continued)

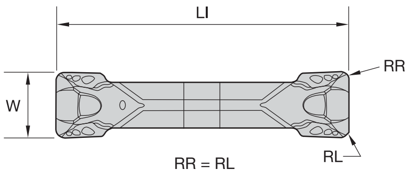
(WMT-CM-W — continued)



● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

catalogue number	seat size	W	RL	LI	αR	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC020R05CMW08	2	2,00	0,08	19,20	5	R - Right	–	–	–	4169676	–
WMTC020R12CMW08	2	2,00	0,08	19,27	12	R - Right	–	–	–	4169679	–
WMTC094R12CMW13	2B	2,39	0,13	22,29	12	R - Right	–	–	–	4169581	–
WMTC094R05CMW13	2B	2,39	0,13	22,32	5	R - Right	–	–	–	4169579	–
WMTC030R05CMW17	3	3,00	0,17	25,40	5	R - Right	–	–	–	4169685	–
WMTC030R12CMW17	3	3,00	0,17	25,40	12	R - Right	–	–	–	4169689	–
WMTC125R05CMW17	3	3,17	0,17	25,41	5	R - Right	–	–	–	4169665	–
WMTC125R12CMW17	3	3,17	0,17	25,41	12	R - Right	–	–	–	4169667	–

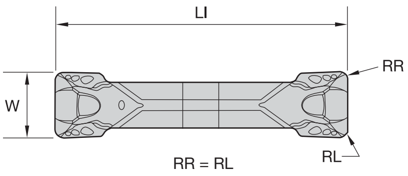


● first choice
○ alternate choice

	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P	●	●	○	○	
M			●	●	○
K	●	●	○	○	
N			●	●	●
S			●	●	●
H			○		

WMT-U-PT • Moulded

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS205M2U02PT	2	2,05	0,15	19,23	4169554	4169555	4116131	4116132	-
WMTS305M3U03PT	3	3,05	0,31	25,81	4169556	4169557	4113568	4113569	-
WMTS305M3U06PT	3	3,05	0,61	25,78	4169558	4169559	4113570	4113571	-
WMTS405M4U03PT	4	4,05	0,31	25,53	4169560	4169561	4113577	4113578	-
WMTS405M4U06PT	4	4,05	0,61	25,53	4169562	4169563	4113579	4113580	-
WMTS505M5U03PT	5	5,05	0,30	28,76	4169564	4169565	4116148	4116149	-
WMTS505M5U06PT	5	5,05	0,61	28,76	4169566	4169567	4116150	4116151	-
WMTS605M6U03PT	6	6,05	0,30	28,76	4169568	4169569	4117253	4117254	-
WMTS605M6U06PT	6	6,05	0,59	28,76	4169570	4169571	4117255	4117256	-
WMTS805M8U06PT	8	8,05	0,61	28,70	4169572	4169573	4117261	4117262	-
WMTS805M8U15PT	8	8,05	1,50	28,71	4169574	4169575	4117263	4117264	-



● first choice
○ alternate choice

	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P	●	●	○	○	
M			●	●	○
K	●	●	○	○	
N			●	●	●
S			●	●	●
H			○		

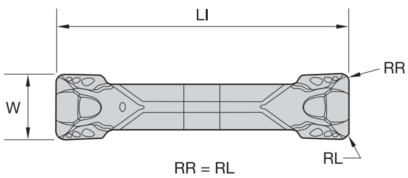
WMT-P-PT • Precision

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS200M2P02PT	2	2,00	0,15	19,10	–	–	4116129	4116130	–
WMTS094I2BP02PT	2B	2,38	0,15	22,15	–	–	4118451	4118452	–
WMTS094I2BP04PT	2B	2,38	0,38	22,14	–	–	4118583	4118584	–
WMTS300M3P03PH	3	3,00	0,30	25,65	–	–	5346412	5346413	5346414
WMTS300M3P03PT	3	3,00	0,31	25,65	–	–	4113563	4113564	4113566
WMTS300M3P06PH	3	3,00	0,60	25,65	–	–	5346415	5346416	5346417
WMTS300M3P06PT	3	3,00	0,61	25,65	–	–	4113565	4113567	–
WMTS125I3P03PT	3	3,17	0,23	25,40	–	–	4118585	4118586	–
WMTS125I3P08PT	3	3,17	0,76	25,40	–	–	4118587	4118588	–
WMTS125I3P03PH	3	3,18	0,25	25,40	–	–	5345914	5291300	–
WMTS125I3P08PH	3	3,18	0,75	25,40	–	–	5345915	5331093	–
WMTS156I4P03PH	4	3,95	0,30	25,40	–	–	5345916	5345917	–
WMTS156I4P08PH	4	3,96	0,75	25,40	–	–	5345918	5345919	–
WMTS400M4P03PH	4	4,00	0,30	25,40	–	–	5346418	5346419	5346420
WMTS400M4P03PT	4	4,00	0,31	25,40	–	–	4113572	4113574	4113573
WMTS400M4P06PH	4	4,00	0,60	25,40	–	–	5346421	5346422	5346423

(continued)

Grooving and Cut-Off

(WMT-P-PT • Precision — continued)



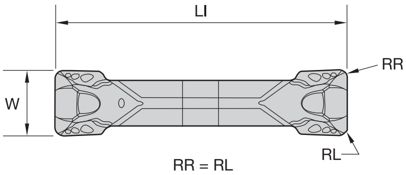
● first choice
○ alternate choice

	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P	●	●	○	○	
M			●	●	○
K	●	●	○	○	
N			●	●	●
S			●	●	●
H			○		

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS400M4P06PT	4	4,00	0,60	25,40	-	-	4113575	4113576	-
WMTS188I5P03PT	5	4,76	0,26	28,63	-	-	4118589	4118590	-
WMTS188I5P03PH	5	4,77	0,25	28,63	-	-	5345980	5331095	-
WMTS188I5P08PH	5	4,77	0,75	28,63	-	-	5345981	5331097	-
WMTS188I5P08PT	5	4,77	0,76	28,63	-	-	4118591	4118592	-
WMTS500M5P03PH	5	5,00	0,30	28,63	-	-	5346424	5346425	5346426
WMTS500M5P03PT	5	5,00	0,30	28,63	-	-	4116143	4116144	4116145
WMTS500M5P06PH	5	5,00	0,60	28,63	-	-	5346427	5346428	5346429
WMTS500M5P06PT	5	5,00	0,61	28,63	-	-	4116146	4116147	-
WMTS600M6P03PH	6	6,00	0,30	28,63	-	-	5346430	5346431	-
WMTS600M6P03PT	6	6,00	0,30	28,63	-	-	4117239	4117240	-
WMTS600M6P06PT	6	6,00	0,58	28,63	-	-	4117241	4117242	-
WMTS600M6P06PH	6	6,00	0,60	28,63	-	-	5346432	5346433	-
WMTS250I6P08PH	6	6,32	0,75	28,63	-	-	5345984	5327621	-

(continued)

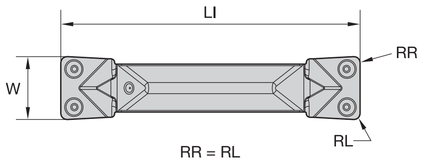
(WMT-P-PT • Precision — continued)



● first choice
○ alternate choice

	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P	●	●	○	○	
M			●	●	○
K	●	●	○	○	
N			●	●	●
S			●	●	●
H			○		

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS250I6P08PT	6	6,34	0,76	28,63	-	-	4118595	4118596	-
WMTS250I6P03PH	6	6,35	0,25	28,63	-	-	5345983	5327620	-
WMTS250I6P03PT	6	6,35	0,25	28,63	-	-	4118593	4118594	-
WMTS312I8P03PH	8	7,92	0,25	28,57	-	-	5345985	5345986	-
WMTS312I8P08PH	8	7,92	0,75	28,57	-	-	5345987	5345988	-
WMTS800M8P03PH	8	8,00	0,30	28,57	-	-	5346436	5346437	-
WMTS800M8P06PH	8	8,00	0,60	28,57	-	-	5346434	5346435	-
WMTS800M8P06PT	8	8,00	0,61	28,57	-	-	4117257	4117258	-
WMTS800M8P15PT	8	8,00	1,50	28,57	-	-	4117259	4117260	-

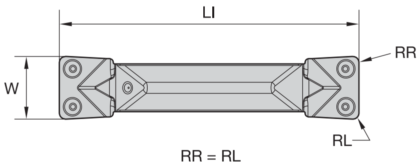


● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

WMT-U-PH • Moulded

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS305M3U03PH	3	3,05	0,30	25,81	-	-	5346392	5346393	-
WMTS305M3U06PH	3	3,05	0,60	25,81	-	-	5346394	5346395	-
WMTS405M4U03PH	4	4,05	0,30	25,53	-	-	5346396	5346397	-
WMTS405M4U06PH	4	4,05	0,60	25,53	-	-	5346398	5346399	-
WMTS505M5U03PH	5	5,05	0,30	28,76	-	-	5346400	5346401	-
WMTS505M5U06PH	5	5,05	0,60	28,76	-	-	5346402	5346403	-
WMTS605M6U03PH	6	6,05	0,30	28,76	-	-	5346404	5346405	-
WMTS605M6U06PH	6	6,05	0,60	28,76	-	-	5346406	5346407	-
WMTS805M8U03PH	8	8,05	0,30	28,70	-	-	5346410	5346411	-
WMTS805M8U06PH	8	8,05	0,60	28,70	-	-	5346408	5346409	-



● first choice
○ alternate choice

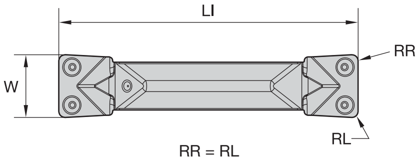
	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P	●	●	○	○	
M			●	●	○
K	●	●	○	○	
N			●	●	●
S			●	●	●
H			○		

■ WMT-P-PH • Precision

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS300M3P03PH	3	3,00	0,30	25,65	–	–	5346412	5346413	5346414
WMTS300M3P06PH	3	3,00	0,60	25,65	–	–	5346415	5346416	5346417
WMTS125I3P03PH	3	3,18	0,25	25,40	–	–	5345914	5291300	–
WMTS125I3P08PH	3	3,18	0,75	25,40	–	–	5345915	5331093	–
WMTS156I4P03PH	4	3,95	0,30	25,40	–	–	5345916	5345917	–
WMTS156I4P08PH	4	3,96	0,75	25,40	–	–	5345918	5345919	–
WMTS400M4P03PH	4	4,00	0,30	25,40	–	–	5346418	5346419	5346420
WMTS400M4P06PH	4	4,00	0,60	25,40	–	–	5346421	5346422	5346423
WMTS188I5P03PH	5	4,77	0,25	28,63	–	–	5345980	5331095	–
WMTS188I5P08PH	5	4,77	0,75	28,63	–	–	5345981	5331097	–

(continued)

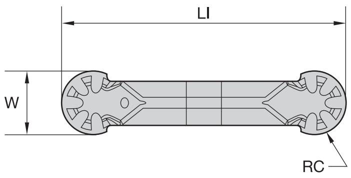
(WMT-P-PH • Precision — continued)



● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS500M5P03PH	5	5,00	0,30	28,63	-	-	5346424	5346425	5346426
WMTS500M5P06PH	5	5,00	0,60	28,63	-	-	5346427	5346428	5346429
WMTS600M6P03PH	6	6,00	0,30	28,63	-	-	5346430	5346431	-
WMTS600M6P06PH	6	6,00	0,60	28,63	-	-	5346432	5346433	-
WMTS250I6P08PH	6	6,32	0,75	28,63	-	-	5345984	5327621	-
WMTS250I6P03PH	6	6,35	0,25	28,63	-	-	5345983	5327620	-
WMTS312I8P03PH	8	7,92	0,25	28,57	-	-	5345985	5345986	-
WMTS312I8P08PH	8	7,92	0,75	28,57	-	-	5345987	5345988	-
WMTS800M8P03PH	8	8,00	0,30	28,57	-	-	5346436	5346437	-
WMTS800M8P06PH	8	8,00	0,60	28,57	-	-	5346434	5346435	-

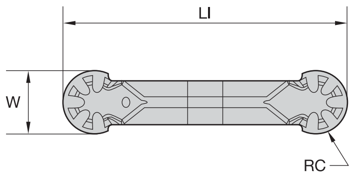


● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

WMT-U-PC • Moulded

catalogue number	seat size	W	RC	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTR305M3UPC	3	3,05	1,53	25,53	4170174	-	4170172	4170173	-
WMTR405M4UPC	4	4,05	2,03	25,58	4170179	-	4170177	4170178	-
WMTR505M5UPC	5	5,05	2,53	29,01	4170184	-	4170182	4170183	-
WMTR605M6UPC	6	6,05	3,03	28,77	4170189	-	4170187	4170188	-
WMTR805M8UPC	8	8,05	4,03	29,22	4170194	-	4170192	4170193	-



● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

WMT-P-PC • Precision

catalogue number	seat size	W	RC	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTR300M3PPC	3	3,00	1,50	25,40	-	-	4170170	4170171	4170195
WMTR400M4PPC	4	4,00	2,00	25,45	-	-	4170175	4170176	4170196
WMTR188I5PPC	5	4,78	2,39	28,65	-	-	4170119	4170120	-
WMTR500M5PPC	5	5,00	2,50	28,88	-	-	4170180	4170181	-
WMTR600M6PPC	6	6,00	3,00	28,65	-	-	4170185	4170186	-
WMTR250I6PPC	6	6,36	3,18	29,01	-	-	4170121	4170122	-
WMTR312I8PPC	8	7,94	3,96	29,00	-	-	4170163	4170164	-
WMTR800M8PPC	8	8,00	4,00	29,08	-	-	4170190	4170191	-

NOVO KNOWS SEARCH

Searching for a tool by using the outdated method of a catalogue has been replaced with the Advise and Select functions from NOVO™ — saving you time and money.

ADVISE

Uses a rules-based approach to provide cutting tool recommendations:

- Define Machining Feature (face milling, slotting, blind hole, etc.)
- Apply Constraint Requirements (geometric, material, tolerance, etc.)
- Set Machining Sequence (single or multi-step operations, rough then finish, etc.)
- Receive Ranked Results

SELECT

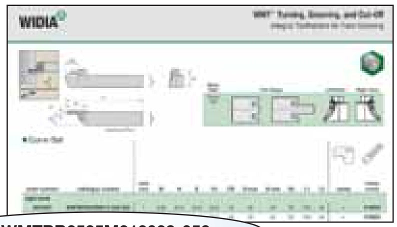
A method of selecting cutting tools from a tree structure via a hierarchy or parametric search:

- If you know which product you are looking for, a quick search can be performed by just the catalogue number or product description.
- Smart filters significantly reduce the amount of potential tooling solutions.
- After the tool is selected, NOVO also provides cutting and adaptive item options that fit with your solution.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. **widia.com/novo**

WMT System

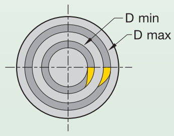
Our WMT toolholders now have a smart new naming system.
Here are some examples of the improved nomenclature for our WMT Toolholders.

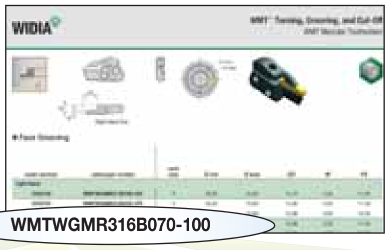


WMTBR2525M313038-052

Integral Toolholders

WMT	B	R	2525	M	3	13	—	038-052
Tooling System	Tool Style	Hand	Shank Size	Tool Length	Seat Size	Max Grooving Depth		Face Grooving Diameter
WMT = Groove and Turn (WMT Insert)	**S** = Straight **C** = Straight with circular support **E** = End mount **A** = Straight, face grooving, curve in **B** = Straight, face grooving, curve out	**R** = Right hand **L** = Left hand	Height x Width in mm	**H** = 100 **J** = 110 **K** = 125 **L** = 140 **M** = 150 **P** = 170	**1** **2** **2B** **3** **4** **5** **6** **8**	CD max in mm	D min – D max in mm (e.g., 70–100 = 70mm D min 100 mm D max)	Diameters are min and max for outer face groove diameter 999 = unlimited D max

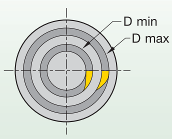




WMTWGMR316B070-100

Modular Blades

WMT	WGM	R	3	16	B	070-100
Tooling System	Connection Type	Hand	Seat Size	Max Grooving Depth	Tool Style	Face Grooving Diameter
		R = Right hand **L** = Left hand			**A** = Curve In **B** = Curve Out	

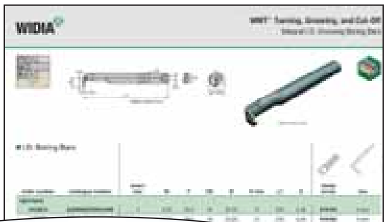


WIDIA VICTORY

WGMSR2525

Modular Toolholders

WGM	S	R	2525
Tooling System	Tool Style	Hand	Shank Size
MDG = Modular Deep Grooving **WGM** = Modular Serrated Locking System	**S** = Straight **E** = End mount	**R** = Right hand **L** = Left hand	

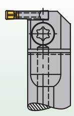


A25RWMTER0316M

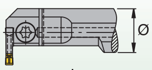
Integral Boring Bars

A	25	R	WMT	E	R	03	16	M
Steel Bar with Coolant	Bar Diameter	Bar Length	WMT™ Groove and Turn System	Tool Style	Hand	Seat Size	Max Grooving Depth	Tool Units

A – Steel Bar with Coolant

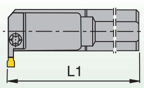


25 – Bar Diameter



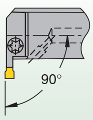
metric bars:	inch bars:
Bar diameter in millimetres	A two-digit number which indicates the bar diameter in 1/16" increments.

R – Bar Length



metric bars:			inch bars:		
R	=	200mm	R	=	8"
S	=	250mm	S	=	10"
T	=	300mm	T	=	12"

E – Tool Style



E = End mounted (90º)

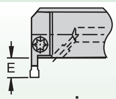
R – Hand

R = Right hand
L = Left hand

03 – Seat Size

pocket seat size	cutting width (mm)
02	2,00–2,62
2B	2,39–2,62
03	3,0–3,05
04	4,0–4,05
05	5,0–5,05
06	6,0–6,05
08	8,0–8,05
10	10,0–10,05

16 – Max Grooving Depth

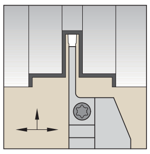


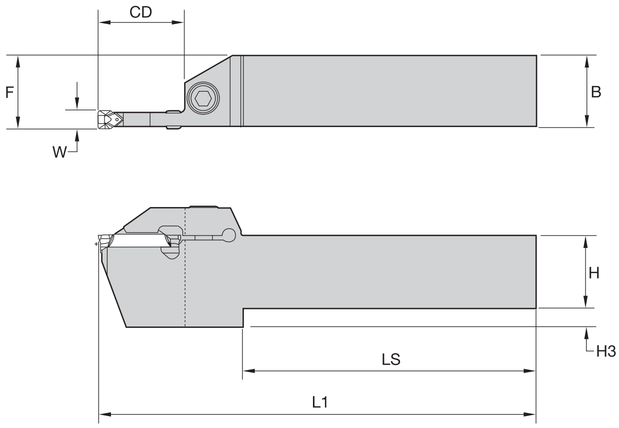
conversions:

mm	inch
7mm	.28"
10mm	.39"
12mm	.47"
16mm	.63"

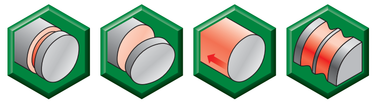
M – Tool Units

N = Inch
M = Metric

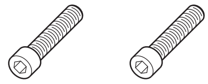




Right Hand Tool



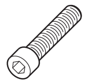
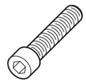
O.D. Grooving and Cut-Off

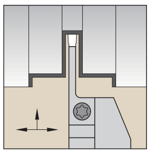


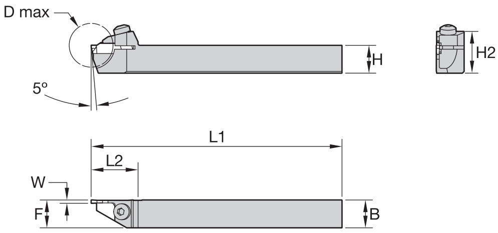
order number	catalogue number	seat size	W	H	B	CD	F	H3	L1	LS	clamp screw	clamp screw
right hand												
3650516	WMTSR2525M116	1	1,50	25,0	25,0	17	25,0	—	150	116	606249	—
3650456	WMTSR1616K216	2	2,00	16,0	16,0	17	16,0	6	125	101	606249	—
3650458	WMTSR2020K216	2	2,00	20,0	20,0	17	20,0	—	125	92	606249	—
3650506	WMTSR2525M216	2	2,00	25,0	25,0	17	25,0	—	150	116	606249	—
3539172	WMTSR1616K2B19	2B	2,38	16,0	16,0	24	15,9	5	125	88	—	MS326
3539174	WMTSR2020K2B19	2B	2,38	20,0	20,0	24	19,9	5	125	88	—	MS326
3539221	WMTCR2525M2B19	2B	2,38	25,0	25,0	24	24,9	—	150	113	—	MS326
3650460	WMTSR1616K311	3	3,00	16,0	16,0	11	16,0	—	125	93	—	619205
3650462	WMTSR1616K322	3	3,00	16,0	16,0	22	16,0	5	125	85	—	619205
3650468	WMTSR2020K311	3	3,00	20,0	20,0	11	20,0	—	125	93	—	619205
3650470	WMTSR2020K322	3	3,00	20,0	20,0	22	20,0	5	125	85	—	619205
3650479	WMTSR2525M311	3	3,00	25,0	25,0	11	25,0	—	150	118	—	619205
3650481	WMTSR2525M322	3	3,00	25,0	25,0	22	25,0	—	150	110	—	619205
3650502	WMTSR1616411	4	4,00	16,0	16,0	11	16,0	—	125	92	—	619205
3650464	WMTSR1616K422	4	4,00	16,0	16,0	22	16,0	5	125	83	—	619205
3653751	WMTSR2020K20	4	4,00	20,0	20,0	22	20,0	5	125	83	—	619205
3650504	WMTSR2020K411	4	4,00	20,0	20,0	11	20,0	—	125	92	—	619205
3653752	WMTSR2525M11	4	4,00	25,0	25,0	11	25,0	—	150	117	—	619205
3650483	WMTSR2525M422	4	4,00	25,0	25,0	22	25,0	—	150	109	—	619205
3650466	WMTSR1616K514	5	5,00	16,0	16,0	14	16,0	—	125	88	—	619168
3650473	WMTSR2020K514	5	5,00	20,0	20,0	14	20,0	—	125	88	—	619168
3650475	WMTSR2020L525	5	5,00	20,0	20,0	15	20,0	5	140	93	—	619168
3650485	WMTSR2525M514	5	5,00	25,0	25,0	14	25,0	—	150	115	—	619168
3650487	WMTSR2525M525	5	5,00	25,0	25,0	25	25,0	—	150	104	—	619168
3650477	WMTSR2020L614	6	6,00	20,0	20,0	14	20,0	—	140	103	—	619168
3650489	WMTSR2525M614	6	6,00	25,0	25,0	14	25,0	—	150	114	—	619168
3650491	WMTSR2525M625	6	6,00	25,0	25,0	25	25,0	—	150	104	—	619168
3650494	WMTSR2525M814	8	8,00	25,0	25,0	14	25,0	—	150	113	—	619168
3650496	WMTSR2525M825	8	8,00	25,0	25,0	25	25,0	—	150	104	—	619168
3650498	WMTSR3232M814	8	8,00	32,0	32,0	14	32,0	—	150	113	—	619168
3650500	WMTSR3232M825	8	8,00	32,0	32,0	25	32,0	—	150	104	—	619168

(continued)

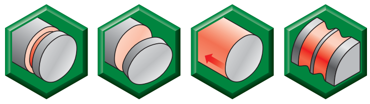
(O.D. Grooving and Cut-Off — continued)

order number	catalogue number	seat size	W	H	B	CD	F	H3	L1	LS	 clamp screw	 clamp screw
left hand												
3653332	**WMTSL2525M116**	1	1,50	25,0	25,0	16	25,0	–	150	116	**606249**	**–**
3650457	**WMTSL1616K216**	2	2,00	16,0	16,0	17	16,0	6	125	101	**606249**	**–**
3650459	**WMTSL2020K216**	2	2,00	20,0	20,0	17	20,0	–	125	92	**606249**	**–**
3650507	**WMTSL2525M216**	2	2,00	25,0	25,0	17	25,0	–	150	116	**606249**	**–**
3539173	**WMTSL1616K2B19**	2B	2,38	16,0	16,0	24	15,9	5	125	88	**–**	**MS326**
3539175	**WMTSL2020K2B19**	2B	2,38	20,0	20,0	24	19,9	5	125	88	**–**	**MS326**
3650461	**WMTSL1616K311**	3	3,00	16,0	16,0	11	16,0	–	125	93	**–**	**619205**
3650463	**WMTSL1616K322**	3	3,00	16,0	16,0	22	16,0	5	125	85	**–**	**619205**
3650469	**WMTSL2020K311**	3	3,00	20,0	20,0	11	20,0	–	125	93	**–**	**619205**
3650471	**WMTSL2020K322**	3	3,00	20,0	20,0	22	20,0	5	125	85	**–**	**619205**
3650480	**WMTSL2525M311**	3	3,00	25,0	25,0	11	25,0	–	150	118	**–**	**619205**
3650482	**WMTSL2525M322**	3	3,00	25,0	25,0	22	25,0	–	150	110	**–**	**619205**
3650465	**WMTSL1616K422**	4	4,00	16,0	16,0	22	16,0	5	125	83	**–**	**619205**
3650472	**WMTSL2020K22**	4	4,00	20,0	20,0	22	20,0	5	125	83	**–**	**619205**
3650505	**WMTSL2020K411**	4	4,00	20,0	20,0	11	20,0	–	125	92	**–**	**619205**
3653763	**WMTSL2525M11**	4	4,00	25,0	25,0	11	25,0	–	150	117	**–**	**619205**
3650484	**WMTSL2525M422**	4	4,00	25,0	25,0	22	25,0	–	150	109	**–**	**619205**
3650467	**WMTSL1616K514**	5	5,00	16,0	16,0	14	16,0	–	125	88	**–**	**619168**
3650474	**WMTSL2020K514**	5	5,00	20,0	20,0	14	20,0	–	125	88	**–**	**619168**
3650486	**WMTSL2525M514**	5	5,00	25,0	25,0	14	25,0	–	150	113	**–**	**619168**
3650488	**WMTSL2525M525**	5	5,00	25,0	25,0	25	25,0	–	150	104	**–**	**619168**
3650478	**WMTSL2020L614**	6	6,00	20,0	20,0	14	20,0	–	140	103	**–**	**619168**
3650490	**WMTSL2525M614**	6	6,00	25,0	25,0	14	25,0	–	150	114	**–**	**619168**
3650493	**WMTSL2525M625**	6	6,00	25,0	25,0	25	25,0	–	150	104	**–**	**619168**
3650495	**WMTSL2525M814**	8	8,00	25,0	25,0	14	25,0	–	150	113	**–**	**619168**
3650497	**WMTSL2525M825**	8	8,00	25,0	25,0	25	25,0	–	150	104	**–**	**619168**
3650499	**WMTSL3232M814**	8	8,00	32,0	32,0	14	32,0	–	150	113	**–**	**619168**
3650501	**WMTSL3232M825**	8	8,00	32,0	32,0	25	32,0	–	150	104	**–**	**619168**

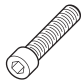




Left Hand Tool



Swiss Grooving and Cut-Off • Metric

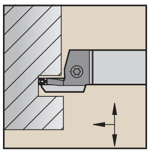


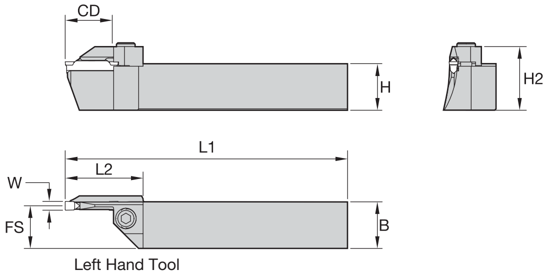
order number	catalogue number	seat size	W	H	B	F	D max	H2	L1	L2	clamp screw
right hand											
3650508	**WMTCR1010H110**	1	1,50	10,0	10,0	10,0	20	16	100	21	**606249**
3650510	**WMTCR1212H110**	1	1,50	12,0	12,0	12,0	20	18	100	21	**606249**
3650512	**WMTCR1616K113**	1	1,50	16,0	15,9	16,0	26	24	125	24	**606266**
3650514	**WMTCR2020K113**	1	1,50	20,0	19,9	20,0	26	28	125	24	**606266**
3653413	**WMTCR1010H210**	2	2,00	10,0	10,0	10,0	20	16	100	21	**606249**
3653415	**WMTCR1212H210**	2	2,00	12,0	12,0	12,0	20	18	100	21	**606249**
3653417	**WMTCR1616K213**	2	2,00	16,0	15,8	16,0	26	24	125	24	**606266**
3653419	**WMTCR2020K213**	2	2,00	20,0	19,8	20,0	26	28	125	24	**606266**
3539170	**WMTCR1212H2B16**	2B	2,38	12,0	11,7	11,9	32	23	100	30	**606249**
left hand											
3650509	**WMTCL1010H110**	1	1,50	10,0	10,0	10,0	20	16	100	21	**606249**
3650511	**WMTCL1212H110**	1	1,50	12,0	12,0	12,0	20	18	100	21	**606249**
3650513	**WMTCL1616K113**	1	1,50	16,0	15,9	16,0	26	24	125	24	**606266**
3650515	**WMTCL2020K113**	1	1,50	20,0	19,9	20,0	26	28	125	24	**606266**
3653414	**WMTCL1010H210**	2	2,00	10,0	10,0	10,0	20	16	100	21	**606249**
3653416	**WMTCL1212H210**	2	2,00	12,0	12,0	12,0	20	18	100	21	**606249**
3653418	**WMTCL1616K213**	2	2,00	16,0	15,8	16,0	26	24	125	24	**606266**
3653420	**WMTCL2020K213**	2	2,00	20,0	19,8	20,0	26	28	125	24	**606266**
3539171	**WMTCL1212H2B16**	2B	2,38	12,0	11,7	11,9	32	23	100	30	**606249**

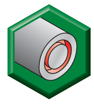
NOTE: Insert exterior edge in line with toolholder edge for 10mm and 12mm shank toolholders.

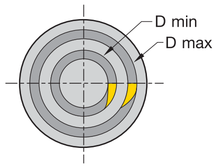
Update to our latest style cut-off inserts for use in the above style toolholders.
These holders can be used in many machines including Stars, Citizens, Tsugami, and Tonos/DECO.

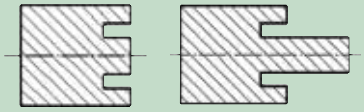
Insert Width	Lead Angle	Old Manchester Catalogue Number	Old Manchester Grade	WMT Cut-Off Insert	WMT Insert Grade	WIDIA™ Order Number
1,5mm	Neutral	583-165	M443B	WMTC015N00CM08	WU25PT	**4169668**
1,5mm	Right - 5°	583-166	M443B	WMTC015R05CM08	WU25PT	**4169670**
1,5mm	Right - 12°	583-168	M443B	WMTC015R12CM08	WU25PT	**4169672**
1,5mm	Left - 5°	583-167	M443B	WMTC015L05CM08	WU25PT	**4169671**
2,0mm	Neutral	583-170	M443B	WMTC020N00CM08	WU25PT	**4169673**
2,0mm	Right - 5°	583-170	M443B	WMTC020R05CM08	WU25PT	**4169675**
2,0mm	Right - 12°	583-173	M443B	WMTC020R12CM08	WU25PT	**4169678**
2,0mm	Left - 5°	583-172	M443B	WMTC020L05CM08	WU25PT	**4169677**
2,0mm	Left - 12°	583-174	M443B	WMTC020L12CM08	WU25PT	**4169680**
2,0mm	Neutral - Groove	583-129	M45 / M43	WMTS200M2P02PT	WU25PT	**4116130**
2,0mm	Neutral	583-125	M45 / M43	WMTC020N00CMW08	WU25PT	**4169674**
2,0mm	Right - 5°	583-126	M45 / M43	WMTC020R05CMW08	WU25PT	**4169676**
2,0mm	Right - 12°	583-128	M45 / M43	WMTC020R12CMW08	WU25PT	**4169679**
2,0mm	Left - 12°	583-129	M45 / M43	WMTC020L12CMW08	WU25PT	**4169681**



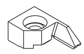


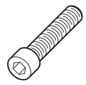




Blade Style	Part Shape	Left Hand	Right Hand
Curve Out			

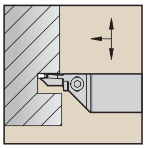
Curve Out

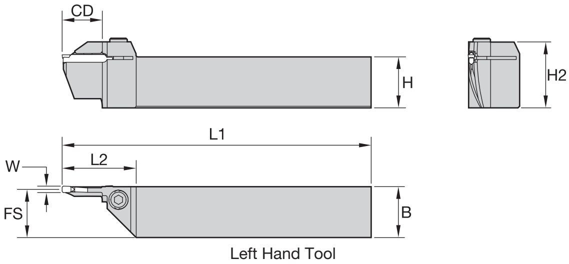


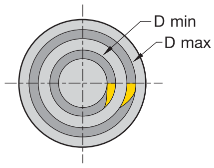


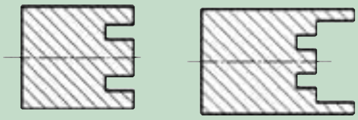
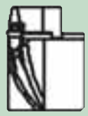
order number	catalogue number	seat size	W	H	B	FS	CD	D max	D min	H2	L1	L2	clamp	clamp screw
right hand														
3653421	**WMTBR2525M313-038-052**	3	3,00	24,8	24,8	23,5	13	52	38	32	150	34	**–**	**619205**
3653423	**WMTBR2525M316-052-070**	3	3,00	24,8	24,8	23,5	16	70	52	32	150	34	**–**	**619205**
3653425	**WMTBR2525M316-070-100**	3	3,00	24,8	24,8	23,5	16	100	70	32	150	34	**–**	**619205**
3653427	**WMTBR2525M319-100-205**	3	3,00	25,0	24,8	23,5	19	205	100	32	150	37	**–**	**619205**
3653764	**WMTBR2525M412-032-052**	4	4,00	24,8	24,8	23,0	13	52	32	32	150	34	**–**	**619205**
3653766	**WMTBR2525M415-052-070**	4	4,00	24,8	24,8	23,0	16	70	52	32	150	34	**–**	**619205**
3653770	**WMTBR2525M418-100-205**	4	4,00	24,8	24,8	23,0	19	205	100	32	150	37	**–**	**619205**
3653431	**WMTBR2525M519-052-070**	5	5,00	24,8	24,8	22,5	19	70	52	34	150	38	**446102**	**619168**
3653433	**WMTBR2525M519-070-100**	5	5,00	24,8	24,8	22,5	19	100	70	34	150	42	**446104**	**619168**
3653435	**WMTBR2525M525-100-205**	5	5,00	24,8	24,8	22,5	25	205	100	34	150	42	**446104**	**619168**
3653437	**WMTBR2525M616-038-052**	6	6,00	24,8	24,8	22,0	16	52	38	35	150	38	**446102**	**619168**
3653441	**WMTBR2525M619-070-100**	6	6,00	24,8	24,8	22,0	19	100	70	36	150	42	**446104**	**619168**
3653443	**WMTBR2525M625-100-205**	6	6,00	24,8	24,8	22,0	25	205	100	34	150	42	**446104**	**619168**
left hand														
3653422	**WMTBL2525M313-038-052**	3	3,00	24,8	24,8	23,5	13	52	38	32	150	34	**–**	**619205**
3653424	**WMTBL2525M316-052-070**	3	3,00	24,8	24,8	23,5	16	70	52	32	150	34	**–**	**619205**
3653426	**WMTBL2525M316-070-100**	3	3,00	24,8	24,8	23,5	16	100	70	32	150	34	**–**	**619205**
3653428	**WMTBL2525M319-100-205**	3	3,00	24,8	24,8	23,5	19	205	100	32	150	37	**–**	**619205**
3653765	**WMTBL2525M412-032-052**	4	4,00	24,8	24,8	23,0	13	52	32	32	150	34	**–**	**619205**
3653767	**WMTBL2525M415-052-070**	4	4,00	24,8	24,8	23,0	16	70	52	32	150	34	**–**	**619205**
3653769	**WMTBL2525M415-070-100**	4	4,00	24,8	24,8	23,0	16	100	70	32	150	34	**–**	**619205**
3653771	**WMTBL2525M418-100-205**	4	4,00	24,8	24,8	23,0	19	205	100	32	150	37	**–**	**619205**
3653432	**WMTBL2525M519-052-070**	5	5,00	24,8	24,8	22,5	19	70	52	34	150	38	**446101**	**619168**
3653434	**WMTBL2525M519-070-100**	5	5,00	24,8	24,8	22,5	19	100	70	34	150	42	**446103**	**619168**
3653436	**WMTBL2525M525-100-205**	5	5,00	24,8	24,8	22,5	25	205	100	34	150	42	**446103**	**619168**
3653438	**WMTBL2525M616-038-052**	6	6,00	24,8	24,8	22,0	16	52	38	35	150	38	**446101**	**619168**
3653444	**WMTBL2525M625-100-205**	6	6,00	24,8	24,8	22,0	25	205	100	34	150	42	**446103**	**619168**

NOTE: Initial cut of tool must be between D min and D max. Due to the insert being positioned 0,75mm above centre, minimum diameter after initial cut is 12,6mm.
Toolholders that accept 3mm and 4mm width inserts have an integral clamp.
Toolholders that accept 5mm and 6mm width inserts are supplied with a detachable clamp.

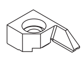
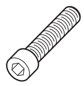




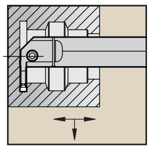


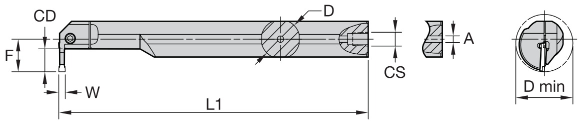
Blade Style	Part Shape	Left Hand	Right Hand
Curve In			

■ Curve In

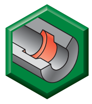
order number	catalogue number	seat size	W	H	B	FS	CD	D max	D min	H2	L1	L2	clamp 	clamp screw 
right hand														
3634282	**WMTAR2525M316-070-100**	3	3,00	24,8	24,8	23,5	16	100	70	32	150	34	**–**	**MS326**
3634284	**WMTAR2525M319-100-205**	3	3,00	24,8	24,8	23,5	19	205	100	32	150	37	**–**	**MS326**
3634290	**WMTAR2525M619-070-100**	6	6,00	24,8	24,8	22,0	19	100	70	34	150	42	**446104**	**619168**
left hand														
3634283	**WMTAL2525M316-070-100**	3	3,00	24,8	24,8	23,5	16	100	70	32	150	34	**–**	**MS326**
3634285	**WMTAL2525M319-100-205**	3	3,00	24,8	24,8	23,5	19	205	100	32	150	37	**–**	**MS326**

NOTE: Initial cut of tool must be between D min and D max. Due to the insert being positioned 0,75mm above centre, minimum diameter after initial cut is 12,6mm.
Toolholders that accept 3mm and 4mm width inserts have an integral clamp.
Toolholders that accept 5mm and 6mm width inserts are supplied with a detachable clamp.


Steel shank with through coolant.

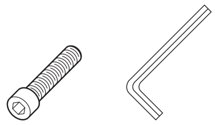


Right Hand Tool

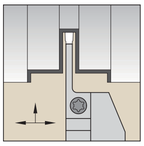


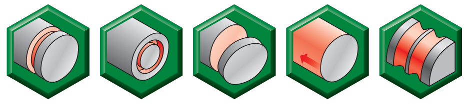

Right Hand Tool

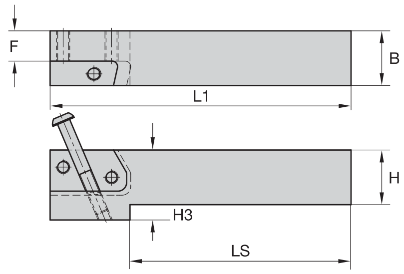
I.D. Boring Bars



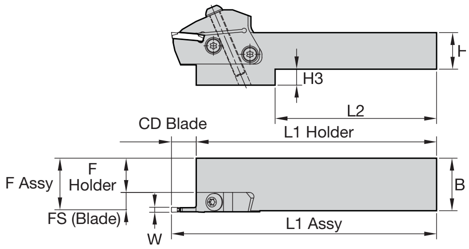
order number	catalogue number	insert size	W	F	CD	D	D min	L1	A	clamp screw	hex
right hand											
5423874	A25RWMTER0316M	3	3,00	26,0	16	25,00	41	200	6,40	619168	5 mm
5423875	A32SWMTER0319M	3	3,00	29,0	19	32,00	47	250	6,40	619168	5 mm
5423876	A25RWMTER0416M	4	4,00	26,0	16	25,00	41	200	6,40	619168	5 mm
5423877	A32SWMTER0419M	4	4,00	29,0	19	32,00	47	250	6,40	619168	5 mm
5423878	A32SWMTER0519M	5	5,00	29,0	19	32,00	47	250	6,40	619168	5 mm
5423879	A40TWMTER0522M	5	5,00	32,0	22	40,00	54	300	6,40	619168	5 mm
5423880	A32SWMTER0619M	6	6,00	29,0	19	32,00	47	250	6,40	619168	5 mm
5423881	A40TWMTER0622M	6	6,00	31,8	22	40,00	54	300	6,40	619168	5 mm
left hand											
5423882	A25RWMTEL0316M	3	3,00	26,0	16	25,00	41	200	6,40	619168	5 mm
5423883	A32SWMTEL0319M	3	3,00	29,0	19	32,00	47	250	6,40	619168	5 mm
5423884	A25RWMTEL0416M	4	4,00	26,0	16	25,00	41	200	6,40	619168	5 mm
5423885	A32SWMTEL0419M	4	4,00	29,0	19	32,00	47	250	6,40	619168	5 mm
5423886	A32SWMTEL0519M	5	5,00	29,0	19	32,00	47	250	6,40	619168	5 mm
5423887	A40TWMTEL0522M	5	5,00	32,0	22	40,00	54	300	6,40	619168	5 mm
5423888	A32SWMTEL0619M	6	6,00	29,0	19	32,00	47	250	6,40	619168	5 mm
5423889	A40TWMTEL0622M	6	6,00	31,8	22	40,00	54	300	6,40	619168	5 mm



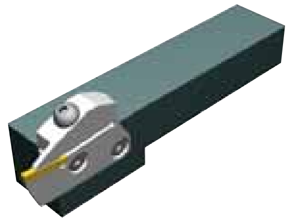




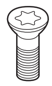
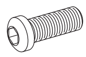
Right Hand Tool
2 blade screws required



F Assy = F (Holder) + FS (Blade) + W/2
L1 Assy = L1 (Holder) + CD (Blade)



Straight Mount • Grooving, Cut-Off, and Face Grooving

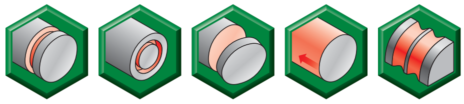
order number	catalogue number	H	B	L1	LS	F	H3	blade screw	Torx for blade screw	clamp screw	Torx for clamp screw
right hand											
5349628	WGMSR2020	20	20	108,0	68,00	8,84	12	MS2002	T25	MS1162	T25
5349629	WGMSR2525	25	25	126,0	95,78	13,84	7	MS2002	T25	MS1162	T25
5349641	WGMSR3232	32	32	126,0	69,85	20,81	–	MS2002	T25	MS1162	T25
left hand											
5349625	WGMSL1620	16	20	108,0	68,00	8,84	16	MS2002	T25	MS1162	T25
5349626	WGMSL2020	20	20	108,0	68,00	8,84	12	MS2002	T25	MS1162	T25
5349627	WGMSL2525	25	25	126,0	95,78	13,84	7	MS2002	T25	MS1162	T25
5349640	WGMSL3232	32	32	126,0	69,85	20,81	–	MS2002	T25	MS1162	T25

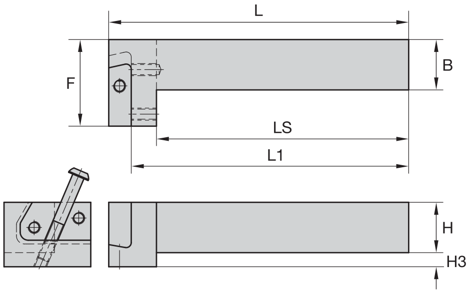
NOTE: Use the larger seat size toolholder for optimal performance.
Blade screws and clamp screw included with holder.

Toolholder Style	Hand of Holder	Hand of Blade
WGMS – Straight Mount	Right	Right
	Left	Left
WGME – End Mount	Right	Left
	Left	Right

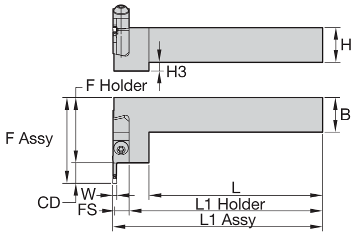
Grooving and Cut-Off Blades found on page E38.

Face Grooving Blades found on page E39.

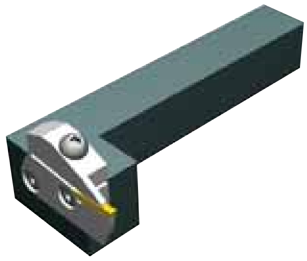




Right Hand Tool



F Assy = F (Holder) + CD (Blade)
L1 Assy = L1 (Holder) + FS (Blade) + W/2



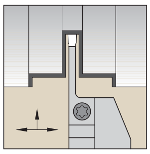
End Mount • Grooving, Cut-Off, and Face Grooving

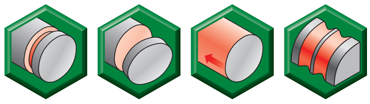
order number	catalogue number	H	B	L	L1	LS	F	H3
right hand								
5514979	**WGMER2525**	25	25	150,3	139,3	125,25	42,75	9
5515021	**WGMER3232**	32	32	170,3	159,3	145,25	42,75	–
left hand								
5514978	**WGMEL2525**	25	25	150,3	139,3	125,25	42,75	9
5515020	**WGMEL3232**	32	32	170,3	159,3	145,25	42,75	–

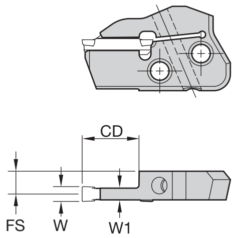
Toolholder Style	Hand of Holder	Hand of Blade
WGMS – Straight Mount	Right	Right
	Left	Left
WGME – End Mount	Right	Left
	Left	Right

Grooving and Cut-Off Blades found on page E38.

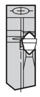
Face Grooving Blades found on page E39.







Right Hand Blade

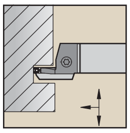


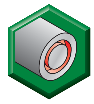
Grooving and Cut-Off

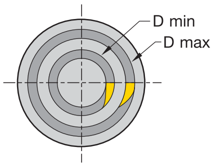
order number	catalogue number	seat size	CD	W	FS	W1
right hand						
5359127	**WMTWGMR114S**	1	14,00	1,50	11,04	1,22
5359128	**WMTWGMR213S**	2	13,00	2,00	10,81	1,68
5359129	**WMTWGMR2B16S**	2B	16,50	2,39	10,71	1,88
5359130	**WMTWGMR319S**	3	19,00	3,00	10,38	2,54
5359131	**WMTWGMR419S**	4	19,00	4,00	10,00	3,30
5359132	**WMTWGMR522S**	5	22,00	5,00	9,82	3,66
5359133	**WMTWGMR622S**	6	22,00	6,00	9,26	4,78
left hand						
5359120	**WMTWGML114S**	1	14,00	1,50	11,04	1,22
5359121	**WMTWGML213S**	2	13,00	2,00	10,81	1,68
5359122	**WMTWGML2B16S**	2B	16,50	2,39	10,71	1,88
5359123	**WMTWGML319S**	3	19,00	3,00	10,38	2,54
5359124	**WMTWGML419S**	4	19,00	4,00	10,00	3,30
5359125	**WMTWGML522S**	5	22,00	5,00	9,82	3,66
5359126	**WMTWGML622S**	6	22,00	6,00	9,26	4,78

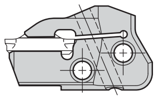
NOTE: Blade and clamp screw torque equals 8–10 Nm.

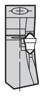
Toolholder Style	Hand of Holder	Hand of Blade
WGMS — Straight Mount	Right	Right
	Left	Left
WGME — End Mount	Right	Left
	Left	Right

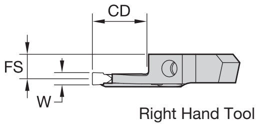












Grooving and Cut-Off

Face Grooving

order number	catalogue number	seat size	D min	D max	CD	W	FS
right hand							
5359150	**WMTWGMR313B038-052**	3	38,00	52,00	12,70	3,00	11,00
5359151	**WMTWGMR316B052-070**	3	52,00	70,00	15,88	3,00	11,00
5359154	**WMTWGMR416B052-070**	4	52,00	70,00	15,88	4,00	10,50
5359152	**WMTWGMR316B070-100**	3	70,00	100,00	15,88	3,00	11,00
5359155	**WMTWGMR416B070-100**	4	70,00	100,00	15,88	4,00	10,50
5359153	**WMTWGMR319B100-205**	3	100,00	205,00	19,05	3,00	11,00
5359156	**WMTWGMR419B100-205**	4	100,00	205,00	19,05	4,00	10,50
5359157	**WMTWGMR522B100-205**	5	100,00	205,00	22,00	5,00	10,00
5359158	**WMTWGMR622B100-205**	6	100,00	205,00	22,00	6,00	10,00
left hand							
5359146	**WMTWGML616B030-052**	6	30,00	52,00	15,88	6,00	10,00
5359134	**WMTWGML313B038-052**	3	38,00	52,00	12,70	3,00	11,00
5359138	**WMTWGML413B038-052**	4	38,00	52,00	12,70	4,00	10,50
5359142	**WMTWGML516B038-052**	5	38,00	52,00	15,88	5,00	10,00
5359135	**WMTWGML316B052-070**	3	52,00	70,00	15,88	3,00	11,00
5359139	**WMTWGML416B052-070**	4	52,00	70,00	15,88	4,00	10,50
5359143	**WMTWGML519B052-070**	5	52,00	70,00	19,05	5,00	10,00
5359147	**WMTWGML619B052-070**	6	52,00	70,00	19,05	6,00	10,00
5359136	**WMTWGML316B070-100**	3	70,00	100,00	15,88	3,00	11,00
5359140	**WMTWGML416B070-100**	4	70,00	100,00	15,88	4,00	10,50
5359144	**WMTWGML519B070-100**	5	70,00	100,00	19,05	5,00	10,00
5359148	**WMTWGML619B070-100**	6	70,00	100,00	19,05	6,00	10,00
5359137	**WMTWGML319100-205**	3	100,00	205,00	19,05	3,00	11,00
5359141	**WMTWGML419B100-205**	4	100,00	205,00	19,05	4,00	10,50
5359145	**WMTWGML522B100-205**	5	100,00	205,00	22,00	5,00	10,00
5359149	**WMTWGML622B100-205**	6	100,00	205,00	22,00	6,00	10,00

NOTE: Blade and clamp screw torque equals 8–10 Nm.

Toolholder Style	Hand of Holder	Hand of Blade
WGMS — Straight Mount	Right	Right
	Left	Left
WGME — End Mount	Right	Left
	Left	Right

WIDIA™ TopGroove™ for Shallow Grooving and Face Grooving

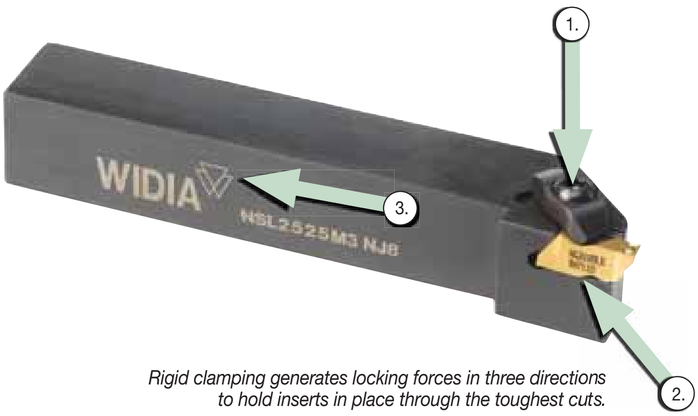
TopGroove

WIDIA has set the industry standard for threading and grooving productivity with the TopGroove clamping design. The TopGroove design provides consistent tool performance, accurate indexing, and superior clamping to provide excellent surface finish and outstanding tool life.

Let us help you select the correct insert for your application needs or upgrade your current TopGroove tooling inventory to include chip control geometries and the high productivity grades available from WIDIA.

Rigidity, Versatility, and Chip Control

- TopGroove clamping design features a rugged bridge clamp, which locates in a groove moulded into the insert to provide superior resistance to side and radial cutting forces.
- TopGroove inserts are available for shallow grooving, deep grooving, light turning, profiling, shallow and deep face grooving, back turning, undercutting, and Poly-Vee grooving.
- The proprietary WIDIA chip control design works in multi-directional turning as well as radial feed applications to provide excellent chip evacuation in deep grooving applications.



Rigid clamping generates locking forces in three directions to hold inserts in place through the toughest cuts.

TopGroove inserts employ a unique top rake chip control geometry that efficiently evacuates chips and produces better quality parts faster.

The WIDIA™ TopGroove™ clamping system offers a complete line of grooving geometries and an extensive grade selection.

Carbide Grades and Proven Solutions for High Productivity

- The TopGroove system has a carbide grade to match your application needs that include uncoated grades, PVD-coated grades, CVD-coated grades, and advanced material grades, including cermets, ceramics, PcBNs, and PCDs (as custom solutions).
- PVD TiAlN-coated grades are designed to cut a variety of workpiece materials.
- Versatile design enables one system to handle O.D. and I.D. grooving, face grooving, back turning, undercutting, and even threading operations.

The Most Advanced Turning Solutions in the Industry

Perfect for shallow grooving operations, the WIDIA™ TopGroove clamping system provides a complete line of grooving geometries and an extensive grade selection to meet even the most demanding application requirements. For increased rigidity, versatility, chip control, and carbide grade options, the TopGroove clamping system is the proven solution.

With maximum clamping rigidity and superior versatility, TopGroove inserts employ a unique top rake chip control geometry that efficiently evacuates chips and produces better quality parts, faster than ever before.

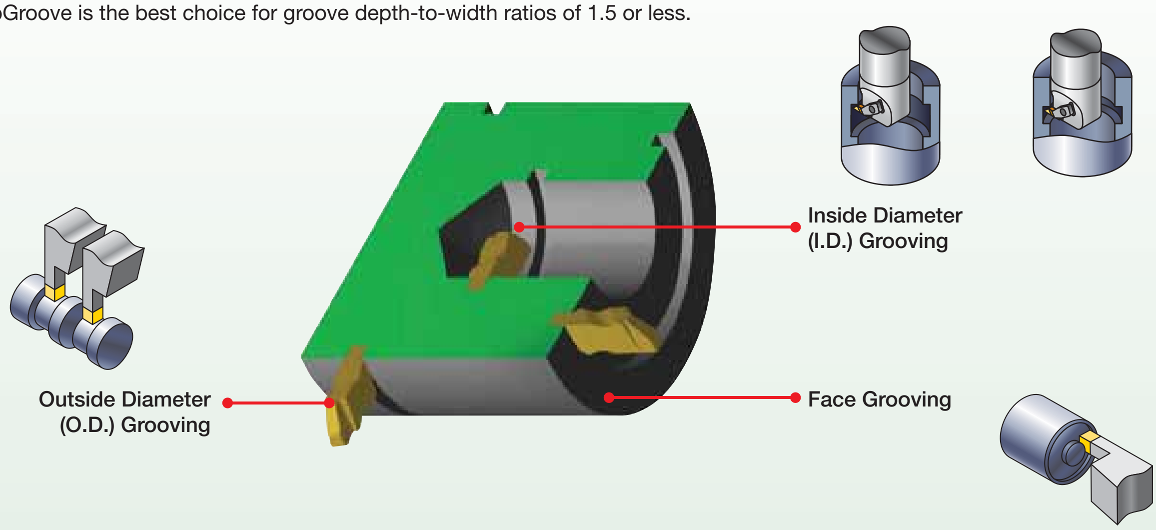
Utilise this comprehensive, easy-to-use guide for the information necessary to identify, choose, and select the appropriate cutting tools for your specific needs.

What you need to know:

- Material being machined.
- Groove depth, width, and profile.
- Application to be performed (face, O.D., or I.D. grooving).
- Toolholder requirements (e.g. KM™, ERICKSON™, square shank, right/left).

1 Choose the application to be performed:

Groove depth, width, and profile.
TopGroove is the best choice for groove depth-to-width ratios of 1.5 or less.



For deep grooving, use WMT™ on page E4.

TopGroove™ for Internal, External, and Face Grooving Applications

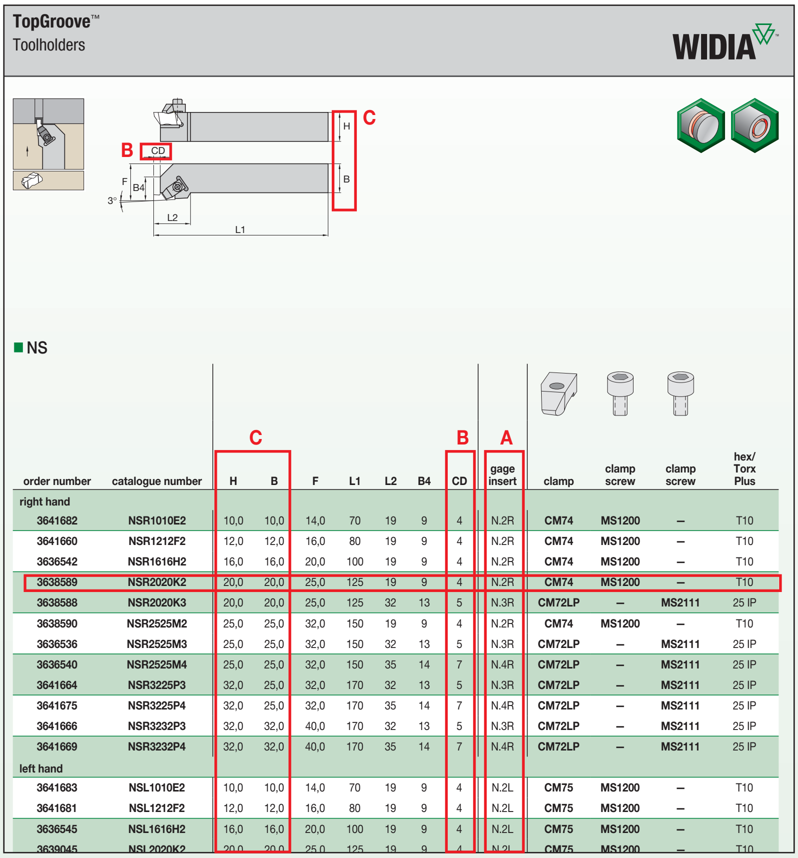
system capabilities			minimum	maximum
	O.D./I.D. Grooving	width	0,50mm	9,53mm
		depth	–	12,7mm
	Face Grooving	width	3,2mm	6,35mm
		depth	–	12,7mm
	Internal Grooving	diameter	11,2mm	–
	Face Grooving Diameter	standard	23,9mm	–
		deep	–	–
	Deep O.D./I.D. Grooving	width	1,50mm	6,35mm
		depth	–	12,7mm
	Deep Face Grooving	width	3,18mm	6,35mm
		depth	–	12,7mm

2 Identify the material to be machined:
Each tool has a material grid marked with a letter indicating the materials that can be machined.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

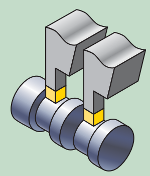
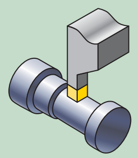
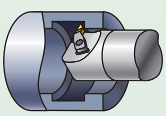
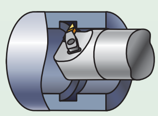
3 Select your toolholder based on the application:

A Choose the appropriate gage insert (width) required for the application.
B Choose the shortest cutting depth "CD" dimension for increased tool rigidity.
C Select the largest toolholder shank "H" and "B" dimensions for maximum rigidity.


TopGroove™
Toolholders
WIDIA

■ NS

order number	catalogue number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand													
3641682	NSR1010E2	10,0	10,0	14,0	70	19	9	4	N.2R	CM74	MS1200	–	T10
3641660	NSR1212F2	12,0	12,0	16,0	80	19	9	4	N.2R	CM74	MS1200	–	T10
3636542	NSR1616H2	16,0	16,0	20,0	100	19	9	4	N.2R	CM74	MS1200	–	T10
3638589	NSR2020K2	20,0	20,0	25,0	125	19	9	4	N.2R	CM74	MS1200	–	T10
3638588	NSR2020K3	20,0	20,0	25,0	125	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3638590	NSR2525M2	25,0	25,0	32,0	150	19	9	4	N.2R	CM74	MS1200	–	T10
3636536	NSR2525M3	25,0	25,0	32,0	150	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3636540	NSR2525M4	25,0	25,0	32,0	150	35	14	7	N.4R	CM72LP	–	MS2111	25 IP
3641664	NSR3225P3	32,0	25,0	32,0	170	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3641675	NSR3225P4	32,0	25,0	32,0	170	35	14	7	N.4R	CM72LP	–	MS2111	25 IP
3641666	NSR3232P3	32,0	32,0	40,0	170	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3641669	NSR3232P4	32,0	32,0	40,0	170	35	14	7	N.4R	CM72LP	–	MS2111	25 IP
left hand													
3641683	NSL1010E2	10,0	10,0	14,0	70	19	9	4	N.2L	CM75	MS1200	–	T10
3641681	NSL1212F2	12,0	12,0	16,0	80	19	9	4	N.2L	CM75	MS1200	–	T10
3636545	NSL1616H2	16,0	16,0	20,0	100	19	9	4	N.2L	CM75	MS1200	–	T10
3639045	NSL2020K2	20,0	20,0	25,0	125	19	9	4	N.2L	CM75	MS1200	–	T10

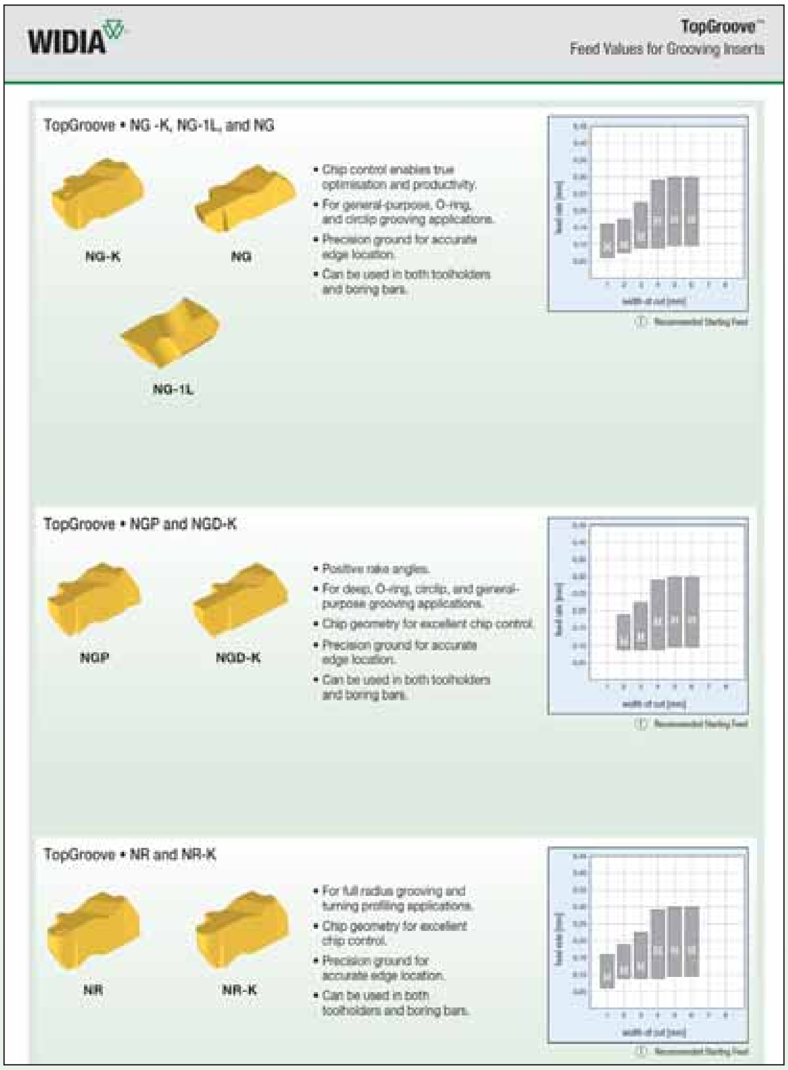
		application	conventional toolholders	modular blades
		O.D. Grooving and Plunge and Turn	pages E74–E76	–
		I.D. Grooving	pages E78–E79	–

4 Select chipbreaker style for the application:

See application guide on page E48 for a complete list of insert styles.

NOTE: Chart shows recommended starting feed rates.

See page E49.


WIDIA

TopGroove™
Feed Values for Grooving Inserts

TopGroove • NG -K, NG-1L, and NG

NG-K
NG
NG-1L

- Chip control enables true optimisation and productivity.
- For general-purpose, O-ring, and circlip grooving applications.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

TopGroove • NGP and NGD-K

NGP
NGD-K

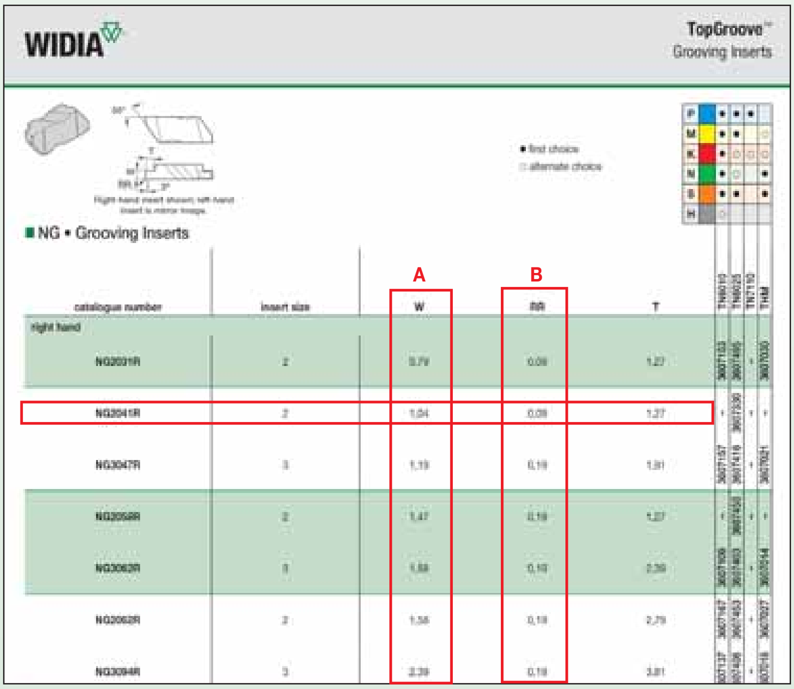
- Positive rake angles.
- For deep, O-ring, circlip, and general-purpose grooving applications.
- Chip geometry for excellent chip control.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

TopGroove • NR and NR-K

NR
NR-K

- For full radius grooving and turning profiling applications.
- Chip geometry for excellent chip control.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

A Choose the appropriate insert width “W” for your specific application.
B Select the required corner radius value “RR”.


WIDIA

TopGroove™
Grooving Inserts

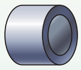
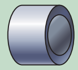
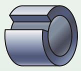
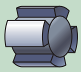
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

NG • Grooving Inserts

catalogue number	insert size	W (A)	RR (B)	T
right hand				
NG2031R	2	0,79	0,08	1,27
NG2041R	2	1,04	0,08	1,27
NG3047R	3	1,19	0,19	1,91
NG2058R	2	1,47	0,19	1,27
NG3062R	3	1,58	0,19	2,39
NG2062R	2	1,58	0,19	2,79
NG3094R	3	2,39	0,19	3,81

5 Select grade:

cutting condition		Recommended Grades: steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
smooth cut, pre-turned surface		TN7110	TN6010	TN7110	TN6010/ THM	TN6010	TN6010
varying depth of cut, casting, or forging skin		TN6010	TN6010	TN6010	TN6010/ THM	TN6010	TN6010
lightly interrupted cut		TN6025	TN6025	TN6025	TN6010/ THM	TN6010	TN6025
heavily interrupted cut		TN6025	TN6025	TN6025	TN6010/ THM	TN6010	TN6025

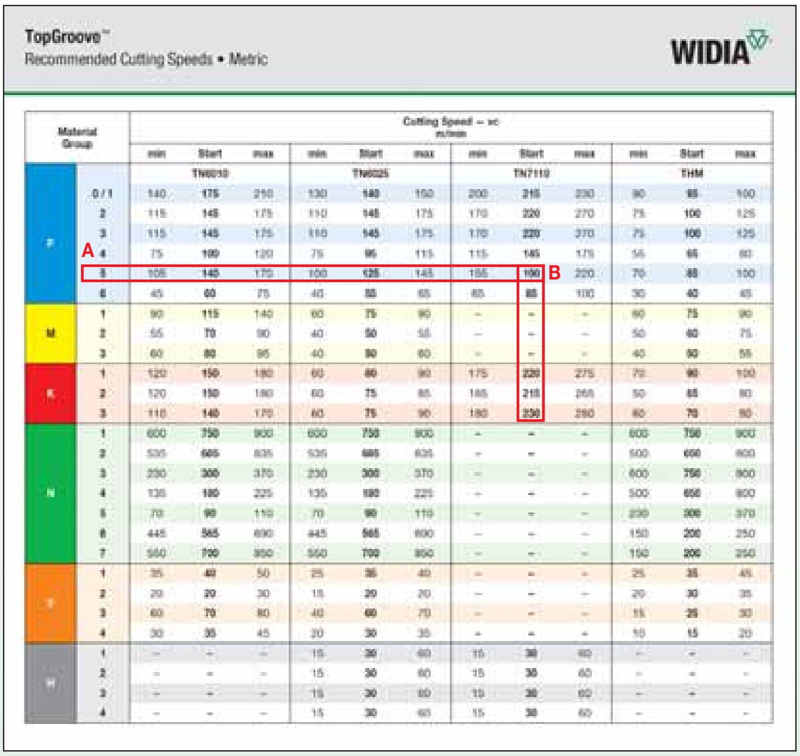
See page E47 for Grades and Grade Descriptions.

6 Determine cutting data:

A Based on material group and grade, identify starting speed (vc).

B First choice starting speed is in **bold**.

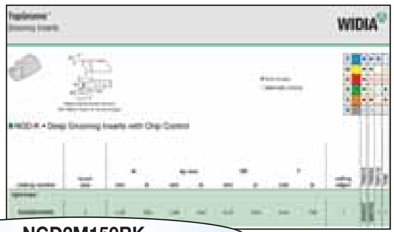
See page E50 for cutting data.



TopGroove™
Recommended Cutting Speeds • Metric
WIDIA

Material Group		TN6010 min	TN6010 Start	TN6010 max	TN6025 min	TN6025 Start	TN6025 max	TN7110 min	TN7110 Start	TN7110 max	THM min	THM Start	THM max
P	0/1	140	**175**	210	130	**140**	150	200	**215**	230	90	**95**	100
	2	115	**145**	175	110	**145**	175	170	**220**	270	75	**100**	125
	3	115	**145**	175	110	**145**	175	170	**220**	270	75	**100**	125
	A 4	75	**100**	120	75	**95**	115	115	**145**	175	55	**65**	80
	5	105	**140**	175	100	**125**	145	155	**190** B	220	70	**85**	100
	6	45	**60**	75	40	**55**	65	65	**85**	100	30	**40**	45
M	1	90	**115**	140	60	**75**	90	–	–	–	60	**75**	90
	2	55	**70**	90	40	**50**	55	–	–	–	50	**60**	75
	3	60	**80**	95	40	**50**	60	–	–	–	40	**50**	55
K	1	120	**150**	180	60	**80**	90	175	**220**	275	70	**90**	100
	2	120	**150**	180	60	**75**	85	165	**215**	265	50	**65**	80
	3	110	**140**	170	60	**75**	90	180	**230**	280	60	**70**	80
N	1	600	**750**	900	600	**750**	900	–	–	–	600	**750**	900
	2	535	**665**	835	535	**665**	835	–	–	–	500	**650**	800
	3	230	**300**	370	230	**300**	370	–	–	–	600	**750**	900
	4	135	**180**	225	135	**180**	225	–	–	–	500	**650**	800
	5	70	**90**	110	70	**90**	110	–	–	–	230	**300**	370
	6	445	**565**	690	445	**565**	690	–	–	–	150	**200**	250
	7	560	**700**	850	560	**700**	850	–	–	–	150	**200**	250
S	1	35	**40**	50	25	**35**	40	–	–	–	25	**35**	45
	2	20	**20**	30	15	**20**	20	–	–	–	20	**30**	35
	3	60	**70**	80	40	**60**	70	–	–	–	15	**25**	30
	4	30	**35**	45	20	**30**	35	–	–	–	10	**15**	20
H	1	–	–	–	15	**30**	60	15	**30**	60	–	–	–
	2	–	–	–	15	**30**	60	15	**30**	60	–	–	–
	3	–	–	–	15	**30**	60	15	**30**	60	–	–	–
	4	–	–	–	15	**30**	60	15	**30**	60	–	–	–

TopGroove
Insert Identification System

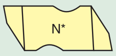


NGD2M150RK

N	G	D	2	M	150	R		K	
Type of Insert	Insert Style	Additional Information	Insert Size	Size Identification	Groove Size**	Hand of Insert	Cutting Depth	Chipbreaker Design	Definition of Inserts

Type of Insert

N – TopGroove



Insert Style

B – Blank (for special forms)
F – Face grooving
G – Grooving
P – Back turning
R – Full radius
U – Undercutting (or relieving)
V – Poly-Vee

Additional Information

D – Deep grooving
P – Positive
C – Groove and chamfer

Insert Size

insert number	W1 mm
1	2,54
2	3,81
3	4,95
4	6,98
5	9,65
6	9,73

Size Identification

M – Metric insert groove width
C – Circlip groove insert width is nominal circlip size
Blank – Indicates inch width insert

Groove Size**

Position pertains to groove width for F-, G-, and U-style inserts, radii for R-style grooving inserts, and circlip size for groove and chamfer inserts. Dimension in 0,01mm.
Example: 3,25mm width groove or radius equals "325" catalogue position number.
Width Tolerance: ±0,025mm unless otherwise specified.

Hand of Insert

L – Left hand
R – Right hand

Cutting Depth

Shown for groove and chamfer inserts in 0,01mm increments.

Chipbreaker Design

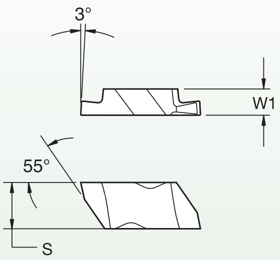
K – Standard chip control
E – Hone only

Definition of Inserts

Groove size J or L – Poly-Vee inserts
I – Internal face grooving

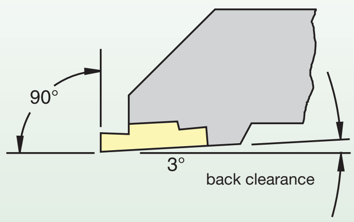
***Omit position for TopGroove NB-style blanks.*

TopGroove/TopThread Threading and Grooving Insert Dimensions



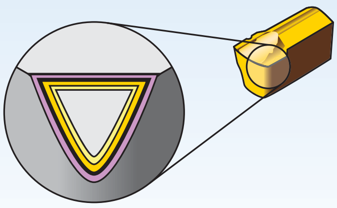
insert size	S mm	S inch	W1 mm	W1 Inch
1	2,54	.100	2,54	.100
2	5,56	.219	3,81	.150
3	8,74	.344	4,95	.195
4	11,51	.453	6,48	.255
5	17,48	.688	9,65	.380
6	11,51	.453	9,73	.383
8	7,93	.312	11,13	.438

TopGroove/TopThread Holder Design



NOTE: Holders are designed to locate insert inclined to 3° to provide back clearance down open side.

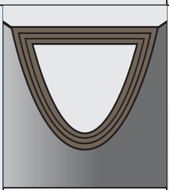
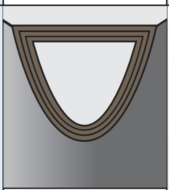
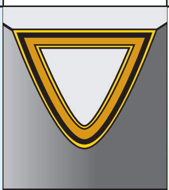
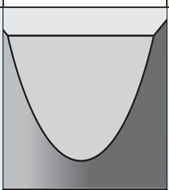
WIDIA™ TopGroove and TopThread™ tooling technology combine to bring you the very best threading and grooving system available in the world today.

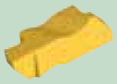
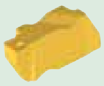
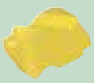
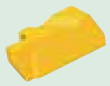
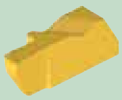
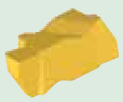
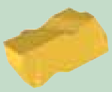
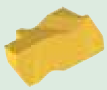
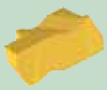


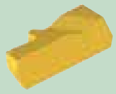
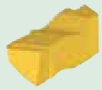
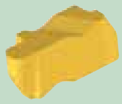
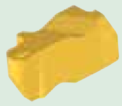
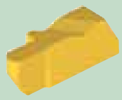
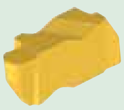
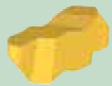
Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

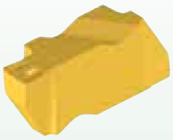
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
TN6010	 HC-S10	An advanced PVD TiAlN coating over a very deformation-resistant unalloyed carbide substrate. TN6010 is ideal for finishing to general machining of most workpiece materials at higher speeds. Excellent for machining most steels, stainless steels, cast irons, non-ferrous materials, and super alloys under stable conditions. It also performs well machining hardened and short chipping materials.	P		■	■	■					
			M		■	■	■					
			K		■	■	■					
			N		■	■	■					
			S		■	■	■					
			H		■							
TN6025	 HC-S25	An advanced PVD TiAlN-coated grade with a tough, ultra-fine-grain unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temp alloys, titanium, irons, and non-ferrous materials. Speeds may vary from low to medium and will handle interruptions and high feed rates.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
			H			■	■					
TN7110	 HC-P10	Coated carbide. MTCVD/CVD — TiN-TiCN-Al_2O_3-TiN. Very wear resistant. Light and medium machining. For steels and nodular cast iron.	P		■	■	■					
			K			■	■					
THM	 HW-K15	Uncoated carbide. Extraordinarily good balance of hardness, wear resistance, edge stability, and toughness. Light and medium machining. For cast iron and all non-ferrous metals and non-metals. Useful in unfavourable conditions.	P		■	■	■					
			M		■	■	■					
			K		■	■	■					
			N		■	■	■					
			S		■	■	■					
			H		■	■	■					

insert style	application	rake angle	page(s)
NG 	• General-purpose grooving. • O-ring grooving. • Circlip grooving.	neutral	**E51–E52**
NG-K 	• Chip control geometry. • General-purpose grooving. • O-ring grooving. • Circlip grooving. • Light turning.	10° positive	**E53–E59**
NGC-K* 	• Combined groove and chamfered edge break in one positive plunge with chip control. • Designed for DIN 471/472 standard circlip grooves.	10° positive	**–**
NGD* 	• Deep grooving.	neutral	**–**
NGD-K 	• Chip control geometry. • Deep grooving. • Light turning.	10° positive	**E60–E62**
NGP 	• General-purpose grooving. • O-ring grooving. • Circlip grooving.	5° positive	**E63–E64**
NF* 	• Face grooving. • Additional side clearance.	neutral	**–**
NF-K 	• Face grooving with chip control. • Additional side clearance.	10° positive	**E65**
NFD-K 	• Deep face grooving with chip control. • Additional side clearance.	10° positive	**E66**

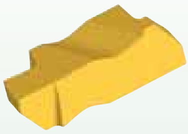
insert style	application	rake angle	page(s)
NFD-KI* 	• Internal deep face grooving with chip control. • For use in boring bars for internal face grooves.	10° positive	**–**
NP-K 	• Turning. • Back turning positive. • Profiling with chip control.	10° positive	**E66**
NR 	• Full radius grooving. • Turning and profiling.	neutral	**E67–E69**
NR-K 	• Chip control geometry. • Full radius grooving, turning, and profiling.	10° positive	**E70**
NRD 	• Deep grooving. • Full radius end-form.	neutral	**E71**
NRP* 	• Full radius grooving. • Light-turning profiling.	5° positive	**–**
NU* 	• Undercutting.	neutral	**–**
NV* 	• Poly-Vee grooving.	neutral	**–**
NB/NBD 	• Blanks. • Blanks for deep grooving. • Available in uncoated grades only.	–	**E72**

**Inserts are available as custom solutions.*

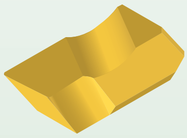
TopGroove • NG -K, NG-1L, and NG



NG-K

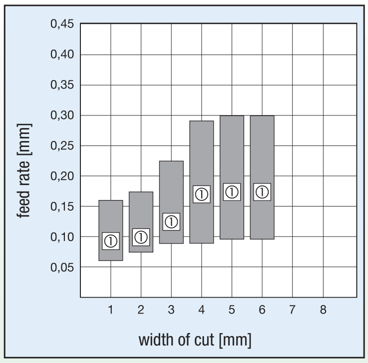


NG



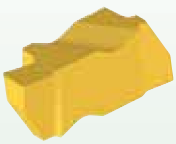
NG-1L

- Chip control enables true optimisation and productivity.
- For general-purpose, O-ring, and circlip grooving applications.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

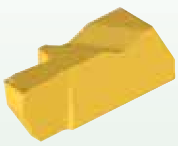


① Recommended Starting Feed

TopGroove • NGP and NGD-K

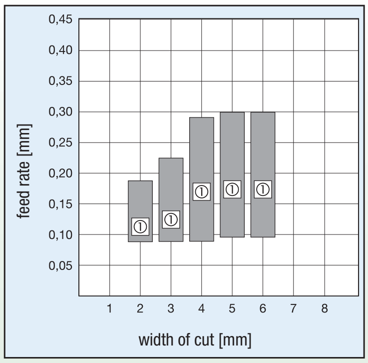


NGP



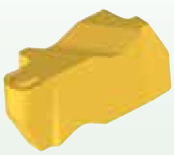
NGD-K

- Positive rake angles.
- For deep, O-ring, circlip, and general-purpose grooving applications.
- Chip geometry for excellent chip control.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

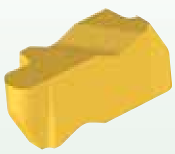


① Recommended Starting Feed

TopGroove • NR and NR-K

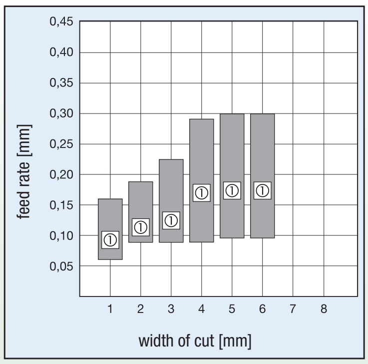


NR



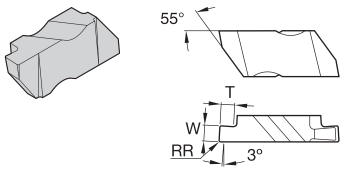
NR-K

- For full radius grooving and turning profiling applications.
- Chip geometry for excellent chip control.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.



① Recommended Starting Feed

Material Group		Cutting Speed — vc m/min											
		TN6010			TN6025			TN7110			THM		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	0/1	140	**175**	210	130	**140**	150	200	**215**	230	90	**95**	100
	2	115	**145**	175	110	**145**	175	170	**220**	270	75	**100**	125
	3	115	**145**	175	110	**145**	175	170	**220**	270	75	**100**	125
	4	75	**100**	120	75	**95**	115	115	**145**	175	55	**65**	80
	5	105	**140**	170	100	**125**	145	155	**190**	220	70	**85**	100
	6	45	**60**	75	40	**55**	65	65	**85**	100	30	**40**	45
M	1	90	**115**	140	60	**75**	90	–	–	–	60	**75**	90
	2	55	**70**	90	40	**50**	55	–	–	–	50	**60**	75
	3	60	**80**	95	40	**50**	60	–	–	–	40	**50**	55
K	1	120	**150**	180	60	**80**	90	175	**220**	275	70	**90**	100
	2	120	**150**	180	60	**75**	85	165	**215**	265	50	**65**	80
	3	110	**140**	170	60	**75**	90	180	**230**	280	60	**70**	80
N	1	600	**750**	900	600	**750**	900	–	–	–	600	**750**	900
	2	535	**685**	835	535	**685**	835	–	–	–	500	**650**	800
	3	230	**300**	370	230	**300**	370	–	–	–	600	**750**	900
	4	135	**180**	225	135	**180**	225	–	–	–	500	**650**	800
	5	70	**90**	110	70	**90**	110	–	–	–	230	**300**	370
	6	445	**565**	690	445	**565**	690	–	–	–	150	**200**	250
	7	550	**700**	850	550	**700**	850	–	–	–	150	**200**	250
S	1	35	**40**	50	25	**35**	40	–	–	–	25	**35**	45
	2	20	**20**	30	15	**20**	20	–	–	–	20	**30**	35
	3	60	**70**	80	40	**60**	70	–	–	–	15	**25**	30
	4	30	**35**	45	20	**30**	35	–	–	–	10	**15**	20
H	1	15	**30**	60	15	**30**	60	–	–	–	10	**20**	35
	2	15	**30**	60	15	**30**	60	–	–	–	10	**20**	35
	3	15	**30**	60	15	**30**	60	–	–	–	10	**20**	35
	4	15	**30**	60	15	**30**	60	–	–	–	10	**20**	35



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

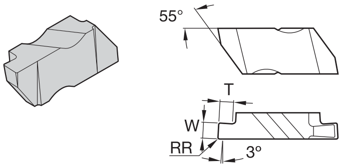
		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

NG • Grooving Inserts

catalogue number	insert size	W	RR	T	TN6010	TN6025	TN7110	THM
right hand								
NG2031R	2	0,79	0,09	1,27	3607153	3607495	-	3607030
NG2041R	2	1,04	0,09	1,27	-	3607330	-	-
NG3047R	3	1,19	0,19	1,91	3607157	3607416	-	-
NG2058R	2	1,47	0,19	1,27	-	3607450	-	-
NG2062R	2	1,58	0,19	2,79	3607167	3607453	-	3607027
NG3062R	3	1,58	0,19	2,39	3607109	3607403	-	3607014
NG3094R	3	2,39	0,19	3,81	3607137	3607406	-	3607018
NG3125R	3	3,18	0,19	3,81	3607110	3607375	-	3607020
NG4250R	4	6,35	0,57	6,35	3607143	3607382	-	-
left hand								
NG2031L	2	0,79	0,09	1,27	-	3607482	-	-
NG3047L	3	1,19	0,19	1,91	3607179	3607501	-	3607036
NG2058L	2	1,47	0,19	1,27	-	3607498	-	-
NG2062L	2	1,58	0,19	2,79	-	3607481	-	-
NG3062L	3	1,58	0,19	2,39	3607158	3607459	-	-

(continued)

(NG • Grooving Inserts — continued)

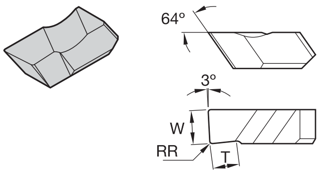


Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

	TN6010	TN6025	TN7110	THM
P	●	●	●	
M	●	●		○
K	●	○	○	○
N	●	○		●
S	●	●		●
H	○	○		

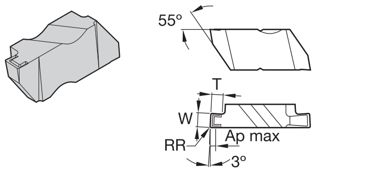
catalogue number	insert size	W	RR	T	TN6010	TN6025	TN7110	THM
NG3094L	3	2,39	0,19	3,81	3607160	3607323	-	-
NG3125L	3	3,18	0,19	3,81	3607152	3607445	-	3607022
NG5M500L	5	5,00	0,32	9,52	-	3636572	-	-
NG4250L	4	6,35	0,57	6,35	3607175	3607513	-	-



NG-1L • Grooving Inserts

catalogue number	insert size	W	RR	T	cutting edges	TN6010	TN6025	TN7110	THM
left hand									
NG1047L	1	1,19	0,19	1,91	1	-	3636571	-	-
NG1062L	1	1,58	0,19	1,91	1	-	3636569	-	-
NG1094L	1	2,39	0,19	1,91	1	-	3636570	-	-

NOTE: Width tolerance is +/– 0,076mm on NG-1L inserts.



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

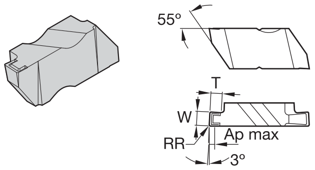
NG-K • Grooving Inserts with Chip Control

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
right hand									
NG2M050RK	2	0,50	0,64	0,09	0,64	3606991	3607394	-	-
NG2031RK	2	0,79	0,76	0,09	1,27	3607090	3607313	-	-
NG2M080RK	2	0,80	0,76	0,09	1,27	3606903	3607291	-	-
NG2M100RK	2	1,00	0,76	0,09	1,27	3607129	3607218	-	-
NG3M100RK	3	1,00	0,76	0,19	1,91	-	3607219	-	-
NG2047RK	2	1,19	0,76	0,09	1,27	3607123	3607404	-	-
NG3047RK	3	1,19	0,76	0,19	1,91	3607084	3607238	-	-
NG2M120RK	2	1,20	0,76	0,09	1,27	3606679	3607299	-	-
NG3M120RK	3	1,20	0,76	0,19	1,91	3606915	3607412	-	-
NG2M140RK	2	1,40	0,76	0,09	1,27	3607151	3607318	-	-
NG2M150RK	2	1,50	1,09	0,19	2,79	-	3607234	-	-
NG3M150RK	3	1,50	1,02	0,19	2,39	-	3607221	3607668	-
NG2062RK	2	1,58	1,09	0,19	2,79	3607089	3607215	-	-
NG3062RK	3	1,58	1,02	0,19	2,39	3607055	3607070	3607628	-
NG2M170RK	2	1,70	1,09	0,19	2,79	3606673	3607242	-	-

(continued)

Grooving and Cut-Off

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

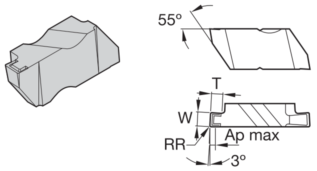
● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG2M175RK	2	1,75	1,09	0,19	2,79	-	3607379	-	-
NG3M175RK	3	1,75	1,02	0,19	2,39	-	3607418	-	-
NG3072RK	3	1,83	1,02	0,19	2,39	3607145	3607332	-	-
NG2M195RK	2	1,95	1,09	0,19	2,79	3606829	3607417	-	-
NG3078RK	3	1,98	1,02	0,19	2,39	3607111	3607309	-	-
NG2M200RK	2	2,00	1,09	0,19	2,79	3607100	3607071	-	-
NG3M200RK	3	2,00	1,02	0,19	2,39	-	3607208	3607662	-
NG2M220RK	2	2,20	1,09	0,19	2,79	-	3607521	-	-
NG3M220RK	3	2,20	1,02	0,19	2,39	-	3607336	-	-
NG3M225RK	3	2,24	1,02	0,19	2,39	3606674	3607310	-	-
NG2M225RK	2	2,25	1,09	0,19	2,79	3606828	3607411	-	-
NG2094RK	2	2,39	1,09	0,19	2,79	3607146	3607317	-	-
NG3094RK	3	2,39	1,02	0,19	3,81	3606660	3607069	-	-
NG2M250RK	2	2,50	1,09	0,19	2,79	-	3607324	-	-
NG3M250RK	3	2,50	1,02	0,19	3,81	-	3607217	3607664	-
NG2M275RK	2	2,75	1,09	0,19	2,79	3606916	3607409	-	-

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

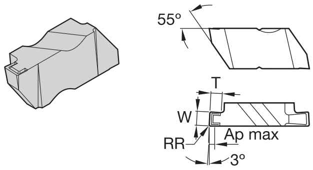
● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG3M275RK	3	2,75	1,02	0,19	3,81	3606677	3607337	–	–
NG2M300RK	2	3,00	1,09	0,19	2,79	3606676	3607340	–	–
NG3M300RK	3	3,00	1,02	0,19	3,81	3607138	3607072	3607655	–
NG4M300RK	4	3,00	1,02	0,19	3,81	–	3607388	–	–
NG2125RK	2	3,18	1,09	0,19	2,79	3607155	3607381	–	–
NG3125RK	3	3,18	1,02	0,19	3,81	3607057	3607068	–	–
NG4125RK	4	3,18	1,06	0,19	3,81	3607163	3607449	–	–
NG3M320RK	3	3,20	1,02	0,19	3,81	–	3607365	–	–
NG2M325RK	2	3,25	1,09	0,19	2,79	–	3607533	–	–
NG3M325RK	3	3,25	1,02	0,19	3,81	–	3607515	–	–
NG3M350RK	3	3,50	2,92	0,32	3,81	–	3607302	–	–
NG4M350RK	4	3,50	2,92	0,57	6,35	–	3607370	–	–
NG3156RK	3	3,96	2,92	0,19	3,81	3607127	3607456	–	–
NG3M400RK	3	3,99	2,92	0,32	3,81	3606678	3607235	–	–
NG4M400RK	4	4,00	2,92	0,57	6,35	3606908	3607364	–	–
NG3M425RK	3	4,24	2,92	0,32	3,81	3606914	3607517	–	–

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

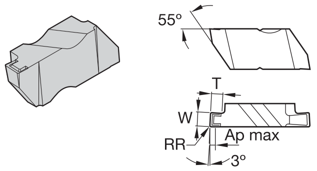
● first choice
○ alternate choice

	TN6010	TN6025	TN7110	THM
P	●	●	●	
M	●	●		○
K	●	○	○	○
N	●	○		●
S	●	●		●
H	○	○		

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG3M450RK	3	4,50	2,92	0,32	3,81	–	3607362	–	–
NG4M450RK	4	4,50	2,92	0,57	6,35	–	3607390	–	–
NG3189RK	3	4,80	2,92	0,57	3,81	3607108	3607305	3607630	–
NG4189RK	4	4,80	2,92	0,57	6,35	3607103	3607220	–	–
NG4M500RK	4	5,00	2,92	0,32	6,35	3606830	3607447	–	–
NG4M550RK	4	5,50	3,81	0,57	6,35	–	3607383	–	–
NG4M600RK	4	6,00	3,81	0,57	6,35	–	3607385	–	–
NG4250RK	4	6,35	3,81	0,57	6,35	3607168	3607304	–	–
left hand									
NG2M050LK	2	0,50	0,64	0,09	0,64	3606990	3607463	–	–
NG2031LK	2	0,79	0,76	0,09	1,27	3607112	3607443	–	–
NG2M080LK	2	0,80	0,76	0,09	1,27	3606911	3607534	–	–
NG2M100LK	2	1,00	0,76	0,09	1,27	3607159	3607239	–	–
NG3M100LK	3	1,00	0,76	0,19	1,91	–	3607419	–	–
NG2047LK	2	1,19	0,76	0,09	1,27	–	3607376	–	–
NG3047LK	3	1,19	0,76	0,19	1,91	3607105	3607374	–	–

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

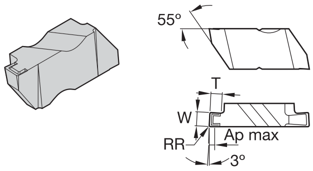
catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG2M120LK	2	1,20	0,76	0,09	1,27	3606827	3607334	-	-
NG3M120LK	3	1,20	0,76	0,19	1,91	3606917	3607384	-	-
NG2M140LK	2	1,40	0,76	0,09	1,27	3606904	3607338	-	-
NG2M150LK	2	1,50	1,09	0,19	2,79	-	3607294	-	-
NG3M150LK	3	1,50	1,02	0,19	2,39	-	3607308	3607663	-
NG2062LK	2	1,58	1,09	0,19	2,79	3607126	3607307	-	-
NG3062LK	3	1,58	1,02	0,19	2,39	3607092	3607213	3607631	-
NG2M170LK	2	1,70	1,09	0,19	2,79	3606905	3607327	-	-
NG2M175LK	2	1,75	1,09	0,19	2,79	-	3607421	-	-
NG3M175LK	3	1,75	1,02	0,19	2,39	-	3607331	-	-
NG3072LK	3	1,83	1,02	0,19	2,39	3607184	3607454	-	-
NG2M195LK	2	1,95	1,09	0,19	2,79	3606910	3607420	-	-
NG3078LK	3	1,98	1,02	0,19	2,39	3607106	3607460	-	-
NG2M200LK	2	2,00	1,09	0,19	2,79	3607144	3607207	-	-
NG3M200LK	3	2,00	1,02	0,19	2,39	-	3607211	3607666	-
NG2M220LK	2	2,20	1,09	0,19	2,79	-	3607367	-	-

(continued)

Grooving and Cut-Off

Grooving and Cut-Off

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

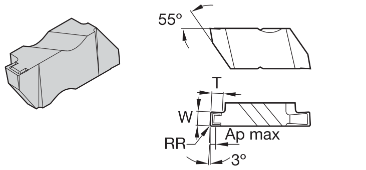
● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG3M220LK	3	2,20	1,02	0,19	2,39	-	3607516	-	-
NG3M225LK	3	2,24	1,02	0,19	2,39	3606909	3607329	-	-
NG2M225LK	2	2,25	1,09	0,19	2,79	3606907	3607413	-	-
NG2094LK	2	2,39	1,09	0,19	2,79	3607149	3607380	-	-
NG3094LK	3	2,39	1,02	0,19	3,81	3607058	3607204	-	-
NG2M250LK	2	2,50	1,09	0,19	2,79	-	3607518	-	-
NG3M250LK	3	2,50	1,02	0,19	3,81	-	3607300	-	-
NG2M275LK	2	2,75	1,09	0,19	2,79	3606913	3607292	-	-
NG3M275LK	3	2,75	1,02	0,19	3,81	3606831	3607297	-	-
NG2M300LK	2	3,00	1,09	0,19	2,79	3606680	3607326	-	-
NG3M300LK	3	3,00	1,02	0,19	3,81	3606522	3607212	-	-
NG4M300LK	4	3,00	1,02	0,19	3,81	-	3607386	-	-
NG2125LK	2	3,18	1,09	0,19	2,79	3607165	3607444	-	-
NG3125LK	3	3,18	1,02	0,19	3,81	3607061	3607203	-	-
NG4125LK	4	3,18	1,06	0,19	3,81	3607183	3607448	-	-
NG3M320LK	3	3,20	1,02	0,19	3,81	-	3607372	-	-

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)

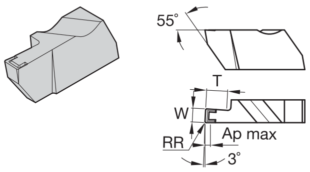


Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

	TN6010	TN6025	TN7110	THM
P	●	●	●	
M	●	●		○
K	●	○	○	○
N	●	○		●
S	●	●		●
H	○	○		

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG2M325LK	2	3,25	1,09	0,19	2,79	-	3607368	-	-
NG3M325LK	3	3,25	1,02	0,19	3,81	-	3607315	-	-
NG3M350LK	3	3,50	2,92	0,32	3,81	-	3607519	-	-
NG4M350LK	4	3,50	2,92	0,57	6,35	-	3607371	3607653	-
NG3156LK	3	3,96	2,92	0,19	3,81	3607177	3607335	-	-
NG3M400LK	3	3,99	2,92	0,32	3,81	3606906	3607237	3607656	-
NG4M400LK	4	4,00	2,92	0,57	6,35	3606912	3607363	-	-
NG3M425LK	3	4,24	2,92	0,32	3,81	3606918	3607520	-	-
NG3M450LK	3	4,50	2,92	0,32	3,81	-	3607369	-	-
NG4M450LK	4	4,50	2,92	0,57	6,35	-	3607389	-	-
NG3189LK	3	4,80	2,92	0,57	3,81	3607107	3607320	3607629	-
NG4189LK	4	4,80	2,92	0,57	6,35	3607140	3607377	-	-
NG4M500LK	4	5,00	2,92	0,32	6,34	3606832	3607522	-	-
NG4M550LK	4	5,50	3,81	0,57	6,35	-	3607366	-	-
NG4M600LK	4	6,00	3,81	0,57	6,35	-	3607387	-	-
NG4250LK	4	6,35	3,81	0,57	6,35	3607142	3607311	-	-



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

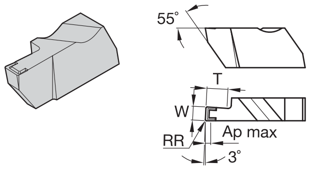
	TN6010	TN6025	TN7110	THM
P	●	●	●	
M	●	●		○
K	●	○	○	○
N	●	○		●
S	●	●		●
H	○	○		

NGD-K • Deep Grooving Inserts with Chip Control

catalogue number	insert size	W	Ap max	RR	T	cutting edges	TN6010	TN6025	TN7110	THM
right hand										
NGD2M150RK	2	1,50	1,09	0,19	4,06	1	3606937	3607503	-	-
NGD3062RK	3	1,58	1,02	0,19	3,18	2	3607104	3607233	-	-
NGD2M200RK	2	2,00	1,09	0,19	5,08	1	3606938	3607465	-	-
NGD3M200RK	3	2,00	1,02	0,19	4,06	1	3606945	3607505	-	-
NGD3094RK	3	2,39	1,02	0,19	6,35	1	3607083	3607205	-	3607029
NGD2M250RK	2	2,50	1,09	0,19	5,08	1	3606939	3607504	-	-
NGD3M250RK	3	2,50	1,02	0,19	6,35	1	3606946	3607425	-	-
NGD3M300RK	3	3,00	1,02	0,19	6,35	1	3606922	3607426	-	-
NGD3125RK	3	3,18	1,02	0,19	6,35	1	3607088	3607210	-	-
NGD4125RK	4	3,18	1,02	0,19	6,35	2	3607133	3607312	-	-
NGD3M350RK	3	3,50	2,92	0,32	6,35	1	-	3607506	-	-
NGD3M400RK	3	4,00	2,92	0,32	6,35	1	3606940	3607427	-	-
NGD4M400RK	4	4,00	2,92	0,57	9,53	1	3606986	3607507	-	-
NGD4M450RK	4	4,50	2,92	0,57	12,70	1	-	3607508	-	-
NGD3189RK	3	4,80	2,92	0,57	6,35	1	3607170	3607373	-	-

(continued)

(NGD-K • Deep Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

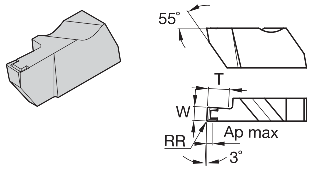
● first choice
○ alternate choice

	TN6010	TN6025	TN7110	THM
P	●	●	●	
M	●	●		○
K	●	○	○	○
N	●	○		●
S	●	●		●
H	○	○		

catalogue number	insert size	W	Ap max	RR	T	cutting edges	TN6010	TN6025	TN7110	THM
NGD4189RK	4	4,80	2,92	0,57	9,53	1	3607161	3607321	–	–
NGD4M500RK	4	5,00	2,92	0,57	12,70	1	3606988	3607509	–	–
NGD4M550RK	4	5,50	3,81	0,57	12,70	1	3606989	–	–	–
NGD4250RK	4	6,35	3,81	0,57	12,70	1	3607134	3607414	–	–
left hand										
NGD2M150LK	2	1,50	1,09	0,19	4,06	1	3606935	3607402	–	–
NGD3062LK	3	1,58	1,02	0,19	3,18	2	3607098	3607451	–	–
NGD2M200LK	2	2,00	1,09	0,19	5,08	1	3606936	3607399	–	–
NGD3M200LK	3	2,00	1,02	0,19	4,06	1	3606941	3607487	–	–
NGD3094LK	3	2,39	1,02	0,19	6,34	1	3607096	3607240	–	3607035
NGD2M250LK	2	2,50	1,09	0,19	5,08	1	3606992	3607391	–	–
NGD3M250LK	3	2,50	1,02	0,19	6,35	1	3606942	3607423	–	–
NGD3M300LK	3	3,00	1,02	0,19	6,35	1	3606943	3607400	–	–
NGD3125LK	3	3,18	1,02	0,19	6,35	1	3607097	3607209	–	–
NGD4125LK	4	3,18	1,02	0,19	6,35	2	3607132	3607316	–	–
NGD3M350LK	3	3,50	2,92	0,32	6,35	1	–	3607488	–	–

(continued)

(NGD-K • Deep Grooving Inserts with Chip Control — continued)

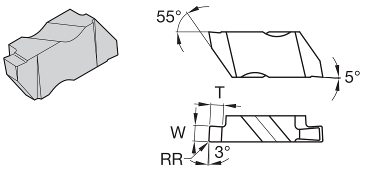


Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

catalogue number	insert size	W	Ap max	RR	T	cutting edges	TN6010	TN6025	TN7110	THM
NGD3M400LK	3	4,00	2,92	0,32	6,35	1	3606921	3607424	–	–
NGD4M400LK	4	4,00	2,92	0,57	9,53	1	3606923	3607489	–	–
NGD4M450LK	4	4,50	2,92	0,57	12,70	1	–	3607490	–	–
NGD3189LK	3	4,80	2,92	0,57	6,35	1	3607148	3607410	–	–
NGD4189LK	4	4,80	2,92	0,57	9,53	1	3607147	3607314	–	–
NGD4M500LK	4	5,00	2,92	0,57	12,70	1	–	3607491	–	–
NGD4M550LK	4	5,50	3,81	0,57	12,70	1	–	3607492	–	–
NGD4250LK	4	6,35	3,80	0,57	12,70	1	3607178	3607422	–	–



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

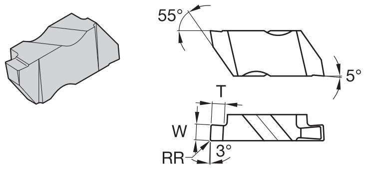
		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

NGP • Grooving Positive Rake Inserts

catalogue number	insert size	W	RR	T	TN6010	TN6025	TN7110	THM
right hand								
NGP2M150R	2	1,50	0,19	2,79	3606975	-	-	3607045
NGP3M150R	3	1,50	0,19	1,90	3606979	-	-	3607049
NGP2062R	2	1,58	0,19	2,79	3607128	-	-	-
NGP2M200R	2	2,00	0,19	2,79	3606976	-	-	3607046
NGP3M200R	3	2,00	0,19	2,79	3606980	-	-	3607050
NGP2M250R	2	2,50	0,19	2,79	3606977	-	-	3607047
NGP3M250R	3	2,50	0,19	3,81	3606981	-	-	3607051
NGP2M300R	2	3,00	0,19	2,79	3606978	-	-	3607048
NGP3M300R	3	3,00	0,19	3,81	-	-	-	3607052

(continued)

(NGP • Grooving Positive Rake Inserts — continued)

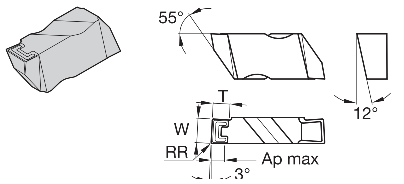


Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

	TN6010	TN6025	TN7110	THM
P	●	●	●	
M	●	●		○
K	●	○	○	○
N	●	○		●
S	●	●		●
H	○	○		

catalogue number	insert size	W	RR	T	TN6010	TN6025	TN7110	THM
left hand								
NGP2M150L	2	1,50	0,19	2,79	3606967	–	–	3607037
NGP3M150L	3	1,50	0,19	1,90	3606971	–	–	3607041
NGP2062L	2	1,57	0,19	2,79	3607182	–	–	–
NGP2M200L	2	2,00	0,19	2,79	3606968	–	–	3607038
NGP3M200L	3	2,00	0,19	2,79	3606972	–	–	3607042
NGP2M250L	2	2,50	0,19	2,79	3606969	–	–	3607039
NGP3M250L	3	2,50	0,19	3,81	3606973	–	–	3607043
NGP2M300L	2	3,00	0,19	2,79	–	–	–	3607040
NGP3M300L	3	3,00	0,19	3,81	3606974	–	–	3607044



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

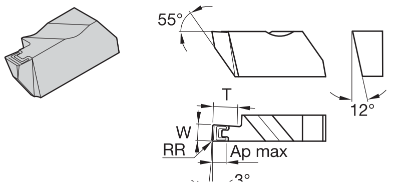
	TN6010	TN6025	TN7110	THM
P	●	●	●	
M	●	●		○
K	●	○	○	○
N	●	○		●
S	●	●		●
H	○	○		

NF-K • Face Grooving Positive Rake Inserts

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
right hand									
NF3M200RK	3	2,00	1,02	0,19	1,78	–	**3607511**	–	–
NF3M300RK	3	3,00	1,02	0,19	3,81	–	**3607512**	–	–
NF3125RK	3	3,18	1,02	0,19	3,81	–	**3607241**	–	–
left hand									
NF3M200LK	3	2,00	1,02	0,19	1,78	–	**3607428**	–	–
NF3M300LK	3	3,00	1,02	0,19	3,81	–	**3607429**	–	–
NF3125LK	3	3,18	1,02	0,19	3,81	–	**3607322**	–	–
NF3156LK	3	3,96	2,92	0,19	3,81	–	**3607333**	–	–

Grooving and Cut-Off

WIDIA



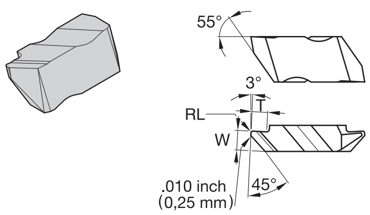
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

■ NFD-K • Face Grooving Deep-Grooving Inserts

catalogue number	insert size	W	Ap max	RR	T	cutting edges	TN6010	TN6025	TN7110	THM
right hand										
NFD3M300RK	3	3,00	1,02	0,19	6,35	1	–	3607523	–	–
NFD3125RK	3	3,18	1,02	0,19	6,35	1	–	3607296	–	–
NFD4189RK	4	4,80	2,92	0,57	9,53	1	–	3607325	–	–
NFD4250RK	4	6,35	3,81	0,57	12,70	1	–	3607378	–	–
left hand										
NFD3M300LK	3	3,00	1,02	0,19	6,35	1	–	3607464	–	–
NFD3125LK	3	3,18	1,02	0,19	6,35	1	–	3607293	–	–
NFD4189LK	4	4,80	2,92	0,57	9,53	1	–	3607415	–	–

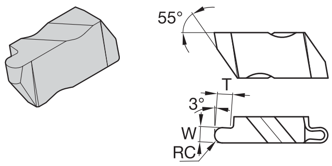


Right-hand insert shown; left-hand insert is mirror image.

■ NP-K • Profiling Inserts

catalogue number	insert size	W	RL	T	TN6010	TN6025	TN7110	THM
right hand								
NP2002RK	2	3,68	0,25	2,79	3607136	3607477	–	–
NP3002RK	3	4,83	0,25	5,08	3607154	3607493	–	–
NP3012RK	3	4,83	0,25	5,08	–	3607328	–	–

NOTE: Width tolerance is +/- 0,13mm.



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

NR • Full Radius Inserts

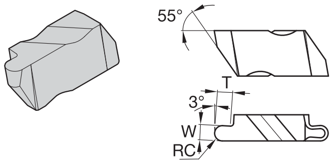
catalogue number	insert size	W	RC	T	TN6010	TN6025	TN7110	THM
right hand								
NR2M050R	2	1,00	0,50	1,27	3606957	3607393	-	-
NR2M075R	2	1,50	0,75	2,79	3606929	3607469	-	-
NR2031R	2	1,58	0,79	2,79	3607174	3607301	-	-
NR3031R	3	1,58	0,79	2,39	3607125	3607475	-	3607015
NR2M100R	2	2,00	1,00	2,79	3606930	3607470	-	-
NR3M100R	3	2,00	1,00	2,39	3606958	3607397	-	-
NR2047R	2	2,39	1,19	2,79	-	3607494	-	-
NR3047R	3	2,39	1,19	3,81	3607093	3607502	-	3607031
NR2M125R	2	2,50	1,25	2,79	3606931	3607471	-	-
NR3M125R	3	2,50	1,25	3,81	3606959	3607439	-	-
NR2M150R	2	3,00	1,50	2,79	3606932	3607472	-	-
NR3M150R	3	3,00	1,50	3,81	3606960	3607440	-	-
NR3062R	3	3,18	1,59	3,81	3607131	3607473	-	3607026
NR2M175R	2	3,50	1,75	2,79	3606933	3607483	-	-
NR3M175R	3	3,50	1,75	3,81	3606961	3607441	-	-

(continued)

Grooving and Cut-Off

Grooving and Cut-Off

(NR • Full Radius Inserts — continued)



Right-hand insert shown; left-hand insert is mirror image.

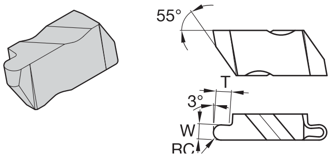
● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

catalogue number	insert size	W	RC	T	TN6010	TN6025	TN7110	THM
NR3M200R	3	4,00	2,00	3,81	3606962	3607398	–	–
NR4M200R	4	4,00	2,00	6,35	3606964	3607484	–	–
NR3M225R	3	4,50	2,25	3,81	3606963	3607442	–	–
NR4M225R	4	4,50	2,25	6,35	3606965	3607485	–	–
NR3094R	3	4,78	2,39	3,81	3607180	3607476	–	–
NR4M250R	4	5,00	2,50	6,35	3606966	3607486	–	–
NR4125R	4	6,35	3,18	6,35	3607130	3607500	–	–
left hand								
NR2M050L	2	1,00	0,50	1,27	3606948	3607401	3607672	–
NR2M075L	2	1,50	0,75	2,79	3606924	3607430	–	–
NR2031L	2	1,58	0,79	2,79	3607176	3607319	–	–
NR3031L	3	1,58	0,79	2,39	3607139	3607478	–	3607034
NR2M100L	2	2,00	1,00	2,79	3606925	3607431	3607684	–
NR3M100L	3	2,00	1,00	2,39	3606949	3607395	–	–
NR2047L	2	2,39	1,19	2,79	–	3607446	–	–
NR3047L	3	2,39	1,19	3,81	3607135	3607479	–	3607028

(continued)

(NR • Full Radius Inserts — continued)

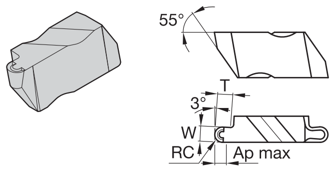


Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

	TN6010	TN6025	TN7110	THM
P	●	●	●	
M	●	●		○
K	●	○	○	○
N	●	○		●
S	●	●		●
H	○	○		

catalogue number	insert size	W	RC	T	TN6010	TN6025	TN7110	THM
NR2M125L	2	2,50	1,25	2,79	3606926	3607432	–	–
NR3M125L	3	2,50	1,25	3,81	3606950	3607435	3607689	–
NR2M150L	2	3,00	1,50	2,79	3606927	3607433	–	–
NR3M150L	3	3,00	1,50	3,81	3606951	3607436	–	–
NR3062L	3	3,18	1,59	3,81	3607171	3607497	–	3607032
NR2M175L	2	3,50	1,75	2,79	3606928	3607434	–	–
NR3M175L	3	3,50	1,75	3,81	3606952	3607437	3607691	–
NR3M200L	3	4,00	2,00	3,81	3606953	3607396	–	–
NR4M200L	4	4,00	2,00	6,35	3606954	3607466	–	–
NR3M225L	3	4,50	2,25	3,81	3606934	3607438	–	–
NR4M225L	4	4,50	2,25	6,35	3606955	3607467	–	–
NR3094L	3	4,78	2,39	3,81	3607169	3607339	–	–
NR4M250L	4	5,00	2,50	6,35	3606956	3607468	–	–
NR4125L	4	6,35	3,18	6,35	3607181	3607514	–	–



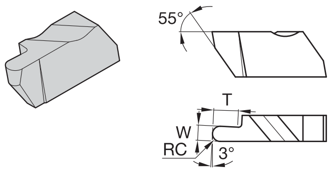
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

■ NR-K • Full Radius Inserts with Chip Control

catalogue number	insert size	W	Ap max	RC	T	TN6010	TN6025	TN7110	THM
right hand									
NR3031RK	3	1,57	1,97	0,79	2,39	3607062	3607206	-	-
NR3047RK	3	2,39	1,91	1,19	3,81	3607086	3607214	-	-
NR3062RK	3	3,18	2,92	1,59	3,81	3607056	3607236	-	-
NR4062RK	4	3,18	2,92	1,59	3,81	-	3607461	-	-
NR3078RK	3	3,96	2,54	1,98	3,81	3607094	3607407	-	-
NR4094RK	4	4,78	3,81	2,39	6,35	3607101	3607480	-	-
NR4125RK	4	6,35	3,81	3,18	6,35	3607141	3607303	-	-
left hand									
NR3031LK	3	1,58	1,98	0,79	2,39	3607095	3607222	-	-
NR3047LK	3	2,39	1,91	1,19	3,81	3607102	3607408	-	-
NR3062LK	3	3,18	2,92	1,59	3,81	3607091	3607216	-	-
NR4062LK	4	3,18	2,92	1,59	3,81	3607156	3607405	-	-
NR3078LK	3	3,96	2,54	1,98	3,81	3607172	3607306	-	-
NR4094LK	4	4,78	3,81	2,39	6,35	3607150	3607452	-	-
NR4125LK	4	6,35	3,81	3,18	6,35	3607166	3607458	-	-



Right-hand insert shown; left-hand insert is mirror image.

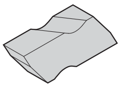
● first choice
○ alternate choice

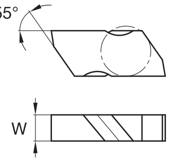
		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

■ NRD • Full Radius Deep-Grooving Inserts

catalogue number	insert size	W	T	cutting edges	TN6010	TN6025	TN7110	THM
right hand								
NRD3031R	3	1,58	3,18	2	3607087	3607457	–	–
NRD3062R	3	3,18	6,35	1	3607099	3607474	–	–
NRD4062R	4	3,18	6,35	2	3607173	3607499	–	–
NRD4125R	4	6,35	12,70	1	–	3607496	–	–
left hand								
NRD3031L	3	1,58	3,18	2	3607085	3607455	–	–
NRD3062L	3	3,18	6,35	1	3607124	3607462	–	–
NRD4062L	4	3,18	6,35	2	3607162	3607295	–	–
NRD4125L	4	6,35	12,70	1	3607186	3607298	–	–

Grooving and Cut-Off





Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

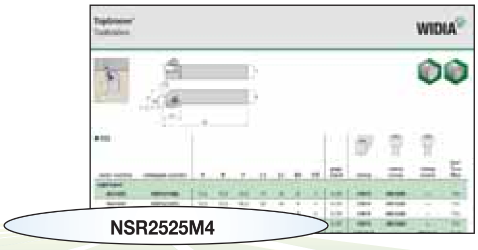
		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

NB • Blanks

catalogue number	insert size	W	TN6010	TN6025	TN7110	THM
right hand						
NB2R	2	3,81	ı	ı	ı	3607064
NB3R	3	4,95	ı	ı	ı	3607019
left hand						
NB2L	2	3,81	ı	ı	ı	3607016
NB3L	3	4,95	ı	ı	ı	3607017

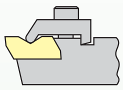
NOTE: NB blanks are designed to allow modification of the W dimension and end form.
W dimension is provided to indicate maximum possible width.
Available in uncoated grades only.

TopGroove™
Holder Identification System



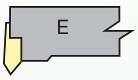
N	S	R		2525	M	4	
Insert Holding Method	Insert Mounting Location	Hand of Tool	Drop Head	Shank Size	Tool Length	Insert Size	Qualified Surface and Length

N –
TopGroove*

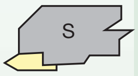


*Proprietary standard only.

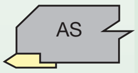
End mount



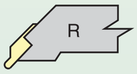
Side mount
Offset



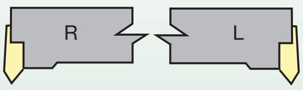
Side mount
No offset
for swiss
machining



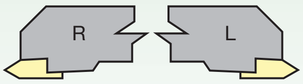
NRR undercut

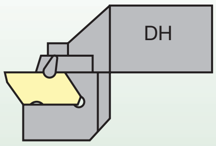


End mount



Side mount

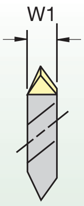




DH = Drop Head

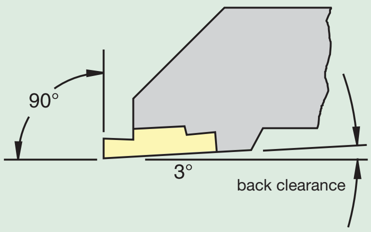
Shank height and width in mm and holder length according to ISO standard.

L1	ISO
32	A
40	B
50	C
60	D
70	E
80	F
90	G
100	H
110	I
125	J
140	K
150	L
160	M
170	N
180	P
200	Q
250	R
300	S
350	T
400	U
450	V
500	W
	Y
Special Length	X

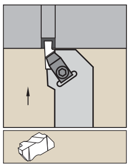


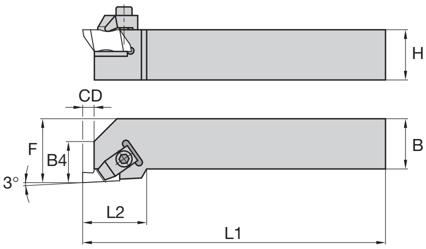
insert size	W1
2	3,81mm
3	4,95mm
4	6,98mm
5	9,65mm
6	9,73mm
8	11,13mm

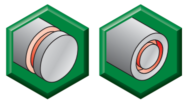
Q –
qualified metric holder



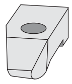
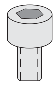
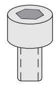
NOTE: Holders are designed to locate insert inclined to 3° to provide back clearance down open side.



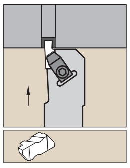


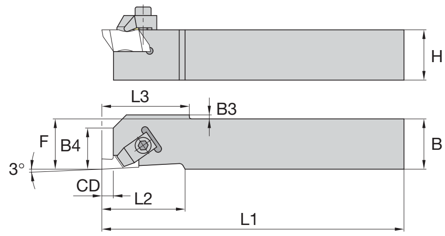


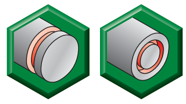
NS

order number	catalogue number	H	B	F	L1	L2	B4	CD	gage insert	 clamp	 clamp screw	 clamp screw	hex/ Torx Plus
right hand													
3641682	NSR1010E2	10,0	10,0	14,0	70	19	9	4	N.2R	CM74	MS1200	–	T10
3641660	NSR1212F2	12,0	12,0	16,0	80	19	9	4	N.2R	CM74	MS1200	–	T10
3636542	NSR1616H2	16,0	16,0	20,0	100	19	9	4	N.2R	CM74	MS1200	–	T10
3638589	NSR2020K2	20,0	20,0	25,0	125	19	9	4	N.2R	CM74	MS1200	–	T10
3638588	NSR2020K3	20,0	20,0	25,0	125	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3638590	NSR2525M2	25,0	25,0	32,0	150	19	9	4	N.2R	CM74	MS1200	–	T10
3636536	NSR2525M3	25,0	25,0	32,0	150	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3636540	NSR2525M4	25,0	25,0	32,0	150	35	14	7	N.4R	CM72LP	–	MS2111	25 IP
3641664	NSR3225P3	32,0	25,0	32,0	170	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3641675	NSR3225P4	32,0	25,0	32,0	170	35	14	7	N.4R	CM72LP	–	MS2111	25 IP
3641666	NSR3232P3	32,0	32,0	40,0	170	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3641669	NSR3232P4	32,0	32,0	40,0	170	35	14	7	N.4R	CM72LP	–	MS2111	25 IP
left hand													
3641683	NSL1010E2	10,0	10,0	14,0	70	19	9	4	N.2L	CM75	MS1200	–	T10
3641681	NSL1212F2	12,0	12,0	16,0	80	19	9	4	N.2L	CM75	MS1200	–	T10
3636545	NSL1616H2	16,0	16,0	20,0	100	19	9	4	N.2L	CM75	MS1200	–	T10
3639045	NSL2020K2	20,0	20,0	25,0	125	19	9	4	N.2L	CM75	MS1200	–	T10
3639046	NSL2020K3	20,0	20,0	32,0	125	32	13	5	N.3L	CM73LP	–	MS2111	25 IP
3639047	NSL2525M2	25,0	25,0	32,0	150	19	9	4	N.2L	CM75	MS1200	–	T10
3636539	NSL2525M3	25,0	25,0	32,0	150	32	13	5	N.3L	CM73LP	–	MS2111	25 IP
3636544	NSL2525M4	25,0	25,0	32,0	150	35	14	7	N.4L	CM73LP	–	MS2111	25 IP
3641670	NSL3225P3	32,0	25,0	32,0	170	32	13	5	N.3L	CM73LP	–	MS2111	25 IP
3641678	NSL3225P4	32,0	25,0	32,0	170	35	14	7	N.4L	CM73LP	–	MS2111	25 IP
3641671	NSL3232P3	32,0	32,0	40,0	170	32	13	5	N.3L	CM73LP	–	MS2111	25 IP
3641679	NSL3232P4	32,0	32,0	40,0	170	35	14	7	N.4L	CM73LP	–	MS2111	25 IP
3641688	NSL3232P5	32,0	32,0	40,0	170	51	16	11	N.5L	CM81	MS352	–	6 mm

NOTE: F dimension measured over sharp point of insert.

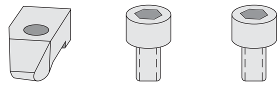






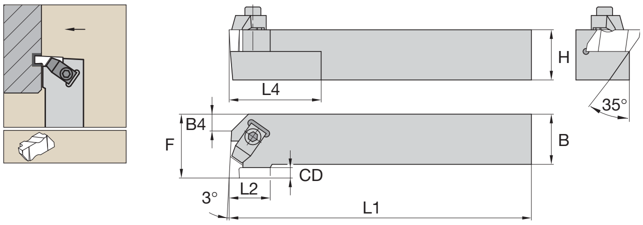
Grooving and Cut-Off

■ NAS

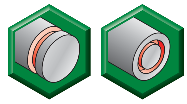


order number	catalogue number	H	B	F	L1	L2	B4	CD	B3	L3	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand															
3641667	**NASR1010M2Q**	10,0	10,0	10,0	150	19	9	3,5	2,03	19	N.2R	**CM182**	**MS1200**	**–**	T10
3641662	**NASR1212M2Q**	12,0	12,0	12,0	150	19	9	3,5	–	–	N.2R	**CM182**	**MS1200**	**–**	T10
3639048	**NASR1616K3Q**	16,0	16,0	16,0	125	32	12	5,3	–	–	N.3R	**CM184LP**	**–**	**MS2111**	25 IP
left hand															
3641691	**NASL1010M2Q**	10,0	10,0	10,0	150	19	9	3,5	2,03	19	N.2L	**CM183**	**MS1200**	**–**	T10
3641686	**NASL1212M2Q**	12,0	12,0	12,0	150	19	9	3,5	–	–	N.2L	**CM183**	**MS1200**	**–**	T10
3641687	**NASL1616K3Q**	16,0	16,0	16,0	125	32	12	5,3	–	–	N.3L	**CM185LP**	**–**	**MS2111**	25 IP

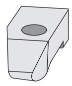
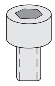
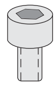
NOTE: F dimension measured over sharp point of insert.



Right-hand toolholder shown.

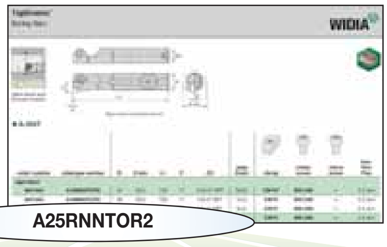


NE

order number	catalogue number	H	B	F	L1	L2	L4	B4	CD	gage insert	clamp 	clamp screw 	clamp screw 	hex/ Torx Plus
right hand														
3641674	**NER1616H2**	16,0	16,0	20,0	100	15	25	–	4	N.2L	**CM75**	**MS1200**	**–**	T10
3641658	**NER2020K2**	20,0	20,0	25,0	125	15	25	6	4	N.2L	**CM75**	**MS1200**	**–**	T10
3641665	**NER2525M2**	25,0	25,0	32,0	150	15	25	12	4	N.2L	**CM75**	**MS1200**	**–**	T10
3636541	**NER2525M3**	25,0	25,0	32,0	150	22	51	–	5	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641672	**NER2525M4**	25,0	25,0	35,0	150	24	51	–	7	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641680	**NER3225P3**	32,0	25,0	32,0	170	22	51	–	4	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641689	**NER3225P4**	32,0	25,0	35,0	170	24	51	–	7	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641693	**NER3232P4**	32,0	32,0	40,0	170	24	51	–	6	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641692	**NER3232P5**	32,0	32,0	50,0	170	35	51	–	11	N.5L	**CM81**	**MS352**	**–**	6 mm
left hand														
3641684	**NEL1616H2**	16,0	16,0	20,0	100	15	25	–	4	N.2R	**CM74**	**MS1200**	**–**	T10
3641677	**NEL2020K2**	20,0	20,0	25,0	125	15	25	6	4	N.2R	**CM74**	**MS1200**	**–**	T10
3641676	**NEL2525M2**	25,0	25,0	32,0	150	15	25	12	4	N.2R	**CM74**	**MS1200**	**–**	T10
3636543	**NEL2525M3**	25,0	25,0	32,0	150	22	51	–	5	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641668	**NEL2525M4**	25,0	25,0	35,0	150	24	51	–	7	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641685	**NEL3225P3**	32,0	25,0	32,0	170	22	51	–	4	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641694	**NEL3225P4**	32,0	25,0	35,0	170	24	51	–	7	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641696	**NEL3232P4**	32,0	32,0	40,0	170	24	51	–	6	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641695	**NEL3232P5**	32,0	32,0	50,0	170	35	51	–	11	N.5R	**CM80**	**MS352**	**–**	6 mm

NOTE: F dimension measured over sharp point of insert.

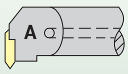
TopGroove
Boring Bar Identification System



A	25	R	N	N	T	0	R	2
Bar Type	Bar Diameter	Bar Length	Insert Holding Method	Insert Shape	Insert Location	Rake Angle	Hand of Tool	Insert Size

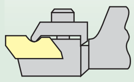
Bar Type

Steel with coolant



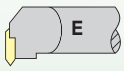
Insert Holding Method

N – TopGroove

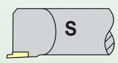


Insert Location

End mount

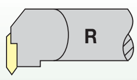


Side mount

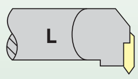


Hand of Tool

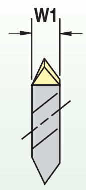
Right hand



Left hand



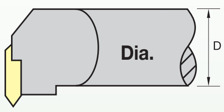
Insert Size



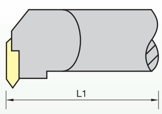
insert size	W1
1	3,54mm
2	3,81mm
3	5,35mm
4	6,40mm
5	9,65mm
6	9,73mm
8	11,13mm

Bar Diameter

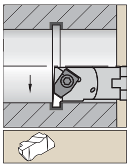
Bar diameter



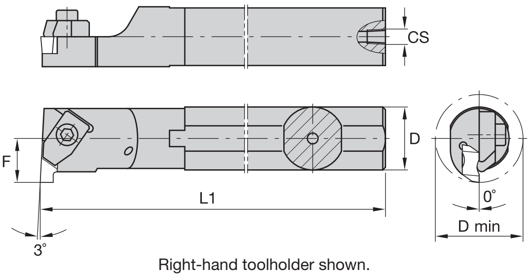
Bar Length



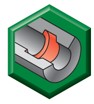
Metric Bars	
M	150mm
Q	180mm
R	200mm
S	250mm
T	300mm
U	350mm



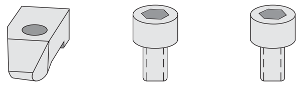
Steel shank with through coolant.



Right-hand toolholder shown.

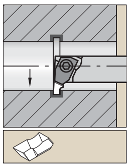


■ A-NNT

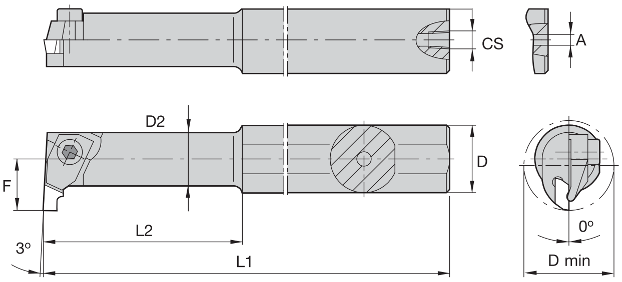


order number	catalogue number	D	D min	L1	F	CS	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand											
3641644	**A12MNNTOR2**	12	18,5	150	11	1/16-27 NPT	NG2L	**CM147**	**MS1200**	**–**	2.5 mm
3641643	**A16MNNTOR2**	16	22,0	150	11	1/8-27 NPT	N.2L	**CM75**	**MS1200**	**–**	2.5 mm
3641645	**A20QNNTOR2**	20	26,0	180	13	1/8-27 NPT	N.2L	**CM75**	**MS1200**	**–**	2.5 mm
3641651	**A25RNNTOR2**	25	34,0	200	17	1/4-18 NPT	N.2L	**CM75**	**MS1200**	**–**	2.5 mm
3641622	**A25RNNTOR3**	25	34,0	200	17	1/8 - 27 NPT	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641646	**A32SNNTOR3**	32	44,0	250	22	1/4-18 NPT	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641653	**A40TNNTOR3**	40	54,0	300	27	1/4-18 NPT	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641654	**A40TNNTOR4**	40	54,0	300	27	1/4-18 NPT	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641661	**A50UNNTOR4**	50	70,0	350	35	1/4-18 NPT	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
left hand											
3641655	**A12MNNTOL2**	12	18,5	150	11	1/16-27 NPT	NG2R	**CM146**	**MS1200**	**–**	2.5 mm
3641649	**A16MNNTOL2**	16	22,0	150	11	1/8-27 NPT	N.2R	**CM74**	**MS1200**	**–**	2.5 mm
3641652	**A20QNNTOL2**	20	26,0	180	13	1/8-27 NPT	N.2R	**CM74**	**MS1200**	**–**	2.5 mm
3641657	**A25RNNTOL2**	25	34,0	200	17	1/4-18 NPT	N.2R	**CM74**	**MS1200**	**–**	2.5 mm
3641650	**A25RNNTOL3**	25	34,0	200	17	1/4-18 NPT	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641656	**A32SNNTOL3**	32	44,0	250	22	1/4-18 NPT	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641659	**A40TNNTOL3**	40	54,0	300	27	1/4-18 NPT	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641663	**A40TNNTOL4**	40	54,0	300	27	1/4-18 NPT	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641690	**A50UNNTOL4**	50	70,0	350	35	1/4-18 NPT	N.4R	**CM72LP**	**–**	**MS2111**	25 IP

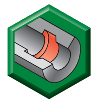
NOTE: Minimum bore capability varies with depth of groove. See pages E86–E87 for details.
F dimension measured over sharp point of insert.



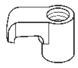
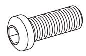
Necked steel shank with through coolant.



Right-hand toolholder shown.



A-NNT-1

order number	catalogue number	D	D min	D2	L1	L2	F	A	CS	gage insert	clamp	clamp screw	hex/ Torx Plus
right hand													
3641648	**A10KNNTOR1**	10	11,5	10,0	125	–	7	3,2	–	NG1L	**CM109**	**MS1034**	1.5 mm
3641647	**A12MNNTOR1**	12	11,5	8,7	150	31,30	7	4,0	1/16-27 NPT	N.1L	**CM109**	**MS1034**	1.5 mm

NOTE: Minimum bore capability varies with depth of groove. See pages E86–E87 for details.
F dimension measured over sharp point of insert.

TopGroove™ Inserts: The Best Platform for Customisation

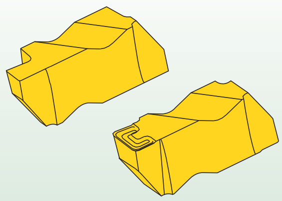
All TopGroove custom order inserts benefit from the superior rigidity of our TopGroove toolholder and clamping system. For added productivity, most custom orders can be incorporated into the double-ended inserts.

Custom orders start with proven WIDIA™ carbide grade technology as the basis for optimising tool performance. Positive top rake angles are also available in most inserts.

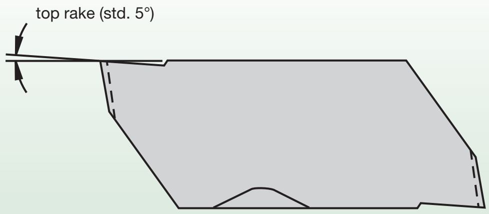
State-of-the-art CAD enables rapid development of your custom insert design. For convenience, a concept drawing is always available to facilitate engineering development of an insert.

There are limitless variations of the flat-top TopGroove design. Additionally, chip control in the most common styles enables true optimisation and productivity. WIDIA offers NB- and NBD-style insert blanks as well. These blanks can be end-form ground in your own shop.

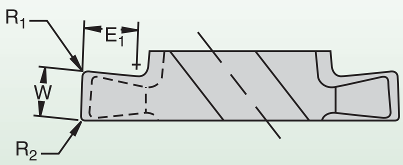
Whatever your special grooving requirements may be, WIDIA can provide an effective solution. We have the technical expertise, resources, and commitment to help you develop insert designs that satisfy your metalcutting application demands.



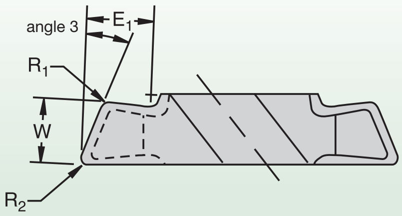
top rake



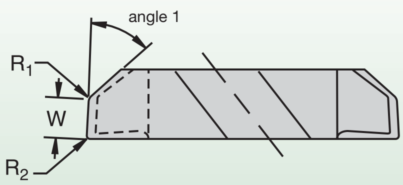
style A



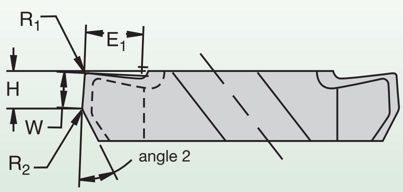
style B1



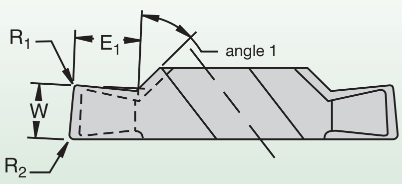
style B2



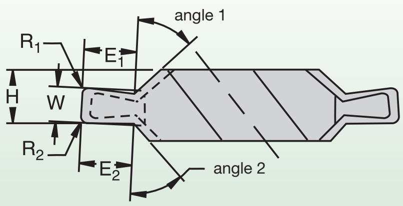
style B3



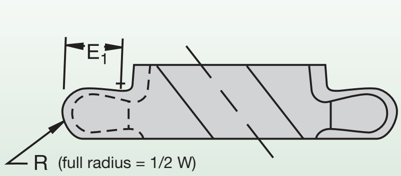
style B4



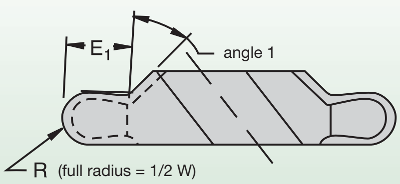
style C1



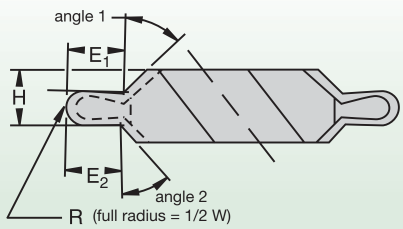
style D



style F



style G



NOTE: Common styles are shown here in right-hand versions. Left-hand versions are also available.

TopGroove Grooving Systems

Use this Custom Order Worksheet to modify an existing product to meet your specifications. If your custom requirements do not fall into these categories, simply contact your WIDIA™ Distributor.

Trust our experienced distributors and WIDIA engineering team to design the best solution for you.

Date

Customer-Specified Dimensions

Style (circle one) A B1 B2 B3 B4 C1 D F G

Orientation (circle one) left hand right hand

Top Rake		**Total Width (T)**	
Cutting Width (W)		**Angle 1**	
Corner Radius 1 (R_1)		**Angle 2**	
Corner Radius 2 (R_2)		**Offset (H)**	
Cutting Depth (E_1)		**Other** (please specify)	

Special Instructions

(please make any necessary notes or sketches in the box at right)

Closest Catalogue Standard

Customer

Distributor

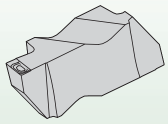
Shipping Requirements

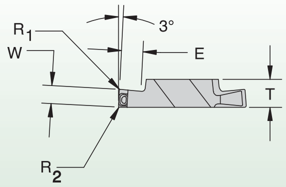
Attention Distributors: Use this worksheet to collect information for your customer.

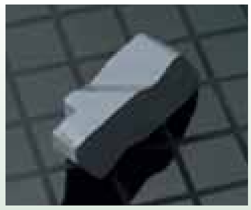
❐ Ground ❐ Next Day Air ❐ 2nd Day Air ❐ 3rd Day Air

A-SK Specials

10° positive cutting action
- Grooving
- Face grooving







insert catalogue number		width range W	corner radii range R_1 and R_2	E	T	grades
right hand	left hand					
NG2-R-SK or NF2-R-SK	NG2-L-SK or NF2-L-SK	0,66–1,42	0,00–0,18	1,27	3,810	Carbide grades quoted upon request. **See page E47.**
		1,45–3,43	0,08–0,33	2,79		
NG3-R-SK or NF3-R-SK	NG3-L-SK or NF3-L-SK	1,07–1,70	0,08–0,33	2,39	4,950	
		1,73–1,93	0,13–0,51	2,39		
		1,96–2,39	0,13–0,76	3,81		
		2,41–2,67	0,13–0,51	3,81		
		2,69–3,18	0,13–0,76	3,81		
		3,20–3,40	0,13–0,51	3,81		
		3,43–3,96	0,13–0,76	3,81		
		3,99–4,42	0,20–0,46	3,81		
		4,67–4,98	0,46–0,71	3,81		
NG4-R-SK or NF4-R-SK	NG4-L-SK or NF4-L-SK	2,54–2,79	0,13–0,51	3,81	6,480	
		2,82–3,18	0,13–0,76	3,81		
		3,20–3,33	0,13–0,51	3,81		
		3,35–3,96	0,13–0,76	3,81		
		3,99–4,11	0,13–0,51	3,81		
		3,89–4,80	0,13–0,76	6,35		
		4,83–4,85	0,46–0,71	6,35		
		4,88–5,18	0,20–0,46	6,35		
		6,22–6,53	0,46–0,64	6,35		

NG-SK, NF-SK, NGD-SK, and NFD-SK inserts may be specially ordered within the specifications listed in the above charts.

Order example: NF3R-SK W = .090, R_1 = .010, R_2 = .010, grade TN6010™.

Unless otherwise specified, a standard tolerance of ±0,03mm on width (W) will be applied, and a standard tolerance of ±0,06mm on radii (R_1 and R_2) will be applied.

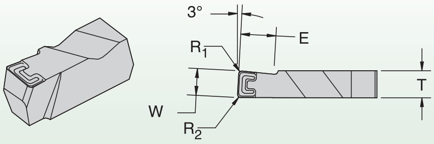
If deeper cutting depth (E) is required, please specify. Refer to the application drawing and charts for maximum face groove depths and minimum face groove diameters.

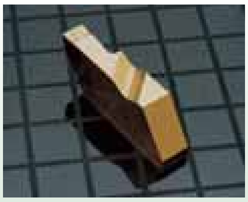
In addition to the guidelines above, full radius face groove inserts may be quoted. Under certain conditions, chip control performance may vary from standard insert styles.

A-SK Specials

10° positive cutting action

- Deep grooving
- Deep face grooving





insert catalogue number		width range W	corner radii range R_1 and R_2	E	T	grades
right hand	left hand					
NGD3-R-SK	**NGD3-L-SK**	1,45–1,75	.008–.033	3,18	4,95	Carbide grades quoted upon request. **See page E47.**
or	**or**	2,26–2,57*	.008–.033	6,35		
		3,05–3,35*	.008–.033	6,35		
NFD3-R-SK	**NFD3-L-SK**	4,67–4,98*	.046–.071	6,35		
NGD4-R-SK	**NG4-L-SK**	3,05–3,35*	.008–.033	6,35	6,48	
or	**or**	4,57–4,98*	.046–.071	9,53		
NFD4-R-SK	**NF4-L-SK**	6,22–6,53*	.046–.071	12,70		

**One cutting edge.*

NG-SK, NF-SK, NGD-SK, and NFD-SK inserts may be specially ordered within the specifications listed in the above charts.

Order example: NF3R-SK W = .090, R_1 = .010, R_2 = .010, grade TN6010™.

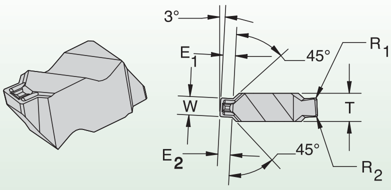
Unless otherwise specified, a standard tolerance of ±0,03mm on width (W) will be applied, and a standard tolerance of ±0,06mm on radii (R_1 and R_2) will be applied.

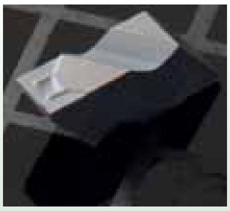
If deeper cutting depth (E) is required, please specify. Refer to the application drawing and charts for maximum face groove depths and minimum face groove diameters.

In addition to the guidelines above, full radius face groove inserts may be quoted. Under certain conditions, chip control performance may vary from standard insert styles.

C1-SK Specials

- Groove and chamfer

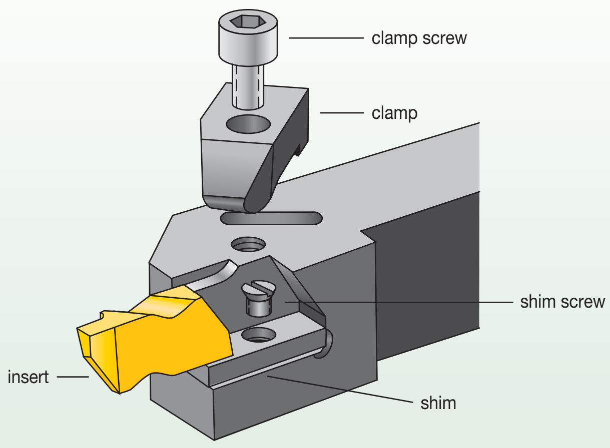




insert catalogue number		width range W	corner radii range R_1 and R_2	E	T	grades
right hand	left hand					
NB2-R-K	**NB2-L-K**	1,19–3,18	0,13–0,38	2,54	3,81	Carbide grades quoted upon request. **See page E47.**
NB3-R-K	**NB3-L-K**	2,39–4,32	0,13–0,64	3,81	4,95	

NOTE: The above insert style is for simultaneous groove and chamfer operations with chip control.

TopGroove Toolholders and Boring Bars



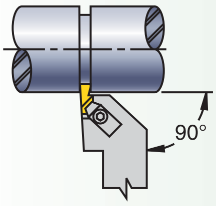
insert size and style	clamp	clamp screw	shim	shim screw
NG-1L	CM-109	S-304	–	–
NG-2R	CM-182	S-310	–	–
NG-2L	CM-183	S-310	–	–
NG-2R	CM-74	S-310	–	–
NG-2L	CM-75	S-310	–	–
NG-3R	CM-184	S-412	–	–
NG-3L	CM-185	S-412	–	–
NG-3R	CM-72	S-412	–	–
NG-3L	CM-73	S-412	–	–
NG-3R*	CM-78	S-412	–	–
NG-3L*	CM-70	S-412	–	–
NG-4R	CM-72	S-412	SM-420	SL-344
NG-4L	CM-73	S-412	SM-420	SL-344
NG-5R	CM-80	S-352	–	–
NG-5L	CM-81	S-352	–	–
NG-6R	CM-120	S-412	SM-416	S-111
NG-6L	CM-121	S-412	SM-416	S-111
TopGroove relief grooving				
NU-3125R	CM-72	S-412	–	–
NU-3125L	CM-73	S-412	–	–
NU-3125R**	CM-72	S-618	–	–
NU-3125L**	CM-73	S-618	–	–
Utility threading				
NTU-4R	CM-72	S-412	–	–
NTU-4L	CM-73	S-412	–	–

**25mm diameter boring head.*
***Boring head.*

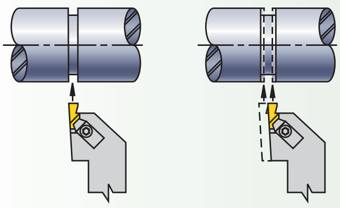
Grooving Tool Failure and Solution Guide

Practical Solutions to Common Grooving Problems

Holder Position for Grooving Operation

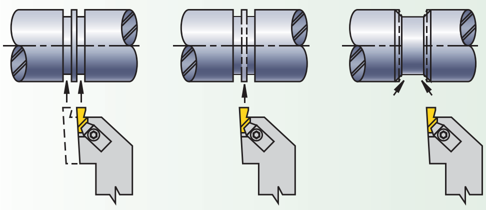


How to Cut a Groove Slightly Wider than the Groove Tool



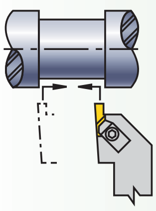
1. Plunge the centre of the groove.
2. Plunge each side of the groove to get the specified width. Use a slower feed rate when cutting groove sides.

How to Cut Wider Grooves



1. Plunge out both sides of groove width.
2. Plunge centre area to remove web of material remaining.
3. Plunge both sides of groove at the required angle, using approximately one-half the width of the grooving tool for maximum width of cut.

Finish Turning the Groove



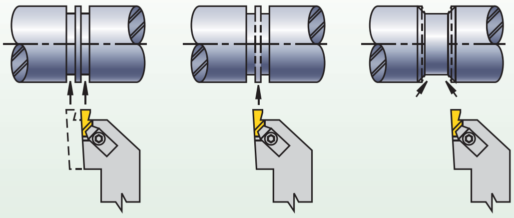
1. Follow recommendations explained above.
2. To avoid insert chipping and to achieve groove wall perpendicularity, follow the tool path outlined here.
3. Use the lightest depth of cut that still enables good chip surface finishing.

problem	solution
bur	1. Ensure tool centre height. 2. Use sharp tool (index more often). 3. Use positive rake PVD-coated insert. 4. Use correct grade for workpiece material. 5. Use correct geometry (e.g., positive rake for work-hardening material). 6. Chamfer before grooving. 7. Change tool path.
poor surface finish	1. Increase speed. 2. Use sharp tool (index more often). 3. Dwell tool in bottom 1–3 revolutions (max). 4. Use proper chip control geometry. 5. Increase coolant flow/concentration. 6. Ensure proper setup (overhang, shank size). 7. Use correct geometry (e.g., positive rake for work-hardening material).
groove bottom that is not flat	1. Use sharp tool (index more often). 2. Dwell tool in bottom 1–3 revolutions (max). 3. Reduce tool overhang (increase rigidity). 4. Ensure correct tool alignment. 5. Reduce feed rate at groove bottom. 6. Use a wider insert. 7. Ensure tool centre height.
poor chip control	1. Use “K” chip control geometry insert. 2. Use sharp tool (index more often). 3. Increase coolant concentration. 4. Adjust feed rate (usually increase first).
chatter	1. Reduce tool and workpiece overhang. 2. Adjust speed and feed (usually increase first). 3. Ensure centre height.
insert chipping	1. Use correct grade for workpiece material. 2. Increase speed. 3. Reduce feed. 4. Use a stronger grade. 5. Increase tool and setup rigidity.
side walls not straight	1. Check tool alignment for square. 2. Use correct insert hand. 3. Reduce workpiece and tool overhang. 4. Use sharp insert (index more often).

Machining Guidelines for Chip Control • Grooving

When the proper cutter diameter is not available, proper cutter positioning will provide positive results.

- Centre height of insert should be positioned at the centre of the workpiece or up to 0,13mm above.
- Dwell time in the bottom of the groove (more than three revolutions) is not recommended.
- Chip control is feed-rate related and should be adjusted to fit the particular situation. Recommended feed range is 0,08–0,3 mm/rev.



Machining Guidelines for Chip Control • Turning/Profiling

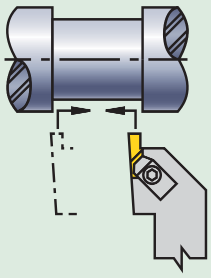
Maximum depth of cut for side cutting (turning/profiling) depends on the material being cut and the width of the tool.

- 0,79–1,6mm wide insert can cut up to 0,6mm deep.
- 1,7–3,3mm wide insert can cut up to 1mm deep.
- 3,5–4,8mm wide insert can cut up to 2mm deep.
- 5–6,35mm wide insert can cut up to 3mm deep.

Groove Limits		
insert catalogue number	maximum internal groove depth mm	minimum bore diameter mm
NG-1094L	1,91	20,32
–	1,02	11,18
NG-2031R/L	1,27	18,54
NG-2041R/L	–	–
NG-2047R/L	–	–
NG-2058R/L	–	–
–	2,79	63,50
NG-2062R/L	2,59	44,45
NG-2094R/L	2,49	38,10
NG-2125R/L	2,03	25,40
–	1,40	18,54
NG-3047R/L	–	–
NG-3062R/L	2,39	44,45
NG-3072R/L	2,29	41,28
NG-3078R/L	1,91	34,93
NG-3088R/L	–	–
NG-3094R/L	–	–
NG-3097R/L	3,81	60,33
NG-3105R/L	–	–
NG-3110R/L	3,68	53,98
NG-3122R/L	–	–
NG-3125R/L	3,51	47,63
NG-3142R/L	–	–
NG-3156R/L	3,18	41,28
NG-3178R/L	–	–
NG-3185R/L	2,79	34,93
NG-3189R/L	–	–
NG-4125R/L	3,81	69,85
–	6,35	146,05
NG-4189R/L	6,22	127,00
NG-4213R/L	6,10	114,30
NG-4219R/L	5,54	82,55
NG-4250R/L	5,08	63,50

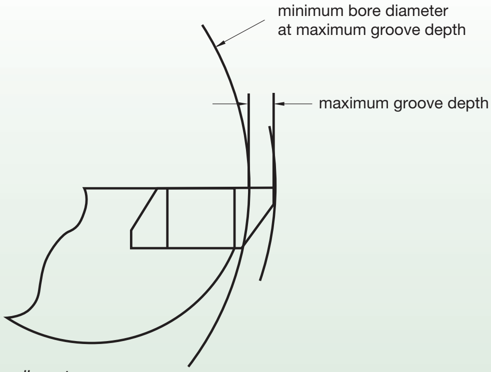
NOTE: The same maximum groove depth and minimum bore diameter values also apply to metric, NG-K (chip control), and NR (full radius) inserts of similar size. The same internal grooving depth limits are a function of bar clearance versus bore diameters.

Finish Turning the Groove



1. Plunge both sides of groove width.
2. Plunge centre area to remove web of material remaining.
3. To avoid insert chipping and to achieve groove wall perpendicularity, follow the tool path outlined.
4. Use the lightest depth of cut that still allows good chipbreaking, tool life, and surface finish.

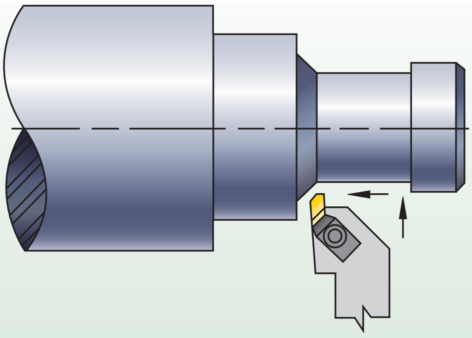
Internal Groove Depth versus Bar Interference



NOTE: Internal grooving depth limits are a function of bar clearance versus bore diameters.

Machining Guidelines for Back Turning/Turning/Profiling

The NP-K-style TopGroove inserts were engineered specifically for back turning on small automatic lathes, but they also find applications for other light turning and profiling operations. For general applications, maximum depth of cut should not exceed 2,74mm for size 2 inserts or 3,84mm for size 3 inserts.



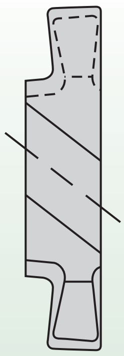
Machining Guidelines for Using TopGroove Deep Grooving Inserts (NGD)

Typically, those NGD- and NRD-style inserts with two cutting edges require no machine offset changes. However, those inserts with only one cutting edge do require offset changes. Refer to the chart here to ensure proper offset adjustments.

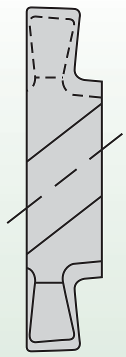
insert catalogue number	add to C dimension mm	add to F dimension mm
NGD-3062	0,00	0,00
NGD-3094	2,54	2,54
NGD-3125	2,54	2,54
NGD-3189	2,54	2,54
NGD-4125	0,00	0,00
NGD-4189	3,18	3,18
NGD-4250	6,35	6,35
NRD-3031	0,00	0,00
NRD-3062	2,54	2,54
NRD-4062	0,00	0,00
NRD-4094	6,35	6,35
NRD-4125	6,35	6,35

TopGroove Insert Selection Guide

- All TopGroove inserts are precision ground to provide accurate edge location and secure locking of the insert in the toolholder pocket.
- TopGroove inserts can be used in either toolholders or boring bars.
- Right-hand TopGroove toolholders use right-hand inserts. Left-hand TopGroove toolholders use left-hand inserts.
- Right-hand TopGroove boring bars use left-hand inserts. Left-hand TopGroove boring bars use right-hand inserts.



left-hand insert

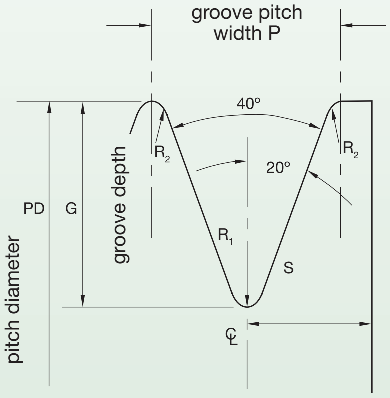


right-hand insert

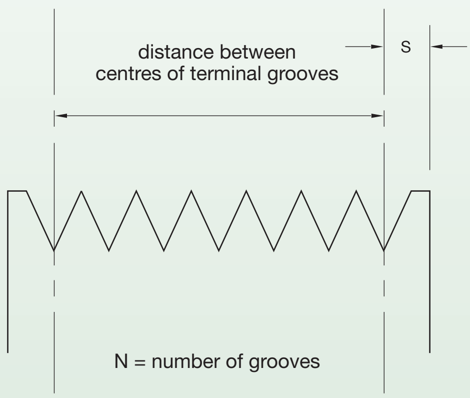
Machining Guidelines for Poly-Vee Grooving with Custom Solution and TopGroove NV Inserts (NV3-J and NV4-L)

- To machine cross section "J", use insert NV3-J.
- To machine cross section "L", use insert NV4-L.

Section J



Section L

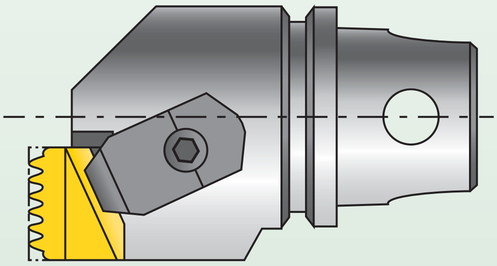


Groove Dimensions and Tolerances for Sheaves

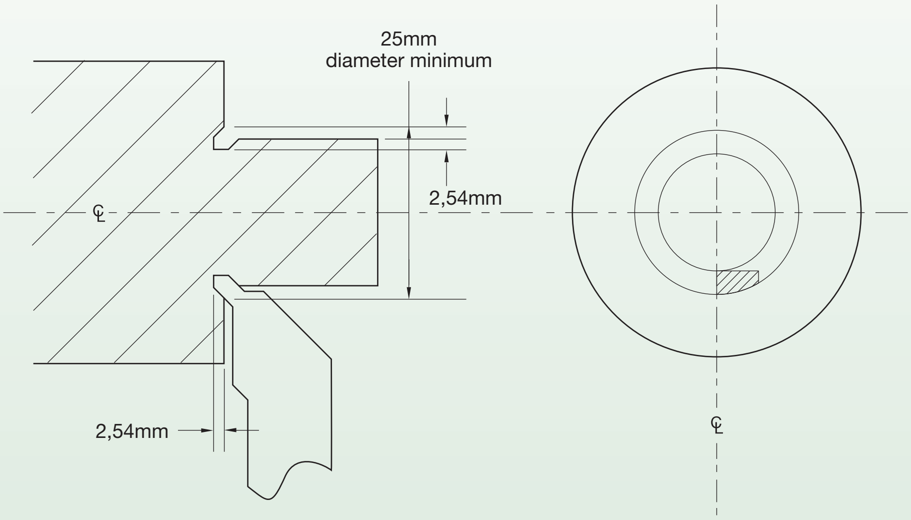
groove cross section	pitch width (P)	groove depth (G)	minimum radius (R2)	radius (R1)	terminal distance	distance between centres of terminal grooves and maximum accumulated tolerance
J	2,34 ±0,03	2,21 ±0,13	0,20	0,32 ±0,06	3,18	(N-1)4,88 ±0,25
L	4,70 ±0,05	5,11 ±0,13	0,38	0,32 ±0,06	3,18	(N-1)4,70 ±0,25

Multiple Tooth Poly–Vee Grooving

Let WIDIA™ quote your multiple tooth poly-vee grooving applications. Semi-standard inserts and holders are available. The strong TopGroove design holds the insert rigid and outperforms any other tooling method for this application.



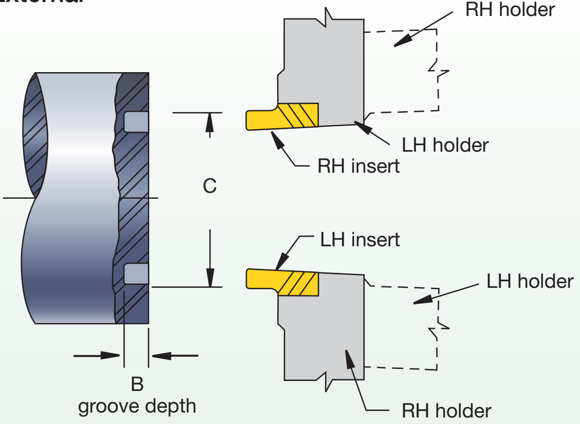
Machining Guidelines for Undercutting Operations Performed with Custom Solution and TopGroove NU Inserts (NU3094, NU3125, and NU3156)



NOTE: Items shown are non-standard items.

Machining Guidelines for Face Grooving Operations • External

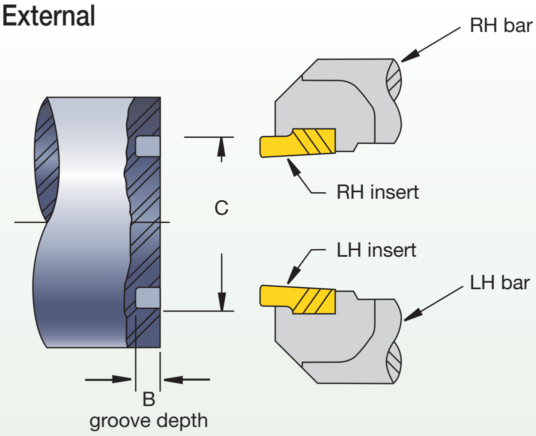
Toolholders



Standard NF/NDF Inserts		
insert family	maximum groove depth B mm	minimum groove diameter C mm
NF-3	1,52	23,9
NF-3	2,39	30,5
NF-3	3,18	36,1
NF-3	3,81	41,3
NFD-3	6,35	47,6
NFD-4	9,53	57,2
NFD-4	12,70	57,2

Machining Guidelines for Face Grooving Operations • External

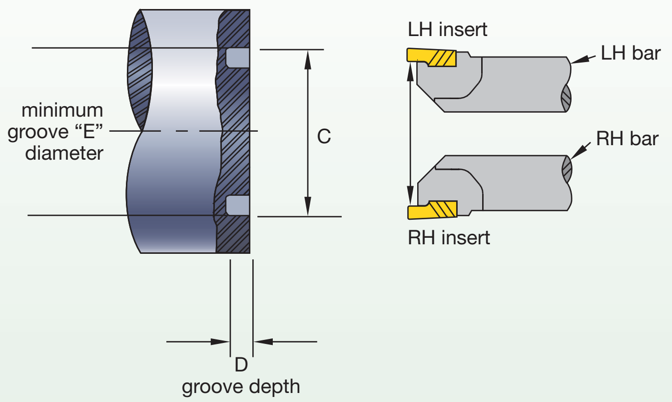
Boring Bars



Standard NG/NGD Inserts		
insert family	maximum groove depth B mm	minimum groove diameter C mm
NG-2	1,27	54,0
NG-2	2,79	88,9
NG-3	2,39	101,6
NG-3	3,18	127,0
NG-3	3,81	139,7
NGD-3	6,35	174,6
NG-4	3,81	152,4
NG-4	6,35	209,6
NGD-4	9,53	222,3
NGD-4	12,70	222,3

Machining Guidelines for Face Grooving Operations • Internal

Boring Bars

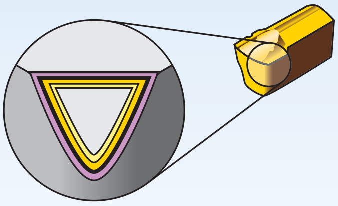


Standard NG/NGD Inserts		
insert family	maximum groove depth B mm	minimum groove diameter C mm
NFD-3-KI	6,35	63,5 *NOTE: Also check minimum bore diameter of boring bar. See page E78.*

ProGroove

With easy-to-change inserts available in multiple high-performance carbide grades, the ProGroove system ensures accurate, reliable, and reproducible cutting edge performance.

- Single-end grooving and cut-off inserts.
- Offered with integral toolholders and blades.
- Shallow, deep grooving, and cut-off capabilities.
- Available in four different geometries.

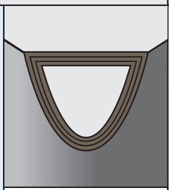
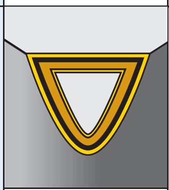
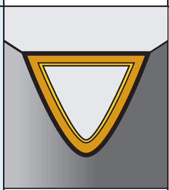
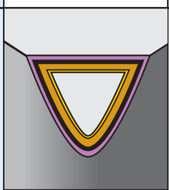
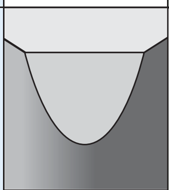
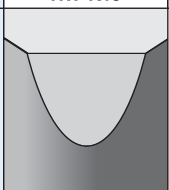


Coatings provide high-speed capability and are engineered for finishing to light roughing.

- Reduce cycle times — high speed and feed capability.
- Longer tool life — new multilayer coating provides better wear resistance.

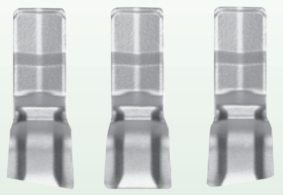
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟷ toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
TN6030	 HC-P30	PVD-TiAlN Nanolayer coated carbide. Medium and heavy machining for steels and nodular cast irons. Recommended at medium cutting speeds when good toughness properties are required.	P					■	■	■		
			M					■	■	■		
			K					■	■	■		
TN7525	 HC-P25	MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN coated carbide. Light and medium machining for steels and nodular cast irons.	P		■	■	■	■	■			
			K		■	■	■	■	■			
TN7535	 HC-P35	MT-CVD/CVD — TiN-TiCN-Al_2O_3 coated carbide. Medium and heavy machining for steels and nodular cast iron.	P		■	■	■	■				
			K		■	■	■	■				
TN8025	 HC-M25	MT-CVD/CVD-TiN-TiCN-Al_2O_3-ZrCN coated carbide. Light and medium machining for all stainless steels. Can be used both with or without coolant.	M				■	■	■			
THM	 HW-K15	Uncoated carbide for light and medium machining. For cast iron and all non-ferrous metals and non-metals. Also capable of machining hardened materials at low cutting speeds.	K		■	■	■					
			N		■	■	■					
			S		■	■	■					
			H		■	■	■					
TTM	 HW-P25	Uncoated carbide with good toughness and wear properties. Medium machining for steels.	P				■	■	■			
			M				■	■	■			

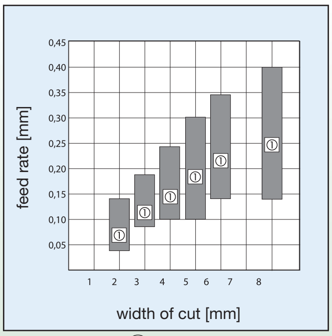
WIDIA

PGU



left-hand neutral right-hand

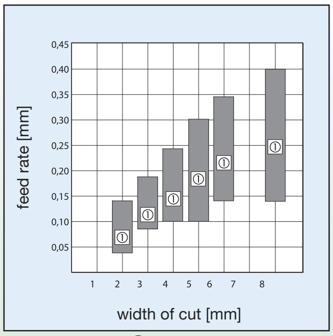
For grooving and parting operations, universal use.
Positive chipbreaker groove for light cutting action.
Right-hand and left-hand styles with 6° front angle.



① Recommended Starting Feed

PGM

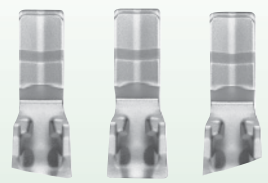
neutral



① Recommended Starting Feed

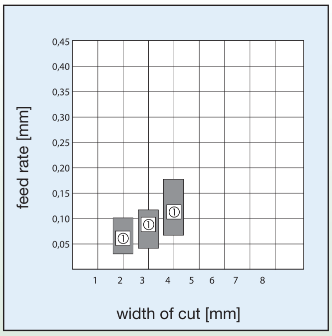
For grooving and parting, also capable of copy and straight turning as well as chamfering. With additional chip forming element for good chip control with varying depths of cut.

PGS



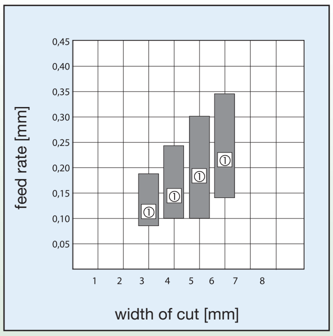
left-hand neutral right-hand

For low-bur parting with straight flanks and smooth surface finishes. All inserts are recommended for parting and grooving slender workpieces, part diameter <32mm, and thin-wall tubes.



① Recommended Starting Feed

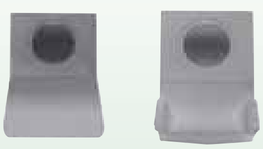
PGR



① Recommended Starting Feed

Full round inserts for profiling, grooving, and copy turning. Very good chip control for broad general use. Accurate, reproducible cutting edge positioning.

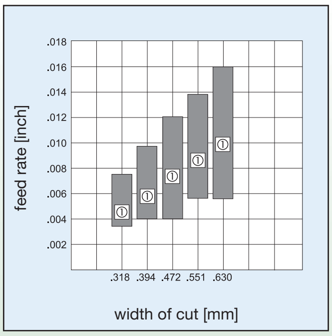
LG System • 0 and 1



0 1

…0
Inserts with wide range of applications in grooving and deep grooving. With additional chip control element for good chip control, even with varying widths of cut.

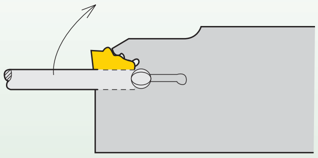
…1
Inserts with wide range of uses in grooving and deep grooving of short chipping materials.



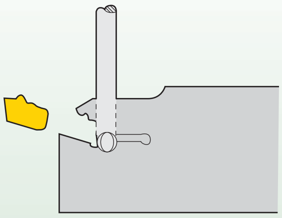
① Recommended Starting Feed

Material Group		Cutting Speed — vc m/min																	
		TN6030			TN7525			TN7535			TN8025			THM			TTM		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	0/1	130	**140**	150	200	**215**	230	140	**175**	210	–	–	–	–	–	–	90	**95**	100
	2	110	**145**	175	170	**220**	270	115	**145**	175	–	–	–	–	–	–	75	**100**	125
	3	110	**145**	175	170	**220**	270	115	**145**	175	–	–	–	–	–	–	75	**100**	125
	4	75	**95**	115	115	**145**	175	75	**100**	120	–	–	–	–	–	–	55	**65**	80
	5	100	**125**	145	155	**190**	220	105	**140**	170	–	–	–	–	–	–	70	**85**	100
	6	40	**55**	65	65	**85**	100	45	**60**	75	–	–	–	–	–	–	30	**40**	45
M	1	90	**110**	140	–	–	–	–	–	–	90	**120**	150	–	–	–	60	**75**	90
	2	55	**70**	90	–	–	–	–	–	–	55	**75**	95	–	–	–	40	**50**	55
	3	60	**75**	95	–	–	–	–	–	–	60	**80**	100	–	–	–	40	**50**	60
K	1	60	**80**	90	120	**150**	180	–	–	–	–	–	–	60	**80**	90	–	–	–
	2	60	**75**	85	120	**150**	180	–	–	–	–	–	–	60	**75**	85	–	–	–
	3	60	**75**	90	110	**140**	170	–	–	–	–	–	–	60	**75**	90	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	600	**750**	900	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	535	**685**	835	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	230	**300**	370	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	135	**180**	225	–	–	–
	5	–	–	–	–	–	–	–	–	–	–	–	–	70	**90**	110	–	–	–
	6	–	–	–	–	–	–	–	–	–	–	–	–	445	**565**	690	–	–	–
	7	–	–	–	–	–	–	–	–	–	–	–	–	550	**700**	850	–	–	–
S	1	–	–	–	–	–	–	–	–	–	–	–	–	25	**35**	40	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	15	**20**	20	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	40	**60**	70	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	20	**30**	35	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	10	**20**	35	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	10	**20**	35	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	10	**20**	35	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	10	**20**	35	–	–	–

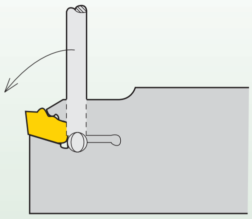
ProGroove System



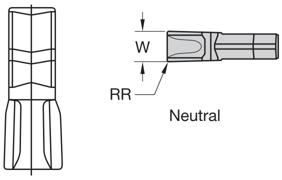
To change the cutting insert, place the wrench into the blade recess.
The blade mouth is opened by turning through 90°.



In this position, the wrench is self-locking, leaving both hands free for changing the cutting insert.



The cutting insert is pressed against the rear seat in the blade mouth, releasing the wrench. The insert is accurately positioned and securely clamped.



● first choice
○ alternate choice

		TN6030	TN7525	TN7535	TN8025	THM	TTM
P		●	●	●	○		●
M		●	○	○	●		●
K		●	●	●		●	
N		○				●	
S		○				●	
H						●	

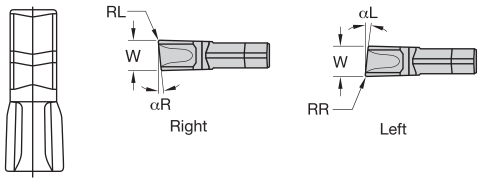
■ PGU

catalogue number	insert size	W	RR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567320	2	2,10	0,20	N - Neutral	2953289	2498725	2498713	2021804	2008876	-
123567330	3	3,10	0,30	N - Neutral	2953284	-	2498714	2017822	2008931	-
123567340	4	4,10	0,30	N - Neutral	2953286	2498727	2498715	-	2009080	-
123567350	5	5,10	0,30	N - Neutral	2953673	2498728	2498716	-	2021873	-
123567360	6	6,10	0,40	N - Neutral	2953674	2952333	2952350	-	2009385	-
123567380	8	8,15	0,60	N - Neutral	2953666	-	2952351	2009482	2009504	-

NOTE: W tolerance on all = ±0,05mm.

(continued)

(PGU — continued)



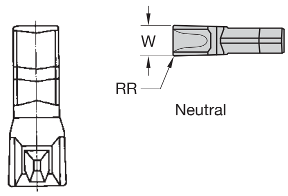
● first choice
○ alternate choice

		TN6030	TN7525	TN7535	TN8025	THM	TTM
P		●	●	●	○		●
M		●	○	○	●		●
K		●	●	●		●	
N		○				●	
S		○				●	
H						●	

catalogue number	insert size	W	RR	αL	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567231	3	3,10	0,25	6	L - Left	2953672	2498730	2498718	-	-	-
123567241	4	4,10	0,25	6	L - Left	2953676	-	-	-	-	-

catalogue number	insert size	W	RL	αR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567230	3	3,10	0,25	6	R - Right	2953291	2498729	2498717	-	-	-
123567240	4	4,10	0,25	6	R - Right	2953667	2498731	2498719	-	-	-

NOTE: W tolerance on all = ±0,05mm.



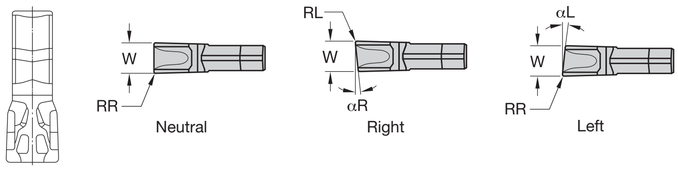
● first choice
○ alternate choice

		TN6030	TN7525	TN7535	TN8025	THM	TTM
P		●	●	●	○		●
M		●	○	○	●		●
K		●	●	●		●	
N		○				●	
S		○				●	
H						●	

■ PGM

catalogue number	insert size	W	RR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567420	2	2,10	0,20	N - Neutral	2953679	2498733	2498721	-	-	-
123567430	3	3,10	0,30	N - Neutral	2953678	2498734	2498722	-	-	-
123567440	4	4,10	0,30	N - Neutral	2953663	2498735	2498723	-	-	-
123567450	5	5,10	0,30	N - Neutral	2953671	2498736	2498724	-	-	-
123567460	6	6,10	0,40	N - Neutral	2953677	2952335	2952352	-	-	-
123567480	8	8,15	0,60	N - Neutral	2953675	2952336	2952353	-	-	-

NOTE: W tolerance on all = ±0,05mm.



● first choice
○ alternate choice

		TN6030	TN7525	TN7535	TN8025	THM	TTM
P		●	●	●	○		●
M		●	○	○	●		●
K		●	●	●		●	
N		○				●	
S		○				●	
H						●	

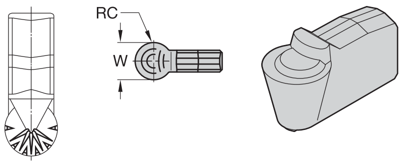
PGS

catalogue number	insert size	W	RR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567702	2	2,25	0,20	N - Neutral	–	–	2952354	–	–	–
123567703	3	3,25	0,20	N - Neutral	–	–	2952355	–	–	–
123567704	4	4,25	0,20	N - Neutral	–	–	2952356	–	–	–

catalogue number	insert size	W	RR	αL	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567721	2	2,25	0,20	6	L - Left	–	–	2952358	–	–	–
123567731	3	3,25	0,20	6	L - Left	–	–	2952360	–	–	–

catalogue number	insert size	W	RL	αR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567720	2	2,25	0,20	6	R - Right	–	–	2952357	–	–	–
123567730	3	3,25	0,20	6	R - Right	–	–	2952359	2017912	–	–
123567740	4	4,25	0,20	6	R - Right	–	–	2952361	–	–	–

NOTE: W tolerance on all = ±0,05mm.



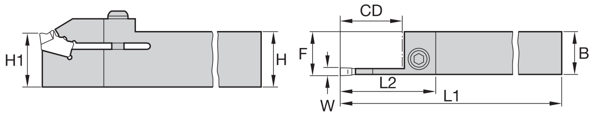
● first choice
○ alternate choice

	TN6030	TN7525	TN7535	TN8025	THM	TTM
P	●	●	●	○		●
M	●	○	○	●		●
K	●	●	●		●	
N	○				●	
S	○				●	
H					●	

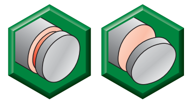
PGR

catalogue number	insert size	W	RC	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567803	3	3,00	1,50	–	2952337	–	–	–	–
123567804	4	4,00	2,00	–	2952338	–	–	–	–
123567805	5	5,00	2,50	–	2952339	–	–	–	–
123567806	6	6,00	3,00	–	2952340	–	–	–	–

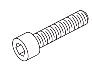
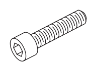
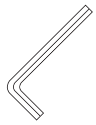
NOTE: W tolerance on all = ±0,07mm.



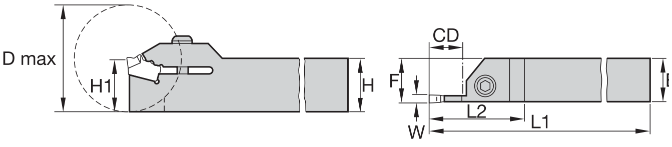
Right Hand Tool Shown



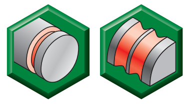
Grooving and Cut-Off

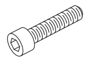
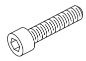
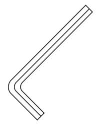
order number	catalogue number	seat size	W	CD	H	B	F	L1	L2	H1	cap screw	cap screw	wrench
right hand													
2007136	12251782000	2	2,10	16,0	16	16,0	16,2	100	27	16	–	12146012600	12148041100
2962743	12250023000	3	3,10	20,0	19	19,1	19,4	127	32	19	12148596200	–	–
2962745	12250023200	3	3,10	25,0	25	25,4	25,7	152	40	25	12148596200	–	–
2022560	12251783000	3	3,10	20,0	20	20,0	20,3	125	32	20	12148596200	–	–
2007142	12251783200	3	3,10	25,0	25	25,0	25,3	150	40	25	12148596200	–	–
2008153	12251783600	3	3,10	25,0	32	25,0	25,3	170	40	32	12148596200	–	–
2022562	12251784000	4	4,10	25,0	20	20,0	20,4	125	40	20	12148596200	–	–
2007148	12251784200	4	4,10	25,0	25	25,0	25,4	150	40	25	12148596200	–	–
2022564	12251785200	5	5,10	32,0	25	25,0	25,4	150	53	25	12148596200	–	–
2022566	12251785400	5	5,10	32,0	32	25,0	25,4	170	53	32	12148596200	–	–
2962751	12250025200	5	5,11	32,0	25	25,4	25,8	152	53	25	12148596200	–	–
2015814	12251784400	6	4,10	32,0	32	25,0	25,4	170	53	32	12148596200	–	–
2022568	12251786400	6	6,10	32,0	32	25,0	25,5	170	53	32	–	12146012700	12148041300
2022569	12251788400	8	8,10	40,0	32	25,0	25,6	170	66	32	–	12146012700	12148041300
left hand													
2007139	12251782100	2	2,10	16,0	16	16,0	16,2	100	27	16	–	12146012600	12148041100
2962744	12250023100	3	3,10	20,0	19	19,1	19,4	127	32	19	12148596200	–	–
2022561	12251783100	3	3,10	20,0	20	20,0	20,3	125	32	20	12148596200	–	–
2007145	12251783300	3	3,10	25,0	25	25,0	25,3	150	40	25	12148596200	–	–
2008150	12251783700	4	3,10	25,0	32	25,0	25,3	170	40	32	12148596200	–	–
2022563	12251784100	4	4,10	25,0	20	20,0	20,4	125	40	20	12148596200	–	–
2007151	12251784300	4	4,10	25,0	25	25,0	25,4	150	40	25	12148596200	–	–
2015816	12251784500	4	4,10	32,0	32	25,0	25,4	170	53	32	12148596200	–	–
2015839	12251786500	4	6,10	32,0	32	25,0	25,5	170	53	32	–	12146012700	12148041300
2022565	12251785300	5	5,10	32,0	25	25,0	25,4	150	53	25	12148596200	–	–
2022567	12251785500	5	5,10	32,0	32	25,0	25,4	170	53	32	12148596200	–	–
2015842	12251788500	8	8,10	40,0	32	25,0	25,6	170	66	32	–	12146012700	12148041300



Right Hand Tool Shown

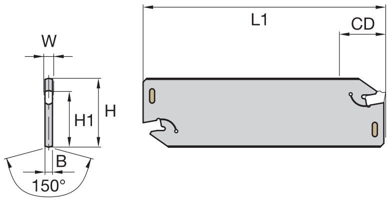


Grooving and Profiling

order number	catalogue number	seat size	W	CD	D max	H	B	F	L1	L2	H1	cap screw	cap screw	wrench
right hand														
2007105	12251762000	2	2,10	10,0	25,4	16	16,0	16,2	100	26	16	–	12146012600	12148041100
2021637	12251762400	2	2,10	10,0	25,4	25	25,0	25,2	150	26	25	–	12146012600	12148041100
2007111	12251763200	2	3,10	10,0	25,4	25	25,0	25,3	150	26	20	12148596200	–	–
2007127	12251763400	3	3,10	10,0	25,4	16	16,0	16,3	100	26	25	12148596200	–	–
2007130	12251764200	3	4,10	12,5	32,0	25	25,0	25,4	150	31	25	12148596200	–	–
2007832	12251762200	4	2,10	10,0	25,4	20	20,0	20,2	125	26	25	–	12146012600	12148041100
2022548	12251764000	4	4,10	12,5	32,0	20	20,0	20,4	125	31	20	12148596200	–	–
2022550	12251764400	4	4,10	12,5	32,0	32	25,0	25,4	170	31	32	12148596200	–	–
2022552	12251765200	5	5,10	12,5	–	25	25,0	25,5	150	31	25	12148596200	–	–
2015792	12251768400	5	8,10	16,0	–	32	25,0	25,7	170	36	32	–	12146012700	12148041300
2022555	12251766200	6	6,10	16,0	–	25	25,0	25,6	150	35	25	–	12146012700	12148041300
2022557	12251766400	6	6,10	16,0	–	32	25,0	25,6	170	35	32	–	12146012700	12148041300
2015754	12251763000	8	3,10	10,0	25,4	20	20,0	20,3	125	26	25	12148596200	–	–
left hand														
2007108	12251762100	2	2,10	10,0	25,4	16	16,0	16,2	100	26	16	–	12146012600	12148041100
2021636	12251762500	2	2,10	10,0	25,4	25	25,0	25,2	150	26	25	–	12146012600	12148041100
2007124	12251763300	2	3,10	10,0	25,4	25	25,0	25,3	150	26	20	12148596200	–	–
2021631	12251762300	3	2,10	10,0	25,4	20	20,0	20,2	125	26	16	–	12146012600	12148041100
2022547	12251763100	3	3,10	10,0	25,4	20	20,0	20,3	125	26	20	12148596200	–	–
2007133	12251764300	3	4,10	12,5	32,0	25	25,0	25,4	150	31	25	12148596200	–	–
2015782	12251765500	3	5,10	12,5	–	32	25,0	25,5	170	31	20	12148596200	–	–
2022549	12251764100	4	4,10	12,5	32,0	20	20,0	20,4	125	31	20	12148596200	–	–
2022551	12251764500	4	4,10	12,5	32,0	32	25,0	25,4	170	31	32	12148596200	–	–
2022553	12251765300	5	5,10	12,5	–	25	25,0	25,5	150	31	25	12148596200	–	–
2022556	12251766300	6	6,10	16,0	–	25	25,0	25,6	150	35	25	–	12146012700	12148041300
2022558	12251766500	6	6,10	16,0	–	32	25,0	25,6	170	35	32	–	12146012700	12148041300
2021627	12251763500	8	3,10	10,0	25,4	16	16,0	16,3	100	26	32	12148596200	–	–
2022559	12251768500	8	8,10	16,0	–	32	25,0	25,7	170	36	32	–	12146012700	12148041300

NOTE: Select shorter CD dimension for added stability.

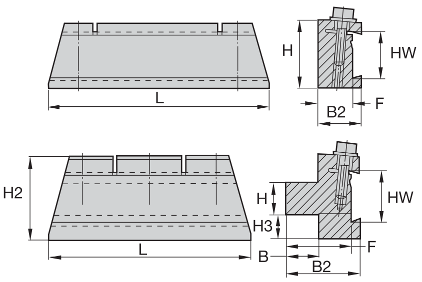


Cut-Off Blades

order number	catalogue number	seat size	W	H	H1	L1	B	CD	wrench
2021629	**12251332000**	2	2,1	19,0	15,7	90	1,7	20	**12146003800**
2021639	**12251342000**	2	2,1	26,0	21,4	110	1,7	25	**12146003800**
2008113	**12251352000**	2	2,1	32,0	25,0	150	1,7	25	**12146003800**
2021640	**12251343000**	3	3,1	26,0	21,4	110	2,4	40	**12146003800**
2008116	**12251353000**	3	3,1	32,0	25,0	150	2,4	50	**12146003800**
2021641	**12251344000**	4	4,1	26,0	21,4	110	3,2	40	**12146003800**
2008119	**12251354000**	4	4,1	32,0	25,0	150	3,2	50	**12146003800**
2008122	**12251355000**	5	5,1	32,0	25,0	150	4,2	60	**12146003800**
2008135	**12251356000**	6	6,1	32,0	25,0	150	5,0	60	**12146009500**
2008138	**12251358000**	8	8,1	32,0	25,0	150	6,8	60	**12146009500**
2021743	**12251368000**	8	8,1	52,5	45,0	250	6,8	100	**12146009500**

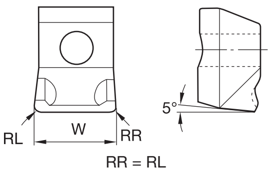
NOTE: Order wrench separately.

Blade Holders



Cut-Off Blade Holders

order number	catalogue number	HW	H	B	F	H2	B2	H3	L	cap screw	wrench
2021625	**12251221900**	19	16,0	16,0	28,3	30	30	4	100	**12148036000**	**12148041300**
2021634	**12251212500**	19	25,0	19,0	17,3	25	19	—	100	**12148036000**	**12148041300**
2021626	**12251221600**	26	16,0	16,0	31,0	40	36	12	100	**12148036000**	**12148041300**
2007826	**12251222000**	26	20,0	18,0	33,0	40	38	8	100	**12148036000**	**12148041300**
2008141	**12251213200**	26	32,0	20,0	15,0	32	20	—	125	**12148036000**	**12148041300**
2021635	**12251222500**	32	25,0	20,0	35,0	50	40	10	125	**12148036000**	**12148041300**
2008156	**12251223200**	32	32,0	25,0	40,0	50	45	3	125	**12148036000**	**12148041300**
2008159	**12251233200**	53	32,0	25,0	50,0	82	57	30	160	**12146013400**	**12148041400**
2021723	**12251234000**	53	40,0	40,0	58,0	82	65	22	160	**12146013400**	**12148041400**



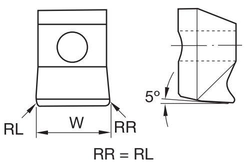
● first choice
○ alternate choice

		TN6030	TN7525	TN7535	TN8025	THM	TTM
P		●	●	●	○		●
M		●	○	○	●		●
K		●	●	●		●	
N		○				●	
S		○				●	
H						●	

LGN0

catalogue number	W	RR	TN6030	TN7525	TN7535	TN8025	THM	TTM
123568080	8,15	0,80	-	2952341	2952363	-	2017973	2009562
123568100	10,15	0,80	-	2952342	2952364	-	2017976	-
123568120	12,20	0,80	-	2952343	2952365	-	2017980	-
123568140	14,20	0,80	-	2952344	2952366	-	2022789	-
123568160	16,20	0,80	-	2952345	2952367	-	2022790	2021798

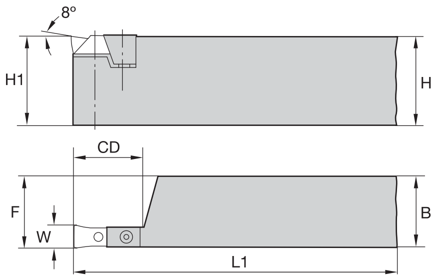
NOTE: W tolerance on all = ± 0,05mm.



LGN1

catalogue number	W	RR	TN6030	TN7525	TN7535	TN8025	THM	TTM
123568081	8,15	0,80	-	-	-	-	2022787	-
123568121	12,20	0,80	-	-	-	-	2017993	-
123568141	14,20	0,80	-	-	-	-	2017996	-
123568161	16,20	0,80	-	-	-	-	2022791	-

NOTE: W tolerance on all = ±0,05mm.



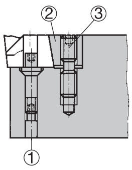
Right Hand Tool

Grooving

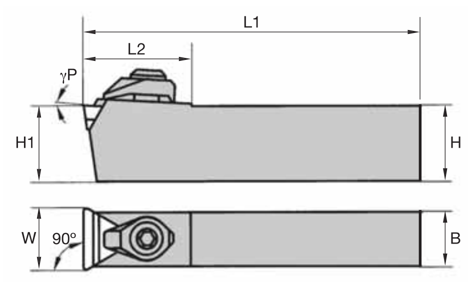
order number	catalogue number	seat size	W	CD	H	B	F	L1	H1
right hand									
2022446	**12250110100**	1	8,00	20,0	32	25,0	25,5	170	32
2008147	**12250110300**	1	10,00	20,0	32	25,0	25,5	170	32
2021719	**12250110500**	1	12,00	25,0	40	32,0	33,0	200	40
2021721	**12250110700**	1	14,00	28,0	40	32,0	33,0	200	40
2008521	**12250110900**	1	16,00	32,0	40	32,0	33,0	200	40
left hand									
2022447	**12250110200**	1	8,00	20,0	32	25,0	25,5	170	32
2008144	**12250110400**	1	10,00	20,0	32	25,0	25,5	170	32
2021718	**12250110600**	1	12,00	25,0	40	32,0	33,0	200	40
2021720	**12250110800**	–	14,00	28,0	40	32,0	33,0	200	40
2021722	**12250111000**	1	16,00	32,0	40	32,0	33,0	200	40

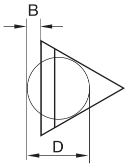
Spare Parts

catalogue number	clamping bolt	wedge clamp	clamping screw	wrench for clamp screw	wrench for clamp screw	wrench for clamping bolt
right hand						
12250110100	**12148060600**	**12148094300**	**12148574100**	**12148041000**	**–**	**12148046000**
12250110300	**12148060600**	**12148094400**	**12148574900**	**–**	**12148041100**	**12148046000**
12250110500	**12148060700**	**12148094500**	**12148574900**	**–**	**12148041100**	**12148040900**
12250110700	**12148060700**	**12148094600**	**12148574000**	**–**	**12148041200**	**12148040900**
12250110900	**12148060800**	**12148094700**	**12148574000**	**12148041000**	**12148041200**	**–**
left hand						
12250110200	**12148060600**	**12148094300**	**12148574100**	**12148041000**	**–**	**12148046000**
12250110400	**12148060600**	**12148094400**	**12148574900**	**–**	**12148041100**	**12148046000**
12250110600	**12148060700**	**12148094500**	**12148574900**	**–**	**12148041100**	**12148040900**
12250110800	**12148060700**	**12148094600**	**12148574000**	**–**	**12148041200**	**12148040900**
12250111000	**12148060800**	**12148094700**	**12148574000**	**12148041000**	**12148041200**	**–**



1. Clamping bolt
2. Wedge clamp
3. Clamping screw





Grooving

order number	W	H1	H	B	L1	L2	γP°	gage insert
2022921	10,40	20	20	9,5	125	21	3	TP..1103../TP..22..
2007414	15,30	20	20	13,0	150	27	3	TP..1603../TP..32..
2022922	15,30	25	25	13,0	150	27	3	TP..1603../TP..32..
2058066	20,20	25	25	18,0	150	35	3	TP..2204../TP..43..
2022923	20,20	32	32	18,0	180	35	3	TP..2204../TP..43..

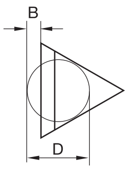
NOTE: Gage inserts listed are ISO-/ANSI-style inserts.
Holders are supplied without chipbreaker. For chipbreaker order numbers, see below.

For Grooving without Chipbreaker

catalogue number	clamp	clamp screw	clamp screw	shim	shim screw	shim screw	washer	wrench
12191061900	**12148589200**	**12148589800**	**–**	**12148032586**	**–**	**12148021900**	**–**	**–**
12191062086	**12148586800**	**–**	**12148586000**	**12148031686**	**12148024100**	**–**	**12148024200**	**–**
12191062586	**12148586800**	**–**	**12148586000**	**12148031686**	**12148024100**	**–**	**12148024200**	**–**
12191062686	**12148586900**	**–**	**12148021100**	**12148032086**	**12148024500**	**–**	**12148024800**	**–**
12191063286	**12148586900**	**–**	**12148021100**	**12148032086**	**12148024500**	**–**	**12148024800**	**–**

For Grooving with Chipbreaker (Order Additional Clamp and Chipbreaker)

inserts	clamp with chipbreaker	D	chipbreakers B — edge width					
			0,4mm	1,2mm	1,8mm	2,5mm	3,2mm	4,0mm
TP...1103...	**12148589200**	6,35	**12148591011**	**12148588211**	**12148588311**	**12148588411**	**–**	**–**
TP...1603...	**12148589300**	9,52	**12148591111**	**12148586611**	**12148587011**	**12148587111**	**12148580011**	**435101**
TP...2204...	**12148586900**	12,70	**–**	**–**	**12148580411**	**12148580511PKG**	**12148580611**	**12148582511**



Separator™ for Cut-Off

Specifically engineered to deliver toolholder flexibility with integral, component, universal, and blade-style designs.

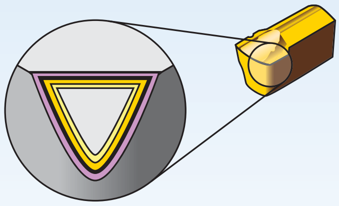
Separator

Features

- Insert widths 2–4mm.
- Toolholder shank sizes 10–31, 75mm.
- Cut-off up to 76mm bar capacity.

Benefits

- Quick, reliable insert indexing.
- Positive mechanical clamping.
- CNC square shank, screw machine, and PL blade-style toolholders.

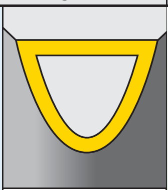
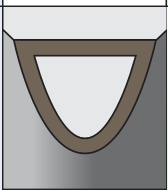
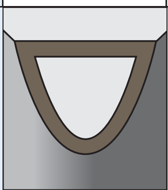
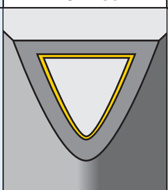
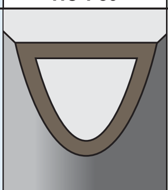


Coatings provide high-speed capability and are engineered for finishing to light roughing.

- Reduce cycle times — high speed and feed capability.
- Longer tool life — new multilayer coating provides better wear resistance.

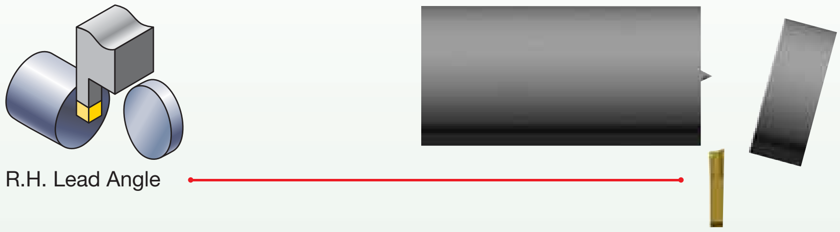
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

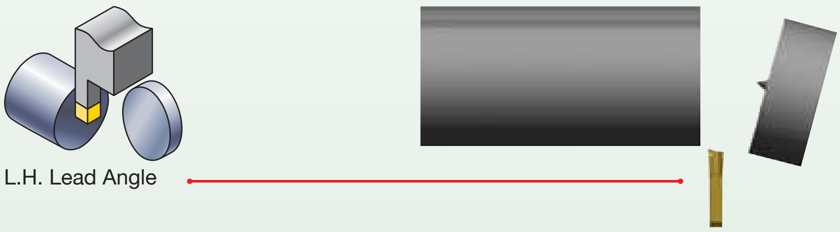
wear resistance ← → toughness

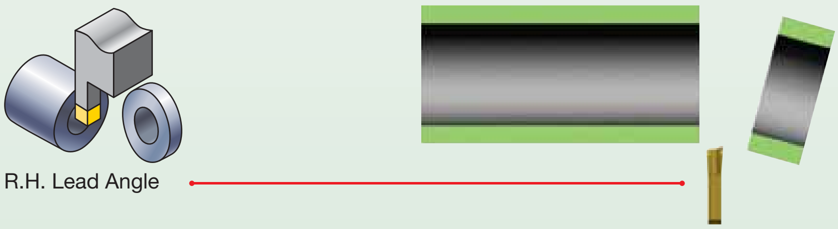
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
M40	 HC-P35	A premium, single-phase PVD TiN coating over a tough, specially formulated substrate that performs well under extremely low to moderate speed conditions found on screw machines. Ideal for carbon steels, alloy steels, most stainless steels, and many high-temperature alloys.	P						■	■	■	
			M							■	■	
			K							■	■	
			N						■	■	■	
			S							■	■	
M43	 HC-P25	PVD-TiAlN multilayer coating over a tough, shock-resistant, fine-grained carbide substrate with increased oxidation resistance. Recommended on low to medium cutting speeds when good toughness properties are required.	P				■	■	■	■		
			M					■	■	■		
			K					■	■	■		
			N					■	■	■		
			S					■	■	■		
M433B	 HC-M30	PVD-TiAlN single-layer coating over a superiorly tough, fine-grained carbide substrate. Outstanding temperature properties with excellent resistance to avoid built-up edges. Medium to high speeds and feeds. For stainless steels and high-temperature alloys.	P					■	■	■		
			M					■	■	■		
			N					■	■	■		
			S				■	■	■			
M45	 HC-P30	A premium PVD-TiCN coated, shock-resistant carbide designed for low to moderate speeds. Excellent resistance to welding and BUE, along with improved abrasion resistance make this an ideal grade for austenitic stainless steel, low carbon steel, and high-temperature alloys.	P					■	■	■	■	
			M						■	■	■	
			K						■	■	■	
			N						■	■	■	
			S						■	■	■	
M93	 HC-P20	PVD-TiAlN multilayer coating over a tough, fine-grained carbide substrate with increased resistance to heat. Recommended for medium to higher cutting speeds under moderate conditions.	P			■	■	■				
			M			■	■	■				
			K			■	■	■				
			N			■	■	■				
			S				■	■				

1 Choose the application to be performed:

Choose lead angle of insert for application.


R.H. Lead Angle


L.H. Lead Angle


R.H. Lead Angle

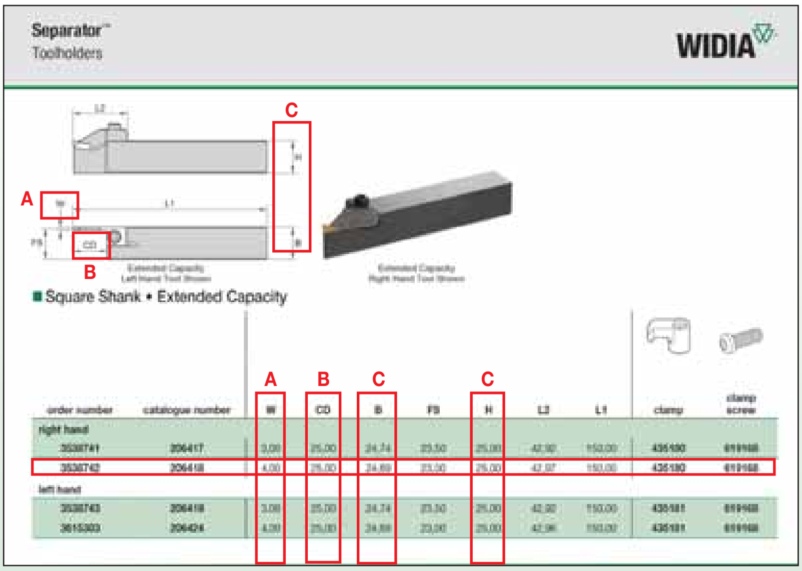
2 Identify the material to be machined:

Each tool has a material grid marked with a letter indicating the materials that can be machined.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

3 Select your toolholder based on the application:

- **A** Choose the appropriate width of insert required for the application.
- **B** Choose the shortest cutting depth "CD" dimension for increased tool rigidity.
- **C** Select the largest toolholder shank "H" and "B" dimensions for maximum rigidity.



4 Select chipbreaker style for the application:

See the application guide on page E112
for a complete list of insert styles.

insert type	steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
first choice	X2-Ultra (X2 has wipers)	X2-Ultra	X2-Ultra	X2-Ultra	X2-Ultra	–
second choice	S2-Ultra	S2-Ultra	Classic	S2-Ultra	S2-Ultra	X2

5 Select grade:

	Recommended Grades					
machining condition	steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
high performance for optimal conditions (clean cuts, good machine condition, higher speed capability)	M93	M433B	M93	M93	M433B	–
	–	M93	–	–	M93	–
general purpose (1st choice for general machining)	M43	M43	M43	M43	M43	M93
unfavourable conditions (interrupted cuts, low speeds, etc.)	M45	M45	M45	M45	M45	–
	M40	M40	M40	M40	M40	–

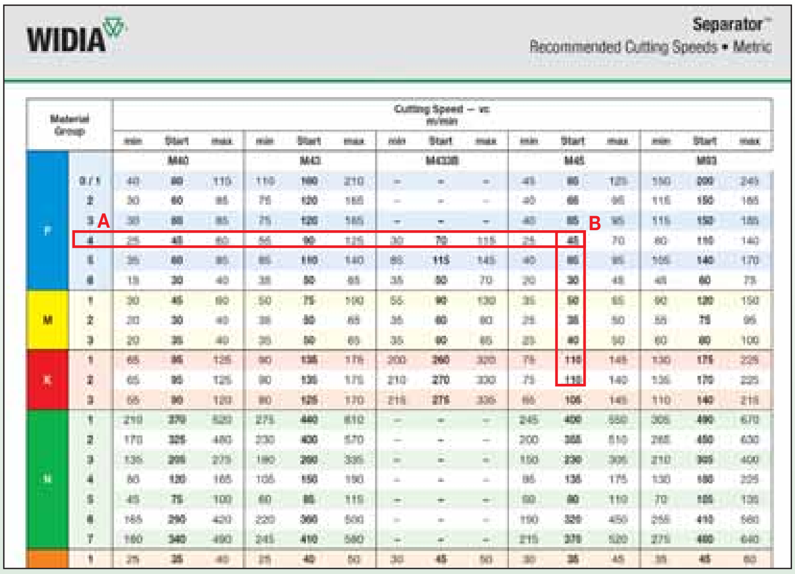
See page E109 for Grades and Grade Descriptions.

6 Determine cutting data:

A Based on material group and grade, identify starting speed (vc).

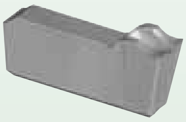
B First choice starting speed is in **bold**.

See page E113 for cutting data.



Separator • X² and X²-Ultra

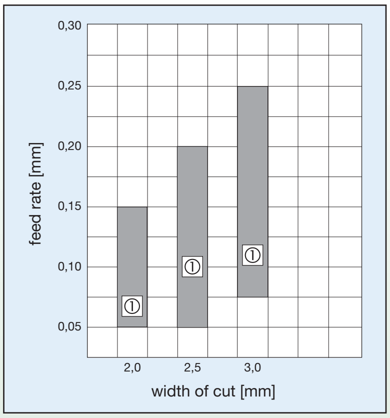
X²



X²-Ultra

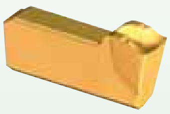
This insert has the same geometry as the WMT-SX™. Chip control geometry offers the widest range of speed and feed capabilities and provides excellent flatness and finish. This chipbreaker cuts with the least amount of tool pressure, extending tool life. The geometry also includes wipers and a corner radius. This geometry works well on a variety of materials.

This insert has the same geometry as the WMT-SX-Ultra. The X²-Ultra is an enhanced version of the X² and is ideal for stainless steels, nickel-based alloys, tool steel, INCONEL®, and titanium.

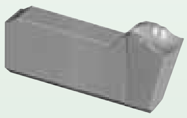


① Recommended Starting Feed

Separator • S² and S²-Ultra



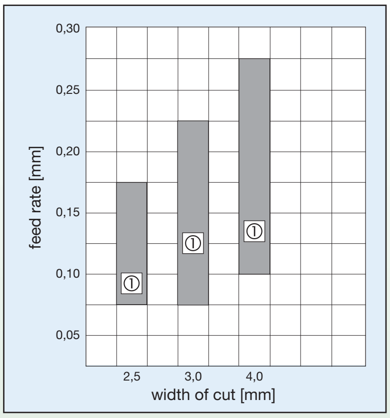
S²



S²-Ultra

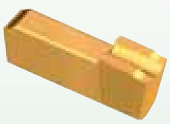
High positive rake with a more open chipbreaker enables increased speeds and feeds for moderate- to high-speed applications. The geometry includes wipers and a corner radius that provides superior flatness and finish. This insert is also available with sharp corners. Its greatest strengths can be seen on stainless steels and soft gummy steels.

The S²-Ultra is an enhanced version of the S² and is ideal for 300 series stainless steels, nickel-based alloys, tool steel, INCONEL, and titanium at moderate to high speeds and feeds.

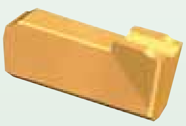


① Recommended Starting Feed

Separator • Classic and F²



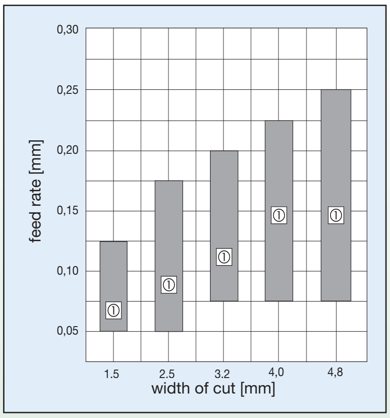
Classic



F²

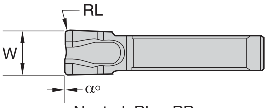
A good general-purpose insert for carbon steels, alloy steels, and most stainless steels. The Separator Classic chipbreaker is designed to perform well at moderate to slow speeds and feeds. The Classic provides standard high lead angles and sharp corners, making it the first choice when choosing an insert for nib-free cut-off.

This insert provides superior flatness and finish on a wide variety of materials Ideal for thick wall parts or cutting off larger diameter parts to centre. The Separator F² performs well at slow to moderate speeds and feeds.

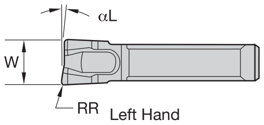


① Recommended Starting Feed

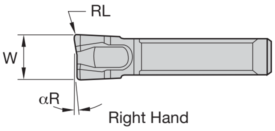
Material Group		Cutting Speed — vc m/min														
		M40			M43			M433B			M45			M93		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	0/1	40	**80**	115	110	**160**	210	–	–	–	45	**85**	125	150	**200**	245
	2	30	**60**	85	75	**120**	165	–	–	–	40	**65**	95	115	**150**	185
	3	30	**60**	85	75	**120**	165	–	–	–	40	**65**	95	115	**150**	185
	4	25	**45**	60	55	**90**	125	30	**70**	115	25	**45**	70	80	**110**	140
	5	35	**60**	85	85	**110**	140	85	**115**	145	40	**65**	95	105	**140**	170
	6	15	**30**	40	35	**50**	65	35	**50**	70	20	**30**	45	45	**60**	75
M	1	30	**45**	60	50	**75**	100	55	**90**	130	35	**50**	65	90	**120**	150
	2	20	**30**	40	35	**50**	65	35	**60**	80	25	**35**	50	55	**75**	95
	3	20	**35**	40	35	**50**	65	35	**60**	85	25	**40**	50	60	**80**	100
K	1	65	**95**	125	90	**135**	175	200	**260**	320	75	**110**	145	130	**175**	225
	2	65	**95**	125	90	**135**	175	210	**270**	330	75	**110**	140	135	**170**	225
	3	55	**90**	120	80	**125**	170	215	**275**	335	65	**105**	145	110	**140**	215
N	1	210	**370**	520	275	**440**	610	–	–	–	245	**400**	550	305	**490**	670
	2	170	**325**	480	230	**400**	570	–	–	–	200	**355**	510	265	**450**	630
	3	135	**205**	275	180	**260**	335	–	–	–	150	**230**	305	210	**305**	400
	4	80	**120**	165	105	**150**	190	–	–	–	95	**135**	175	130	**180**	225
	5	45	**75**	100	60	**85**	115	–	–	–	50	**80**	110	70	**105**	135
	6	165	**290**	420	220	**360**	500	–	–	–	190	**320**	450	255	**410**	560
	7	180	**340**	490	245	**410**	580	–	–	–	215	**370**	520	275	**460**	640
S	1	25	**35**	40	25	**40**	50	30	**45**	50	30	**35**	45	35	**45**	60
	2	10	**15**	20	15	**20**	25	15	**20**	25	10	**15**	20	20	**25**	30
	3	35	**45**	60	35	**50**	65	40	**55**	70	35	**50**	65	55	**65**	80
	4	15	**25**	30	25	**30**	35	25	**30**	40	20	**25**	35	30	**35**	45
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–



Neutral, RL = RR



Left Hand



Right Hand

● first choice
○ alternate choice

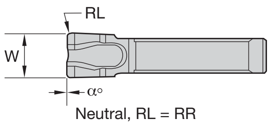
		M40	M43	M433B	M45	M93
P		●	●	●	●	●
M		●	●	●	●	●
K		○				
N			●	●		
S		○	●	●	●	○
H						○

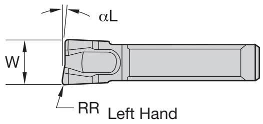
X²

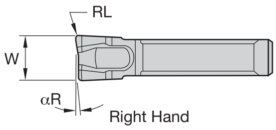
catalogue number	insert size	W	RR	hand	M40	M43	M433B	M45	M93
507305	2	2,39	0,14	N - Neutral	-	-	-	3540872	3540873
507308	3	3,20	0,17	N - Neutral	-	3540878	-	3540879	3540880

catalogue number	insert size	W	RR	αL	hand	M40	M43	M433B	M45	M93
507307	2	2,39	0,14	5	L - Left	-	-	-	3540876	3540877
507310	3	3,20	0,17	5	L - Left	-	-	-	3540884	3540885

catalogue number	insert size	W	RL	αR	hand	M40	M43	M433B	M45	M93
507306	2	2,39	0,14	5	R - Right	-	-	-	3540874	3540875
507309	3	3,20	0,17	5	R - Right	-	-	-	3540882	3540883







● first choice
○ alternate choice

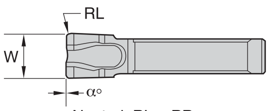
	M40	M43	M433B	M45	M93
P	●	●	●	●	●
M	●	●	●	●	●
K	○				
N		●	●		
S	○	●	●	●	○
H					○

X² Ultra

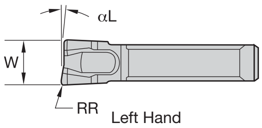
catalogue number	insert size	W	RR	hand	M40	M43	M433B	M45	M93
507354	2	2,39	0,15	N - Neutral	–	–	3540926	–	–
507357	3	3,20	0,15	N - Neutral	–	–	3540929	–	–

catalogue number	insert size	W	RR	αL	hand	M40	M43	M433B	M45	M93
507356	2	2,39	0,13	5	L - Left	–	–	3540928	–	–
507359	3	3,20	0,15	5	L - Left	–	–	3540931	–	–

catalogue number	insert size	W	RL	αR	hand	M40	M43	M433B	M45	M93
507355	2	2,39	0,13	5	R - Right	–	–	3540927	–	–
507358	3	3,20	0,15	5	R - Right	–	–	3540930	–	–



Neutral, RL = RR



Left Hand

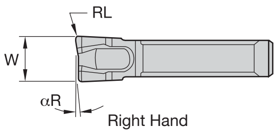
● first choice
○ alternate choice

		M40	M43	M433B	M45	M93
P		●	●	●	●	●
M		●	●	●	●	●
K		○				
N			●	●		
S		○	●	●	●	○
H						○

S²

catalogue number	insert size	W	RR	hand	M40	M43	M433B	M45	M93
507275	2	2,39	0,20	N - Neutral	3540807	3540803	–	3540805	3540806
507295	3	3,00	0,25	N - Neutral	–	3540857	–	3540858	3540859
507278	3	3,20	0,25	N - Neutral	3540822	3540818	–	3540820	3540821
507378	4	4,00	0,25	N - Neutral	–	3540951	–	3540952	3540953
507281	5	4,78	0,25	N - Neutral	–	3540833	–	3540835	3540836

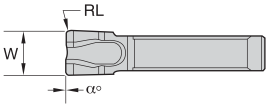
catalogue number	insert size	W	RR	αL	hand	M40	M43	M433B	M45	M93
507277	2	2,39	0,20	5	L - Left	–	–	–	3540815	3540816
507297	3	3,00	0,20	5	L - Left	–	3540863	–	–	3540865
507280	3	3,20	0,20	5	L - Left	–	–	–	3540830	–
507283	5	4,78	0,20	5	L - Left	–	–	–	–	3540846



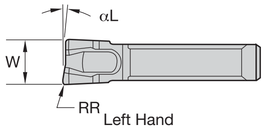
● first choice
○ alternate choice

		M40	M43	M433B	M45	M93
P		●	●	●	●	●
M		●	●	●	●	●
K		○				
N			●	●		
S		○	●	●	●	○
H						○

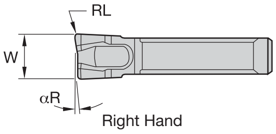
catalogue number	insert size	W	RL	αR	hand	M40	M43	M433B	M45	M93
507276	2	2,39	0,20	5	R - Right	3540812	3540808	–	3540810	3540811
507301	2	2,39	—	5	R - Right	–	–	–	3540870	–
507296	3	3,00	0,20	5	R - Right	–	3540860	–	3540861	3540862
507279	3	3,20	0,20	5	R - Right	3540827	3540823	–	3540825	3540826
507298	3	3,20	—	5	R - Right	–	3540866	–	3540867	3540868
507379	4	4,00	0,25	5	R - Right	–	3540954	–	3540955	–
507282	5	4,78	0,20	5	R - Right	–	3540838	–	3540840	3540841



Neutral, RL = RR



Left Hand



Right Hand

● first choice
○ alternate choice

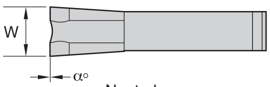
	M40	M43	M433B	M45	M93
P	●	●	●	●	●
M	●	●	●	●	●
K	○				
N		●	●		
S	○	●	●	●	○
H					○

S² Ultra

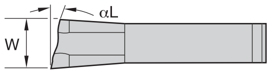
catalogue number	insert size	W	RR	hand	M40	M43	M433B	M45	M93
507329	2	2,39	0,15	N - Neutral	–	–	3540907	–	–
507332	3	3,18	0,15	N - Neutral	–	–	3540910	–	–

catalogue number	insert size	W	RR	αL	hand	M40	M43	M433B	M45	M93
507331	2	2,39	0,15	5	L - Left	–	–	3540909	–	–
507334	3	3,18	0,15	5	L - Left	–	–	3540912	–	–

catalogue number	insert size	W	RL	αR	hand	M40	M43	M433B	M45	M93
507330	2	2,39	0,15	5	R - Right	–	–	3540908	–	–
507333	3	3,18	0,15	5	R - Right	–	–	3540911	–	–



Neutral



Left Hand

● first choice
○ alternate choice

		M40	M43	M433B	M45	M93
P		●	●	●	●	●
M		●	●	●	●	●
K		○				
N			●	●		
S		○	●	●	●	○
H						○

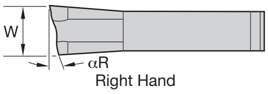
Classic

catalogue number	insert size	W	hand	M40	M43	M433B	M45	M93
507196	2	1,60	N - Neutral	3540664	–	–	3540663	–
507140	2	2,39	N - Neutral	3540530	–	–	3540528	3540529
507117	3	3,20	N - Neutral	3540461	–	–	3540459	3540460
507116	5	4,78	N - Neutral	3540449	–	–	3540447	–

catalogue number	insert size	W	αL	hand	M40	M43	M433B	M45	M93
507152	2	2,36	12	L - Left	3540594	–	–	–	–
507144	2	2,39	4	L - Left	3540554	–	–	3540553	–
507154	3	3,15	12	L - Left	3540598	–	–	3540597	–
507129	3	3,20	4	L - Left	3540510	–	–	3540509	–
507125	5	4,78	4	L - Left	3540487	–	–	–	–

(continued)

(Classic — continued)

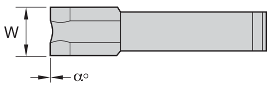


● first choice
○ alternate choice

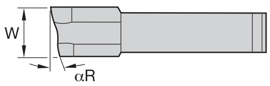
	M40	M43	M433B	M45	M93
P	●	●	●	●	●
M	●	●	●	●	●
K	○				
N		●	●		
S	○	●	●	●	○
H					○

catalogue number	insert size	W	αR	hand	M40	M43	M433B	M45	M93
507197	2	1,60	4	R - Right	3540666	-	-	-	-
507214	2	1,60	12	R - Right	3540692	-	-	3540691	-
507207	2	2,31	4	R - Right	-	-	-	3540685	-
507151	2	2,36	12	R - Right	3540589	3540585	-	3540587	-
507143	2	2,39	4	R - Right	3540544	-	-	3540542	3540543
507161	2	2,39	18	R - Right	3540613	-	-	3540612	-
507171	3	3,12	6	R - Right	3540628	-	-	-	-
507146	3	3,15	12	R - Right	3540562	-	-	3540560	-
507155	3	3,15	18	R - Right	3540603	-	-	3540602	-
507128	3	3,20	4	R - Right	3540498	-	-	3540496	3540497
507224	3	3,20	4	R - Right	3540700	-	-	3540698	-
507176	5	4,72	12	R - Right	3540634	-	-	3540633	-
507124	5	4,78	4	R - Right	3540479	-	-	3540477	3540478

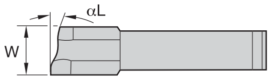
NOTE: 507207 and 507224 have a modified aggressive chip control design.



Neutral



Right Hand



Left Hand

● first choice
○ alternate choice

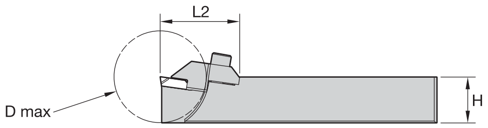
		M40	M43	M433B	M45	M93
P		●	●	●	●	●
M		●	●	●	●	●
K		○				
N			●	●		
S		○	●	●	●	○
H						○

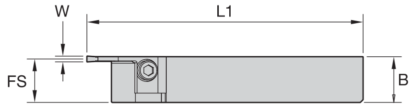
F²

catalogue number	insert size	W	hand	M40	M43	M433B	M45	M93
507240	2	2,39	N - Neutral	3540744	-	-	3540743	-
507244	3	3,20	N - Neutral	3540756	-	-	3540755	-

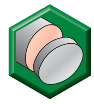
catalogue number	insert size	W	αL	hand	M40	M43	M433B	M45	M93
507255	2	2,39	12	L - Left	3540781	-	-	-	-
507257	3	3,18	4	L - Left	-	-	-	3540784	-

catalogue number	insert size	W	αR	hand	M40	M43	M433B	M45	M93
507241	2	2,39	4	R - Right	3540747	-	-	3540746	-
507242	2	2,39	12	R - Right	3540750	-	-	3540749	-
507243	2	2,39	18	R - Right	3540753	-	-	3540752	-
507245	3	3,18	4	R - Right	3540759	-	-	3540758	-
507246	3	3,18	12	R - Right	3540762	-	-	3540761	-
507247	3	3,18	18	R - Right	3540764	-	-	3540763	-
507252	5	4,75	4	R - Right	3540774	-	-	3540773	-
507253	5	4,78	12	R - Right	3540777	-	-	3540776	-

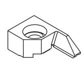
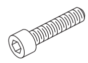




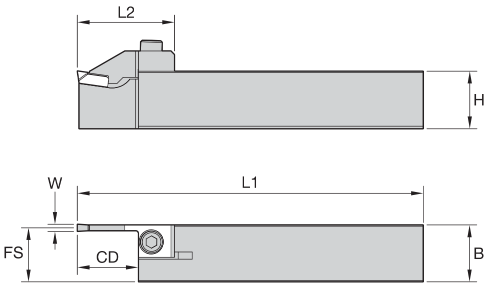
Left Hand Tool



Square Shank

order number	catalogue number	W	D max	B	FS	H	L2	L1	clamp 	clamp screw 
right hand										
3614290	**206445**	2,00	20,00	9,86	9,00	10,00	21,55	75,00	**435200**	**MS318**
3538751	**206446**	2,00	20,00	11,86	11,00	12,00	21,55	90,00	**435200**	**MS318**
3538752	**206447**	2,00	26,00	9,86	9,00	10,00	24,83	150,00	**435201**	**MS318**
3587590	**206448**	2,00	26,00	11,86	11,00	12,00	24,83	150,00	**435201**	**MS318**
3615308	**206449**	2,00	38,00	15,86	15,00	16,00	32,83	100,00	**435202**	**MS412**
3538753	**206450**	2,00	38,00	19,86	19,00	20,00	32,84	125,00	**435202**	**MS412**
3538706	**206265**	2,50	20,00	11,74	10,81	12,00	21,51	89,95	**435170**	**MS318**
3538718	**206279**	2,50	26,00	9,75	8,81	10,00	24,80	150,00	**435152**	**MS318**
3538719	**206280**	2,50	26,00	11,73	10,80	12,00	24,80	150,00	**435152**	**MS318**
3538721	**206282**	2,50	38,00	15,75	14,81	16,00	32,80	100,00	**435140**	**MS412**
3538723	**206284**	2,50	38,00	19,74	18,80	20,00	32,80	125,00	**435140**	**MS412**
3538720	**206281**	3,00	26,00	11,68	10,39	12,00	23,62	150,00	**435130**	**MS318**
3538722	**206283**	3,00	38,00	15,70	14,40	16,00	32,85	100,00	**435126**	**MS412**
3565364	**206285**	3,00	38,00	19,68	18,39	20,00	32,85	125,00	**435126**	**MS412**
left hand										
3614291	**206451**	2,00	20,00	9,86	9,00	10,00	21,55	75,00	**435203**	**MS318**
3538754	**206452**	2,00	20,00	11,86	11,00	12,00	21,55	90,00	**435203**	**MS318**
3614292	**206453**	2,00	26,00	9,86	9,00	10,00	24,83	150,00	**435204**	**MS318**
3538755	**206454**	2,00	26,00	11,00	11,00	12,00	24,83	150,00	**435204**	**MS318**
3538756	**206455**	2,00	38,00	15,86	15,00	16,00	32,83	100,00	**435205**	**MS412**
3615309	**206456**	2,01	38,00	19,86	19,00	20,00	32,84	125,00	**435205**	**MS412**
3538705	**206264**	2,50	20,00	9,75	8,80	10,00	21,51	74,96	**435171**	**MS318**
3538707	**206266**	2,50	20,00	11,74	10,81	12,00	21,51	89,95	**435171**	**MS318**
3538711	**206272**	2,50	26,00	9,75	8,81	10,00	24,80	150,00	**435153**	**MS318**
3538712	**206273**	2,50	26,00	11,73	10,80	12,00	24,80	150,00	**435153**	**MS318**
3538714	**206275**	2,50	38,00	15,75	14,81	16,00	32,80	100,00	**435141**	**MS412**
3538716	**206277**	2,50	38,00	19,74	18,80	20,00	32,80	125,00	**435141**	**MS412**
3538713	**206274**	3,00	26,00	11,68	10,39	12,00	23,62	150,00	**435131**	**MS318**
3538715	**206276**	3,00	38,00	15,70	14,40	16,00	32,85	100,00	**435127**	**MS412**
3538717	**206278**	3,00	38,00	19,68	18,39	20,00	32,85	125,00	**435127**	**MS412**

NOTE: Above toolholders are supplied with clamp and clamp screw.



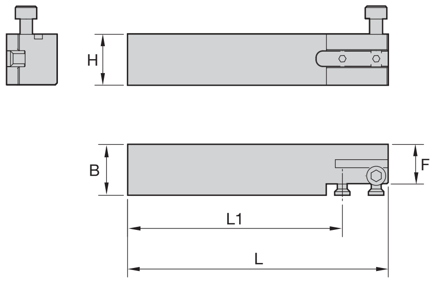
Extended Capacity
Left Hand Tool Shown

Extended Capacity
Right Hand Tool Shown

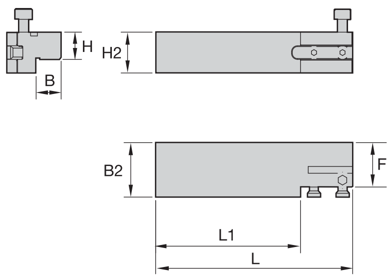
Square Shank • Extended Capacity

order number	catalogue number	W	CD	B	FS	H	L2	L1	clamp	clamp screw
right hand										
3538741	**206417**	3,00	25,00	24,74	23,50	25,00	42,92	150,00	**435180**	**619168**
3538742	**206418**	4,00	25,00	24,69	23,00	25,00	42,97	150,00	**435180**	**619168**
left hand										
3538743	**206419**	3,00	25,00	24,74	23,50	25,00	42,92	150,00	**435181**	**619168**
3615303	**206424**	4,00	25,00	24,69	23,00	25,00	42,96	150,00	**435181**	**619168**

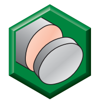
NOTE: Above toolholders are supplied with clamp and clamp screw.



Left Hand Tool

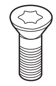
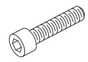


Left Hand Tool



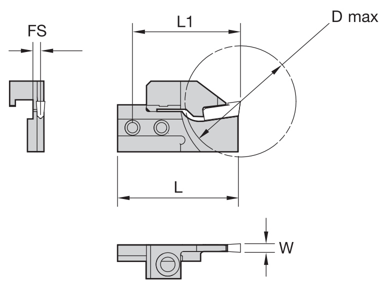
Right Hand Tool

12mm and 20mm Shank Toolholders

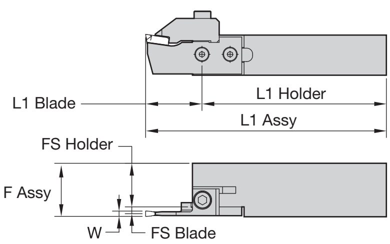



order number	catalogue number	H	B	B2	L	L1	H2	F	support blade screw	clamp screw
right hand										
3538772	**206518**	12,00	11,53	24,99	102,77	84,68	19,05	20,55	**606247**	**MS1495**
3614344	**206522**	20,00	20,00	–	102,77	84,68	–	15,55	**606247**	**MS1495**
left hand										
3538773	**206519**	12,00	11,53	24,99	102,77	84,68	19,05	20,55	**606247**	**MS1495**
3538774	**206523**	20,00	20,00	–	102,77	84,68	–	15,55	**606247**	**MS1495**

Support Blade Assembly

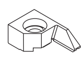


Right Hand Tool



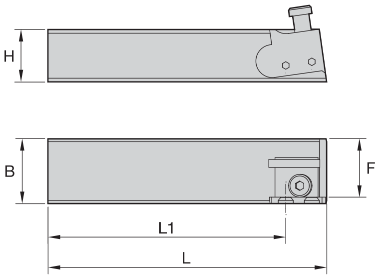
L1 Assy = L1 (Holder) + L1 (Blade)
F Assy = F (Holder) + FS (Blade) + W/2

12mm and 20mm Shank Blades

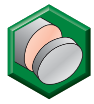


order number	catalogue number	W	D max	FS	L	L1	clamp
right hand							
3539515	**333101**	2,50	41,28	3,25	44,88	40,13	**435154**
3539516	**333102**	3,00	41,28	2,84	44,88	40,13	**435155**
3539522	**333111**	2,00	41,28	3,40	44,88	40,13	**435194**
left hand							
3539517	**333103**	2,50	41,28	3,25	44,88	40,13	**435156**
3539518	**333104**	3,00	41,28	2,84	44,88	40,13	**435157**

NOTE: Clamps do not ship with blades. Order clamps separately.

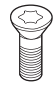
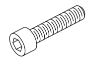


Left Hand Tool

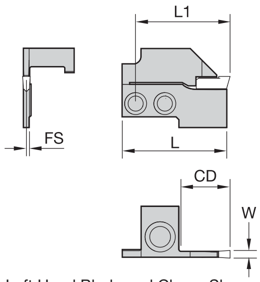



Right Hand Tool

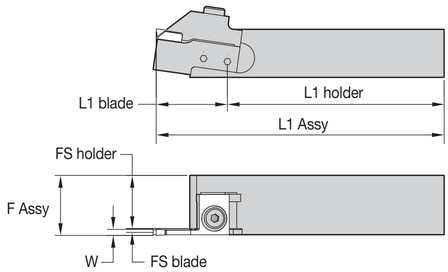
25mm and 32mm Shank Toolholders

order number	catalogue number	H	B	L	L1	F	 support blade screw	 clamp screw	clamp screw
right hand									
3538772	**206518**	12,00	11,53	102,77	84,68	20,55	**606247**	**–**	**MS1495**
3614344	**206522**	20,00	20,00	102,77	84,68	15,55	**606247**	**–**	**MS1495**
3538710	**206271**	25,00	24,61	131,90	112,16	21,41	**MS1073**	**MS1071**	**–**
left hand									
3538773	**206519**	12,00	11,53	102,77	84,68	20,55	**606247**	**–**	**MS1495**
3538774	**206523**	20,00	20,00	102,77	84,68	15,55	**606247**	**–**	**MS1495**
3615305	**206440**	32,00	31,60	132,03	112,18	28,42	**MS1073**	**MS1071**	**–**

Support Blade Assembly

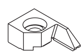


Left Hand Blade and Clamp Shown

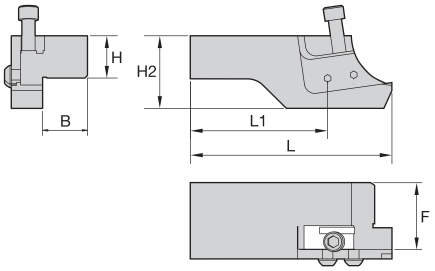


L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2

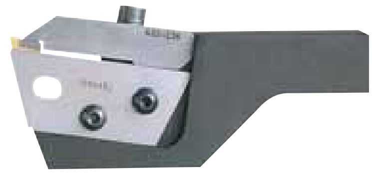
25mm and 32mm Shank Blades

order number	catalogue number	W	CD	FS	L	L1	 clamp
right hand							
3563591	**331117**	2,50	12,70	2,39	36,03	29,60	**435142**
3539504	**331101**	3,00	20,64	1,98	43,80	37,63	**435128**
3539508	**331109**	4,00	20,64	1,98	43,80	37,63	**435128**
left hand							
3539510	**331118**	2,50	12,70	2,39	36,03	29,60	**435143**
3539505	**331102**	3,00	20,64	1,98	43,80	37,63	**435129**
3539509	**331110**	4,00	20,64	1,98	43,80	37,63	**435129**

NOTE: Clamps do not ship with blades. Order clamps separately.



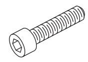
Left Hand Tool



Right Hand Tool

Grooving and Cut-Off

Universal Style Toolholder • 56mm Bar Capacity



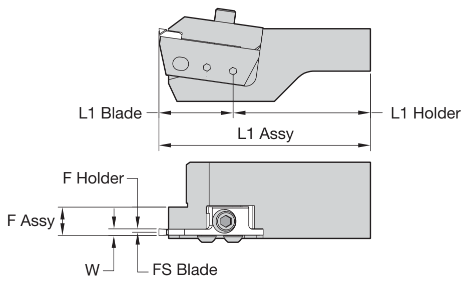
order number	catalogue number	B	H	H2	F	L1	L	clamp screw
right hand								
3614289	**206408**	26,97	25,00	43,66	40,16	105,46	144,14	**MS1294**

NOTE: Support blade requires two screws.
Order blades separately.

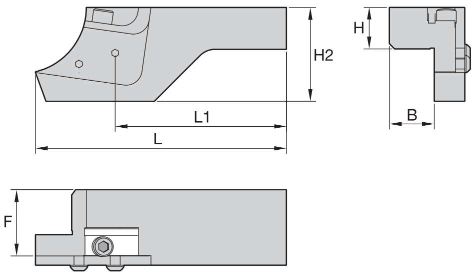
Components

W	L1	FS	left hand clamp for 206410	left hand clamp for 206442	support blade	right hand clamp for 206441	right hand clamp for 206408
2.5	44,50	0,91	**435149**	**435151**	**310109**	**435150**	**435148**
3.0	44,50	1,27	**435104**	**435110**	**310102**	**435116**	**435101**
4.0	44,50	1,84	**435105**	**435109**	**310108**	**435117**	**435102**

NOTE: All components ship separately.



L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2



■ Universal Style Toolholder • 76mm Bar Capacity

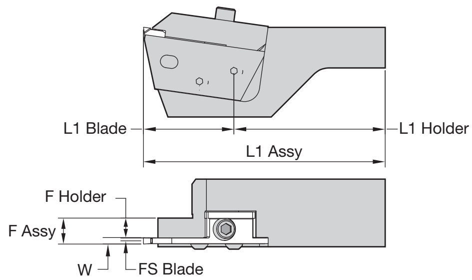
order number	catalogue number	B	H	H2	F	L1	L	support blade screw	clamp screw
right hand									
3538739	**206411**	27,00	25,00	56,36	39,78	102,96	150,85	**MS1072**	**MS352**
3615306	**206443**	27,00	32,00	56,36	39,78	102,96	150,85	**MS1072**	**MS1294**

NOTE: Support blade requires two screws.
Order blades separately.

■ Components

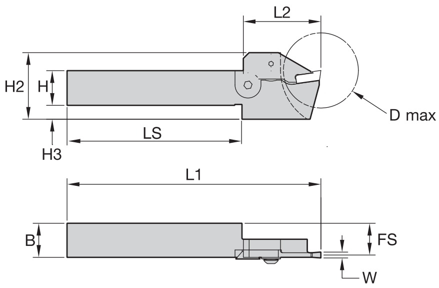
W	L1	FS	left hand clamp	support blade	right hand clamp
3.0	57,05	1,27	**435137**	**309111**	**435136**
4.0	57,05	1,84	**435106**	**309105**	**435103**

NOTE: All components ship separately.



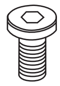
L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2

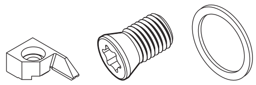
Grooving and Cut-Off



Left Hand Tool

Sub-Spindle





order number	catalogue number	W	D max	B	FS	H	H2	H3	L1	LS	L2	button-head cap screw	clamp	flat-head cap screw	washer
right hand															
3538766	**206506**	3,00	66,70	24,76	23,50	25,00	44,45	9,52	150,00	89,05	60,31	**MS518**	**409182**	**606243**	**613139**
left hand															
3538769	**206509**	2,50	42,00	19,75	18,80	20,00	37,65	7,62	140,00	96,57	42,66	**MS518**	**409185**	**606244**	**613139**
3538767	**206507**	3,00	66,70	24,76	23,50	25,00	44,45	9,52	150,00	89,05	60,32	**MS518**	**409183**	**606243**	**613139**

WIDIA™ Victory™ High-Temp Turning

The new -FS and -MS geometries from WIDIA are specifically designed for use in high-temperature alloys, nickel-based (INCONEL®, Udimet®, Rene) materials, cobalt-based (Haynes®), Fe-based (Airmet 100) materials, titanium and titanium alloys, as well as difficult-to-machine stainless (460SS, duplex, high-alloy stainless), cobalt-chrome, and stainless-based powdered metals.

..GG-FS Geometry

- All ..GG-FS inserts are periphery ground to provide a G tolerance. This is a critical in some applications, especially in the aerospace industry.
- Precision grinding provides a high quality cutting edge which reduces depth-of-cut notching and delivers consistent surface quality in finishing applications.
- Be more productive by utilising the higher speed capability provided by the latest in PVD coating technology and optimised post-coat treatment.
- Achieve better tool life through the high positive rake angle which reduces cutting forces and built-up edge.

..MG-MS Geometry

- High positive rake angle delivers improved tool life by reducing cutting forces and built-up edge when machining high-temp alloys.
- Improved chip control and reduced crater wear due to proprietary chipbreakers with varying shapes and distances.
- Reduced thermal wear and cracking due to near sharp cutting edge with optimised edge treatment.
- Improved chipbreaking at various depths of cut due to variable land width, which improves impact strength.
- All MG-MS inserts are moulded, which supports increased tool life due to the elimination of grinding stress.

To learn more, contact your local Authorised Distributor or visit **widia.com.**

WIDIA™ VICTORY

Definitions and Guidelines

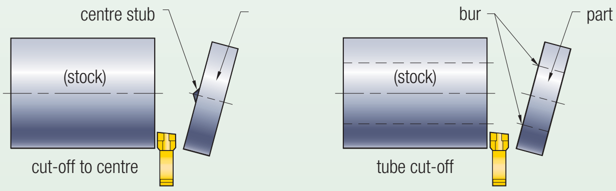
1. Width of cut (W) = width of the insert.
2. Lead angle = 0° (neutral); 4°, 5°, 12°, 18° (RH or LH).

Reduce bur of cut-off faces:

- Use lead angle-type inserts (Figures 1 and 2). Lead angle on a cut-off insert reduces the bur that remains on the part but decreases tool life and increases tool side deflection and possibly cycle time.

Figure 1

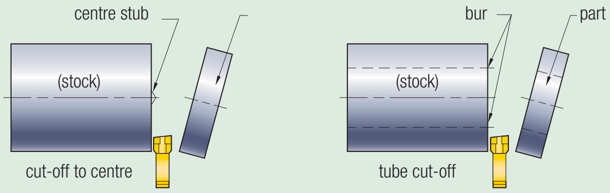
Insert selection **left-hand lead**



Left-hand lead insert leaves centre stub or bur on part and produces clean stock surface.

Figure 2

Insert selection **right-hand lead**

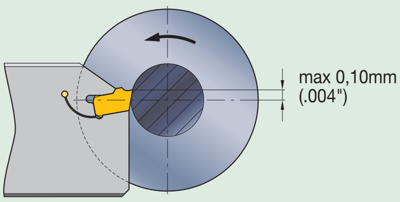


Right-hand lead insert leaves centre stub or bur on stock and produces clean part surface.

- Check total height and maintain on centre with part diameter.
- The cutting edge height should be within ±.0,1mm to the centre; recommended cutting position is 0,05mm above centre.

Figure 3

Above centre



- If 0° lead angle is mandatory, use the narrowest possible cut-off insert and blade. This will minimise the centre stub or cut-off bur length. Decrease the feed rate to maximum 0,05mm or less at the point where diameter equals insert width.
- On tubing-type parts that require a chamfer on the I.D., align I.D. chamfer tool with cut-off surface. This will enable the chamfering operation to actually separate the part from the bar (see Figure 4). Note the part may drop onto the chamfering bar, which, in this case, will act like a catcher for the part.

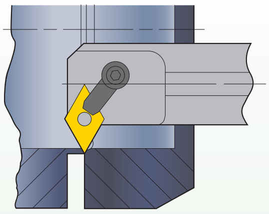


Figure 4

Internal chamfer line up

Improve surface finish of cut-off faces:

- Use insert with 0° lead angle.
- Increase coolant flow or improve application technique, as shown in Figure 5.
- Decrease the feed rate near the break-through point of the cut.
- Check that the grooving tool is set at the correct angle.
- Use blades with the greatest possible face height and smallest possible cutting width.
- Increase the speed.

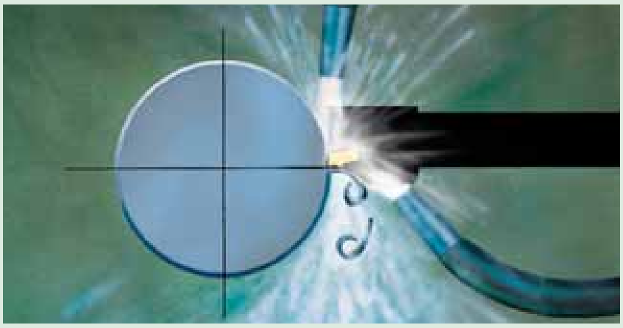


Figure 5

Preferred method for applying coolant

- Mount cut-off tool upside down. This enables gravity to remove chips and avoid cutting the chips twice. Another benefit of mounting the tool upside down is preventing chips from wedging between the tool insert and the groove side walls, which galls the side wall surfaces.

Improve chip control:

- Adjust feed rate up or down to accommodate chip formation.
- Use a 0° or smallest lead available.
- Use ample amounts of well-directed coolant (see Figure A).
- Maintain sharp cutting edge and corners.

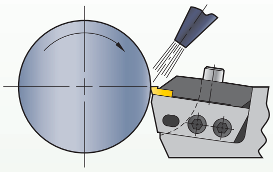
Improve flatness of cut-off surfaces:

- Maintain 90° position (perpendicular alignment) between cut-off tool and workpiece.
- For low to moderate speed (sfpm), use Separator F².
- For moderate to high speed (sfpm), use Separator S² or X².
- Use strongest toolholder system possible.
- Use 0° lead angle inserts when possible. If lead angle inserts are needed, reduce the feed rate.
- Check for minimum overhang of holder and blade.
- Set up for minimum workpiece overhang (distance out of chuck).
- Reduce feed rate.
- Maintain sharp edge and corners on cut-off insert.
- Increase speed (RPM).
- Use ample amounts of well-directed coolant (see Figure A).
- Maintain proper tool centre height 0–0,1mm above centre (see Figure B).

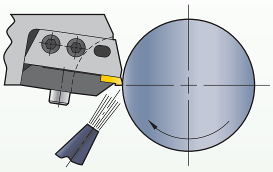
Improve surface finish:

- For low to moderate speed (sfpm), use Separator F².
- For moderate to high speed (sfpm), use Separator S² or X².
- Avoid overly aggressive chip control.
- Increase speed.
- Reduce lead angle and feed rate.
- Determine if corner radius is too large or small.
- Use a coated grade.
- Use coolant (see Figure A).

Figure A

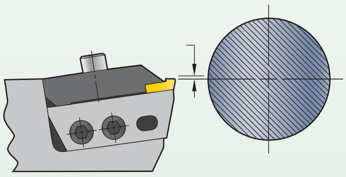


Coolant on cut-off tool



Preferred method of applying coolant

Figure B



Minimise edge chipping:

- Check to see if tool is significantly above or below centre.
- Reduce feed prior to part drop-off.
- Use Separator S² or X².
- Choose the proper speed associated with the insert grade used.
- Call Technical Support to see if a larger hone size is needed.
- Eliminate chatter.
- Avoid chip re-cutting.
- Check for these part and machine problems:
  - – Slide is loose.
  - – Slide travel is irregular.
  - – Bar/tube I.D. and/or O.D. is out of round.
  - – Bar/tube is bent.
  - – Thin wall collapses (deforms) in the cut.
  - – Part is unstable.
  - – Cut-off through unturned stock.
  - – Excessive tool overhang.
  - – Bent or partly attached flash ring.

(continued)

(continued)

Eliminate chatter:

- Minimise tool blade and holder overhang.
- Minimise part overhang.
- Use strongest toolholder system.
- Use a more narrow width of insert.
- Chipbreaker might be too aggressive. (Call Technical Support.)
- Adjust speed and feed rate up or down.
- Hold workpiece rigidly.
- With a longer part, support with steady rest or live centre.
- Avoid machine dwell.
- Use S^2 or X^2 to reduce cutting forces.

Reduce cut-off nib on solid bar or I.D. bur on tubing:

- Check tool height. Insert cutting edge should be on centre to 0,05mm above centreline of workpiece.
- To reduce nib on part, use a high lead angle-type insert. Lead angle on a cut-off insert reduces the nib, which remains on the workpiece. CAUTION: the higher the lead, the more tool-side deflection.
- Use the narrowest possible cut-off insert to minimise the cut-off bur length.
- Reduce feed rate at the end of a cut.
- On most tubing-type parts, a 4° or 5° lead angle will be sufficient.
- Add support to a long slender-type part.
- Maintain proper sub-spindle alignment.
- If nib or bur persists, call Technical Support about reducing hone size.
- Use small- or no-corner radius.

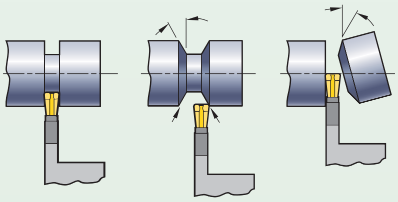
Eliminate built-up edge:

- Select proper grade for insert.
- Increase speed (RPM).
- Increase the feed rate.
- Use ample amounts of well-directed coolant (see Figure A on page E131).

Chamfer and cut-off operations:

- Use Separator S^2 or X^2.
- Groove or breakdown workpiece surface being machined.
- Machine the chamfer.
- For jobs requiring a chamfer on both ends of the part, begin by plunging to a depth just beyond the depth of the chamfers. Then, return to the part O.D. and profile each chamfer individually. Finish the cut-off after completion of the second chamfer.
- Cut off the workpiece (see Figure C).

Figure C



Modifications for Increased Depth of Cut

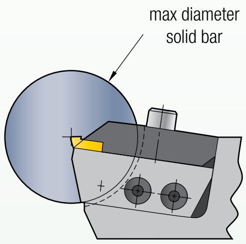


Figure 1
Standard bar capacity shown

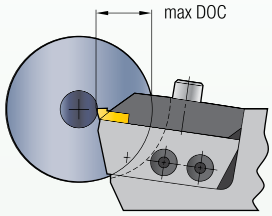


Figure 2
Larger bar diameter shown

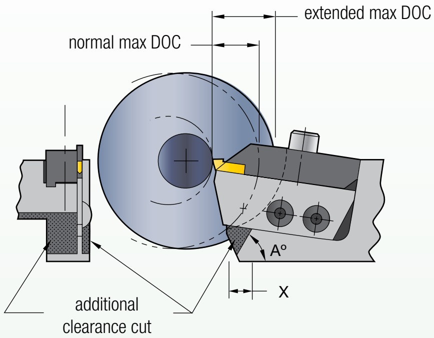


Figure 3
Modified toolholder with larger bar diameter shown

Capacity Chart for 57,15mm Diameter Bar Capacity Tooling

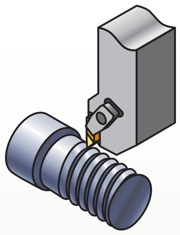
bar diameter	63,50	76,20	88,90	101,60	114,30	127,00	152,40	**NOTE**
max DOC	23,88	19,05	15,75	14,22	12,70	11,94	11,18	**with no modification on toolholder**
	28,45	26,16	24,64	24,64	22,10	21,34	19,81	**with no modification on toolholder X = 10,16mm A = 1270mm**

Capacity Chart for 76,2mm Diameter Bar Capacity Tooling

bar diameter	88,90	101,60	114,30	127,00	152,40	**NOTE**
max DOC	28,45	25,40	22,35	19,81	17,53	**with no modification on toolholder**
	36,58	34,80	33,27	31,75	28,45	**with no modification on toolholder X = 10,16mm A = 1270mm**

Turning • Threading

TopThread External Threading

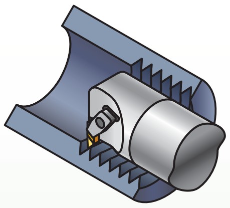


Square Shank Toolholder Sizes:
• Metric — 10–32mm

Cresting (Full Profile):
UN TPI of 32–7
ISO 1,5–3,0mm pitch

60° Partial Profile — Flat Top (NTF and NTK):
UN 44–4.5 TPI
ISO 0,6–5,5mm pitch

TopThread Internal Threading

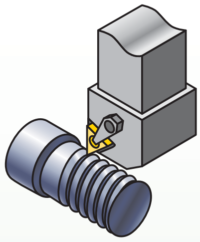


Boring Bar Diameters:
• Metric — 10–50mm
• Minimum bore —11,5mm
• Steel

Cresting (Full Profile):
UN 16–8 TPI
ISO 1,5–3,0mm pitch

60° Partial Profile — Flat Top (NT-1L, NTF, and NTK):
UN 24–4.5 TPI
ISO 1,0–5,5mm pitch

Laydown External Threading

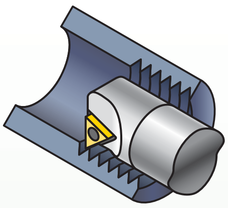


Square Shank Toolholder Sizes:
- Metric — 8–40mm

Cresting (Full Profile):
UN 48–8 TPI
ISO 0,5–5,0mm pitch

60° Partial Profile:
UN 48–4 TPI
ISO 0,5–6,0mm pitch

Laydown Internal Threading



Boring Bar Diameters:
- Metric — 12–50mm
- Minimum bore — (13mm)
- Steel and carbide

Cresting (Full Profile) and Partial Profile:
UN 48–8 TPI
ISO 0,5–5,0mm pitch

60° Partial Profile:
UN 48–4 TPI
ISO 0,5–6,0mm pitch

55° Partial Profile:
UN 48–5 TPI
ISO 0,5–5,0mm pitch

TopThread

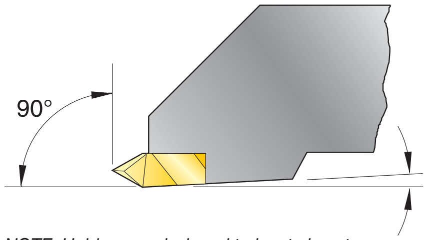
High heat and high edge line load concentrated to a small nose radius, combined with high feed rates, places high demands on carbide threading inserts. The WIDIA TopThread system is the best solution for these problems.

The WIDIA TopThread system is the superior choice for high-demand applications like machining Acme, Buttress, and API threads.

TopThread Insert Technology

TopThread insert technology brings superior chip control to your threading operations. Unlike competitors' designs, the WIDIA recessed chip groove, when used according to our recommendations, will control the chip in most applications, bringing you better tool life and lower cutting pressures.

- Reduced inconsistencies and better workpiece finish.
- Superior chip control reduces the danger to operators.
- Increased productivity in all of your threading operations.
- Excellent choice for special thread forms and toolholder designs.



NOTE: Holders are designed to locate inserts inclined to 3° to provide back clearance down open side.

The Simple Solution

With the WIDIA™ TopThread solution, there is no need to worry about costly setup mistakes. TopThread insert selection is easy, quick, and enables accurate indexing to keep your machine spindle turning.

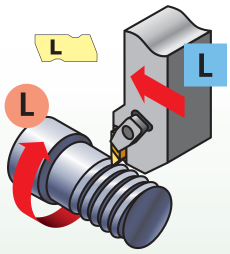
- Rigid design for increased insert stability during threading applications.
- Good quality threads, improved tool life, and improved surface finishes.
- Locking forces in three directions for superior resistance to tangential force.
- Unique 3° insert relief angle for back clearance.
- Available in partial profile inserts for 60° thread forms.

Step 1 • Select Threading Method and Hand of Tooling

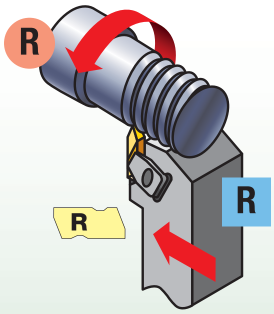
Required Information:
- External/internal operation.
- Spindle rotation/hand of thread.
- Feed direction.

hand of thread | hand of toolholder | hand of insert

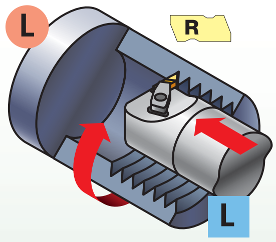
Feed direction toward the chuck • RECOMMENDED



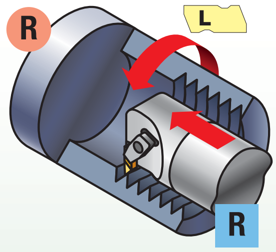
external left-hand thread



external right-hand thread

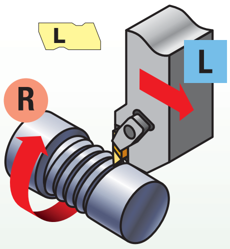


internal left-hand thread

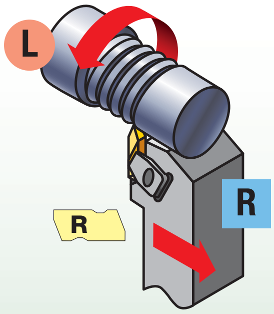


internal right-hand thread

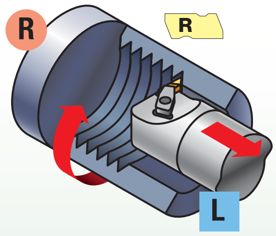
Feed direction away from the chuck



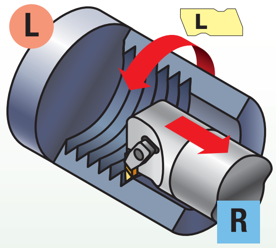
external right-hand thread



external left-hand thread



internal right-hand thread



internal left-hand thread

Step 2 • Select Holder from Catalogue Page

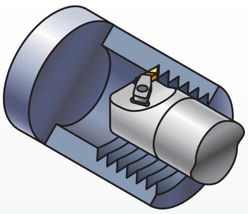
The insert size must match the gage insert size of your toolholder selection:

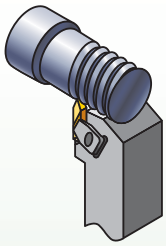
Required Information:
- External/internal operation.
- Minimum bore diameter (for internal operations).
- Hand of tool.
- Insert size (gage insert).

catalogue number	gage insert
NSR-163D	N.3R
NSR-164D	N.4R

NOTE: TopThread toolholders and boring bars are listed with a gage insert to indicate the size and hand required. They are compatible with both grooving and threading inserts of the same size.

Select the appropriate holder for the insert size and hand:



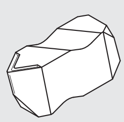


NOTE: Optimise your threading operation by using the proper infeed method and the recommended infeed values.

See the Technical section on pages F79–F101 of this catalogue.
For internal threading, minimum bore varies depending on thread type.
See page F92 for details.

Step 3 • Choose Insert for Application

- See threading insert overview on page F8.
- Select cresting inserts for fully controlled thread form including diameter control. Cresting inserts eliminate the need for deburring.
- Non-cresting partial profile inserts can cut a variety of thread pitches.
- Note insert size for toolholder selection.

	insert size	catalogue number	TN6025	TN6010
	2	**NT-2RK**	●	●
	3	**NT-3RK**	●	●
	4	**NT-4RK**	●	●

Step 4 • Select Grade and Speed

Recommendations for Grade and Speed Selection — m/min

workpiece material	**steel**	**stainless steel**	**cast iron**	**non-ferrous metals**	**high-temp alloys**
insert style	chip control or neutral	chip control or positive	neutral	positive	positive
optimum cutting conditions	**TN6010** 160–750	**TN6010** 160–600	**TN6010** 230–700	–	**TN6010** 65–400
first choice	**TN6025** 130–650	**TN6025** 130–450	**TN6025** 200–475	**TN6025** 160–1150	**TN6025** 35–330

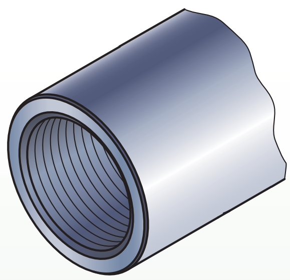
Examples:

Chip Control: *NT-K or NT-CK (partial profile only)*
Neutral: *NT, NT-C, NTF, NTC, NJ, NJF, NDC-V, NA, NDC, NTB-A/B*
Positive: *NTP, NTK, NJP, NJK*

TopThread Threading Example:

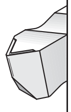
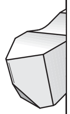
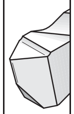
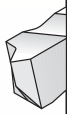
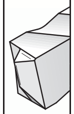
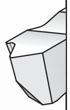
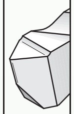
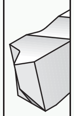
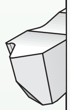
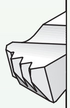
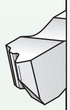
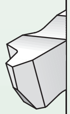
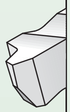
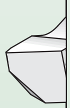
application: 8 TPI Acme internal right-hand thread
material: alloy steel
workpiece diameter: 114,3mm
good cutting conditions
feed towards the chuck

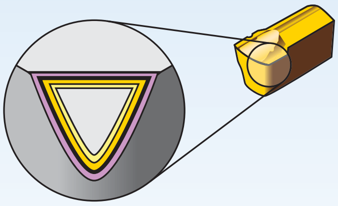
Recommendation:
insert: NA3L8
grade: TN6010
insert size: 3
boring bar: A40NER3
gage insert: N.3L
speed: 150 m/min
infeed passes*: 12 passes



** Infeed recommendations provided in technical data section on pages F88–F91.*

WIDIA

style						thread profile	standard	tolerance class	cresting	application	page(s)
chip control — K		neutral		positive							
NT-K		NT		NTP		Partial Profile 60°	–	–	N	General use for 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	**F13–F15**
NT-CK						Partial Profile 60° — coarse pitch	–	–	N	Coarse pitch 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	**F15**
		NTF		NTK		Partial Profile 60° — fine pitch	–	–	N	Fine pitch 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches — able to thread close to shoulders.	**F16**
		NTC				American UN	ANSI B1.1:74	2A/2B	Y	Widely used inch-based 60° V-form for all industries.	**F17**
				NJP		UNJ	SAEA588791	3A/3B	N	Controlled root radius on external threads for military and aerospace industries.	**F18**
				NJK		UNJ — fine pitch	SAEA588790	3A/3B	N	Controlled root radius on external threads for military and aerospace industries — able to thread close to shoulders.	**F18**
		NDC-V				NPT	ANSI/ACME B1.201: 1983	Standard NPT	Y	National Pipe Thread standard forms for pipe fittings.	**F18**
		NDC-V-M				NPT — multi-tooth	ANSI/ACME B1.201: 1983	Standard NPT	Y	High-productivity multi-tooth threading inserts for NPT threads.	**F19**
		NWC-E				Whitworth, BSW, BSP	BS 84:1956, ISO 228/1: 1982, DIN 259	Medium Class A	Y	Widely used 55° form for gas and water connections.	**F19**
		NDC-RD				API Round	API STD. 5B:1979	Standard API RD	Y	60° V-form with large radius for casing, tubing, and line pipe in the oil and gas industry, including 8 and 10 round forms.	**F20**
		NA				Acme	ANSI B1.5:1988	3G	N	29° truncated thread form for motion applications in a wide variety of industries.	**F21**
		NAS				Stub Acme	ANSI B1.8:1988	2G	N	Shallow depth 29° truncated thread form for motion applications in a wide variety of industries.	**F22**
		NTB-B				American Buttress — 45° clearance flank leading (Pull)	ANSI B1.9:1973	Class 2	N	Sawtooth form for axial load bearing applications in a variety of industries — use the "B" style when the 45° clearance flank is the leading flank.	**F22**

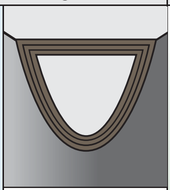
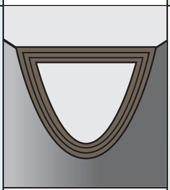
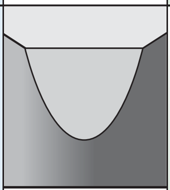


Coatings provide high-speed capability and are engineered for finishing to light roughing.

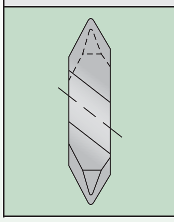
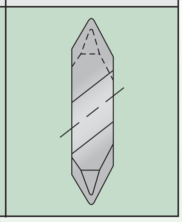
- Reduce cycle times — high speed capability.
- Longer tool life — new multilayer coating provides better wear resistance.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

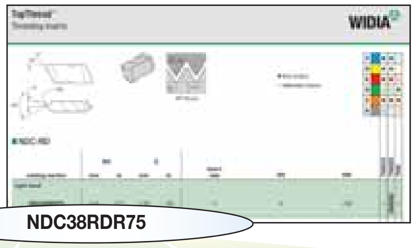
wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
TN6010	 HC-P10	An advanced PVD TiAlN coating over a very deformation-resistant unalloyed carbide substrate. TN6010 is ideal for finishing to general machining of most workpiece materials at higher speeds. Excellent for machining most steels, stainless steels, cast irons, non-ferrous materials, and super alloys under stable conditions. It also performs well in machining hardened and short chipping materials.	P		■	■	■					
			M		■	■	■					
			K		■	■	■					
			N		■	■	■					
			S		■	■	■					
			H		■							
TN6025	 HC-P25	An advanced PVD TiAlN-coated grade with a tough, ultra-fine-grain unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temp alloys, titanium, irons, and non-ferrous materials. Speeds may vary from low to medium and will handle interruptions and high feed rates.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
THM	 HW-K15	Uncoated carbide for light and medium machining. For cast iron, all non-ferrous metals, and non-metals. Also capable of machining hardened materials at low cutting speeds.										
			K		■	■	■					
			N		■	■	■					
			S		■	■	■					

- All TopThread inserts are precision-ground to provide accurate edge location and secure locking of the insert in the toolholder pocket.
- TopThread inserts can be used in either toolholders or boring bars.
- All non-cresting-type threading inserts can be used for either external or internal applications. All cresting-type inserts are designated specifically for external or internal use.
- Right-hand TopThread toolholders use right-hand inserts. Left-hand TopThread toolholders use left-hand inserts.
- Right-hand TopThread boring bars use left-hand inserts. Left-hand TopThread boring bars use right-hand inserts.
- See this page for carbide grade selection and more technical information.

left-hand insert	right-hand insert
	

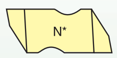
TopThread
Insert Identification System



N	D	C	3	8RD	R	75	
Type of Insert	Insert	Additional Information	Insert Size	Industry Thread Identification	Hand of Insert	Definition of Insert	Additional Information

N — Type of Insert

N — TopThread™



C — Additional Information

B — Buttress

F — Fine pitch

S — Stub Acme

C — Cresting

P — Positive rake

K — Fine pitch, positive

8RD — Industry Thread Identification

Indicates API or drilling industry form designation (e.g., 10RD, 8RD, .038)
or
controlled root radius threading inserts indicate the root radius in 0,025 increments (NJ, NJF, NJP, NJK)
or
M indicates metric ISO thread

R — Hand of Insert

R — Right Hand

L — Left Hand

D — Insert

A — Acme

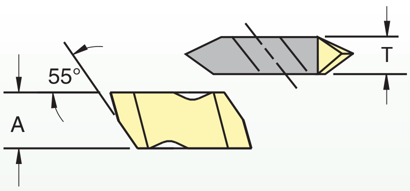
D — API or NPT

J — UNJ thread

T — 60° V thread

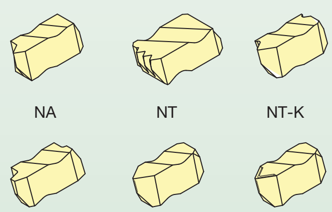
W — 55° V Whitworth

3 — Insert Size



TopThread insert dimensions

insert size	A mm	T mm
1	2,54	2,54
2	5,56	3,81
3	8,74	4,95
4	11,51	6,48
5	17,48	9,65
6	11,51	9,73
8	7,93	11,13



75 — Definition of Insert

- Threads per inch or pitch (for metric)
- “A” or “B” type Buttress insert
- Taper per foot — API threads

Additional Information

I — Internal thread

E — External thread (used only if internal and external thread forms are different)

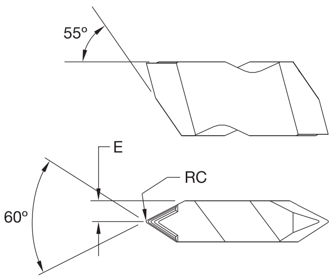
M — Multiple tooth

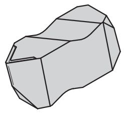
K — Standard chip control

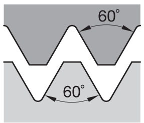
C — Coarse pitch

D — Dryseal

Material Group		TN6010 min	TN6010 Start	TN6010 max	TN6025 min	TN6025 Start	TN6025 max	THM min	THM Start	THM max
		Cutting Speed — vc m/min								
P	0/1	140	**175**	210	130	**140**	150	90	**95**	100
	2	115	**145**	175	110	**145**	175	75	**100**	125
	3	115	**145**	175	110	**145**	175	75	**100**	125
	4	75	**100**	120	75	**95**	115	55	**65**	80
	5	105	**140**	170	100	**125**	145	70	**85**	100
	6	45	**60**	75	40	**55**	65	30	**40**	45
M	1	90	**115**	140	60	**75**	90	60	**75**	90
	2	55	**70**	90	40	**50**	55	50	**60**	75
	3	60	**80**	95	40	**50**	60	40	**50**	55
K	1	120	**150**	180	60	**80**	90	70	**90**	100
	2	120	**150**	180	60	**75**	85	50	**65**	80
	3	110	**140**	170	60	**75**	90	60	**70**	80
N	1	600	**750**	900	600	**750**	900	600	**750**	900
	2	535	**685**	835	535	**685**	835	500	**650**	800
	3	230	**300**	370	230	**300**	370	600	**750**	900
	4	135	**180**	225	135	**180**	225	500	**650**	800
	5	70	**90**	110	70	**90**	110	230	**300**	370
	6	445	**565**	690	445	**565**	690	150	**200**	250
	7	550	**700**	850	550	**700**	850	150	**200**	250
S	1	35	**40**	50	25	**35**	40	25	**35**	45
	2	20	**20**	30	15	**20**	20	20	**30**	35
	3	60	**70**	80	40	**60**	70	15	**25**	30
	4	30	**35**	45	20	**30**	35	10	**15**	20
H	1	15	**30**	60	–	–	–	–	–	–
	2	15	**30**	60	–	–	–	–	–	–
	3	15	**30**	60	–	–	–	–	–	–
	4	15	**30**	60	–	–	–	–	–	–







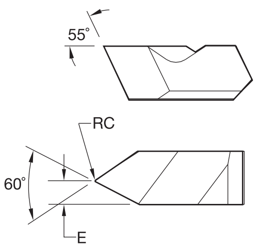
Partial Profile 60°

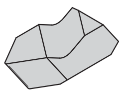
● first choice
○ alternate choice

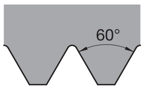
	TN6010	TN6025	THM
P	●	●	
M	●	●	
K	●	●	○
N	○	○	●
S	●	●	●
H	○		

NT-K

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NT2RK	0,10	1,91	2	0,70-3,0	1,25-3,5	8-36	7-20	3607651	3607837	-
NT3RK	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607643	3607824	-
NT4RK	0,17	3,25	4	1,25-6,25	2,0-6,25	4-20	4-12	-	3607846	-
left hand										
NT2LK	0,10	1,91	2	0,70-3,0	1,25-3,5	8-36	7-20	3607674	3607833	-
NT3LK	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607645	3607828	-





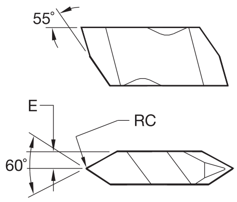


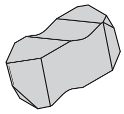
Partial Profile 60°
Internal

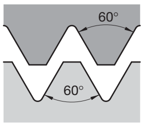
NT-1L

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
left hand										
NT1L	0,08	1,09	1	–	1,0-2,0	–	12-24	3636551	3636555	-

Threading







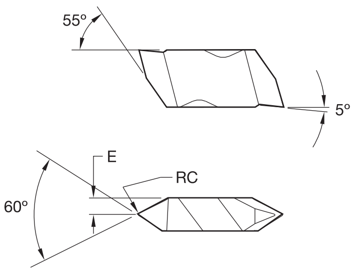
Partial Profile 60°

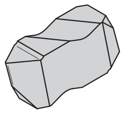
● first choice
○ alternate choice

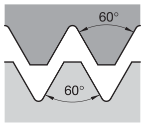
		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

NT

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NT2R	0,10	1,90	2	0,70-3,0	1,25-3,5	8-36	7-20	3607647	3607843	-
NT3R	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607530	3607825	-
NT4R	0,17	3,25	4	1,25-6,25	2,0-6,25	4-20	4-12	3607676	3607834	-
left hand										
NT2L	0,10	1,90	2	0,70-3,0	1,25-3,5	8-36	7-20	3607675	3607835	-
NT3L	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607532	3607826	-
NT4L	0,17	3,25	4	1,25-6,25	2,0-6,25	4-20	4-12	-	3607849	-







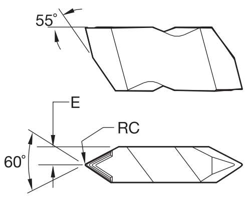
Partial Profile 60°

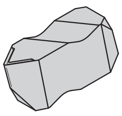
● first choice
○ alternate choice

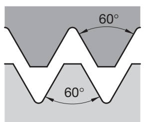
	TN6010	TN6025	THM
P	●	●	
M	●	●	
K	●	●	○
N	○	○	●
S	●	●	●
H	○		

NTP

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NTP2R	0,10	1,91	2	0,70-3,0	1,25-3,5	8-36	7-20	3607677	3607841	-
NTP3R	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607644	3607823	-
NTP4R	0,17	3,25	4	1,25-6,25	2,0-6,25	4-20	4-12	-	3607839	-
left hand										
NTP2L	0,10	1,91	2	0,70-3,0	1,25-3,5	8-36	7-20	3607678	3607840	-
NTP3L	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607650	3607831	-





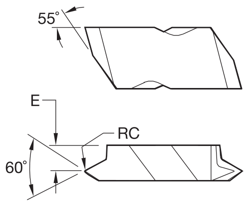


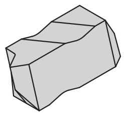
Partial Profile 60°

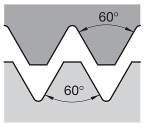
NT-CK

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NT3RCK	0,34	2,46	3	2,5-4,0	4,0	6-11	6	3607649	3607838	-

Threading







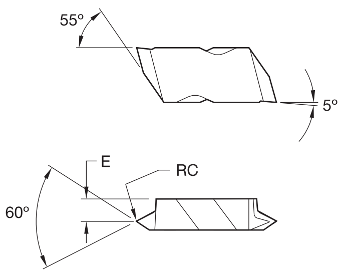
Partial Profile 60°

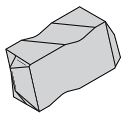
● first choice
○ alternate choice

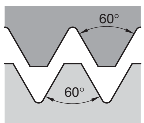
		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

■ NTF

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NTF2R	0,08	2,79	2	0,60-1,75	1,0-2,0	14-44	12-24	3607673	3607852	-
NTF3R	0,08	3,58	3	0,60-2,5	1,0-2,5	10-44	9-24	3607531	3607830	-
left hand										
NTF3L	0,08	3,58	3	0,60-2,5	1,0-2,5	10-44	9-24	3607652	3607832	-



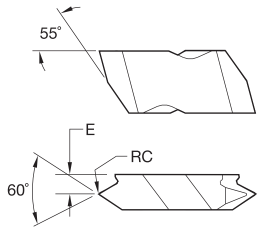


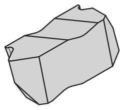


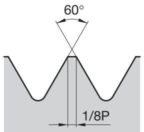
Partial Profile 60°

■ NTK

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NTK2R	0,08	2,79	2	0,60-1,75	1,0-2,0	14-44	12-24	3607646	3607836	-
NTK3R	0,08	3,58	3	0,60-2,50	1,0-2,5	10-44	9-24	3607528	3607827	-
left hand										
NTK3L	0,08	3,58	3	0,60-2,50	1,0-2,5	10-44	9-24	-	3607853	-







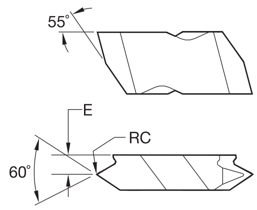
American
UN-External

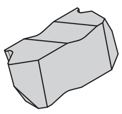
● first choice
○ alternate choice

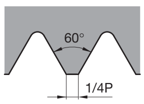
		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

NTC-E

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NTC3R16E	0,19	3,76	3	–	–	16	–	3636553	3636557	-
NTC3R14E	0,22	3,76	3	–	–	14	–	3636554	-	-
NTC3R12E	0,25	3,76	3	–	–	12	–	3636549	3636562	-





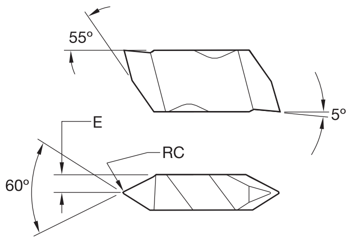


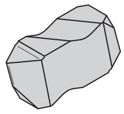
American
UN-Internal

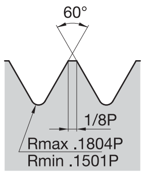
NTC-I

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
left hand										
NTC3L12I	0,10	3,76	3	–	–	–	12	-	3636556	-

Threading







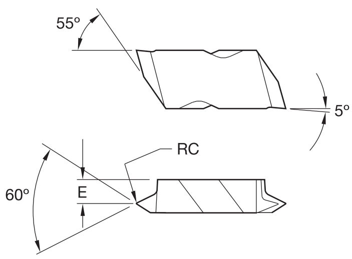
UNJ External

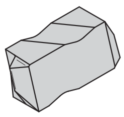
● first choice
○ alternate choice

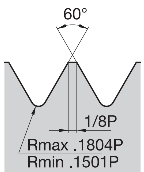
		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

■ NJP

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NJP3014R12	0,33	2,49	3	–	–	12	–	–	3607850	–



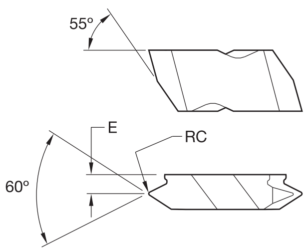


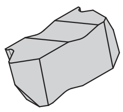


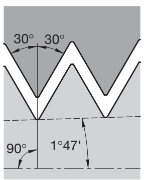
UNJ External

■ NJK

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NJK3008R20	0,20	3,58	3	–	–	20	–	3607648	–	–



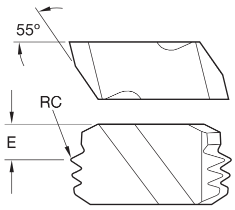


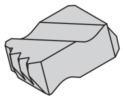


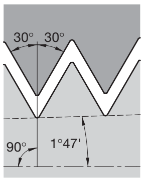
NPT

■ NDC-V

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
right hand								
NDC3115VR75	0,10	3,66	3	11.5	.750	3636550	–	–







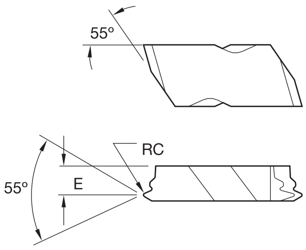
NPT

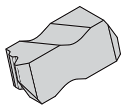
● first choice
○ alternate choice

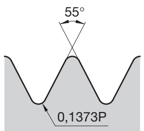
		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

NDC-V-M

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
right hand								
NDC8115VR75M	0,10	2,59	8	11.5	.750	3636552	-	-
NDC88VR75M	0,13	2,41	8	8	.750	3636548	-	-







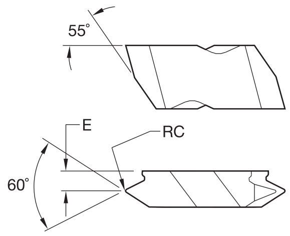
Whitworth BSW,
BSP-External

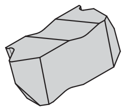
NWC-E

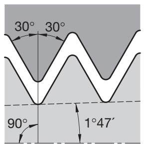
catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
right hand								
NWC3R14E	0,24	3,43	3	14	–	-	3811638	-
NWC3R11E	0,30	3,43	3	11	–	-	3811639	-

Threading

WIDIA







API Round

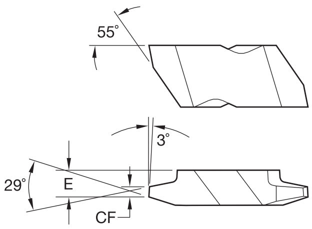
● first choice
○ alternate choice

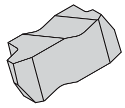
		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

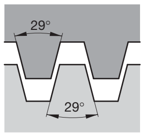
■ NDC-RD

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
right hand								
NDC38RDR75	0,43	3,18	3	8	.750	-	3636558	-
left hand								
NDC310RDL75	0,36	3,18	3	10	.750	-	3636565	-
NDC38RDL75	0,43	3,18	3	8	.750	-	3636559	-

Threading







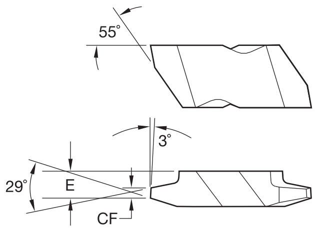
ACME

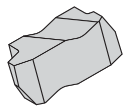
● first choice
○ alternate choice

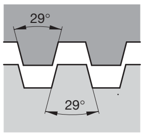
	TN6010	TN6025	THM
P	●	●	
M	●	●	
K	●	●	○
N	○	○	●
S	●	●	●
H	○		

NA

catalogue number	CF	E	insert size	TPI	TN6010	TN6025	THM
right hand							
NA3R8	1,04	3,79	3	8	–	3607854	–
NA3R6	1,44	3,79	3	6	–	3607851	–
NA3R4	2,22	3,38	3	4	–	3607848	–
NA4R4	2,22	5,13	4	4	–	3636566	–
NA6R3	3,01	7,19	6	3	–	3636564	–
NA6R2	4,58	7,19	6	2	–	3636567	–
left hand							
NA3L8	1,04	3,79	3	8	–	3607855	–
NA3L6	1,44	3,79	3	6	–	3607847	–
NA3L4	2,22	3,38	3	4	–	3607842	–
NA4L4	2,22	5,13	4	4	–	3636560	–
NA6L3	3,01	7,19	6	3	–	3636561	–
NA6L2	4,58	7,19	6	2	–	3636568	–







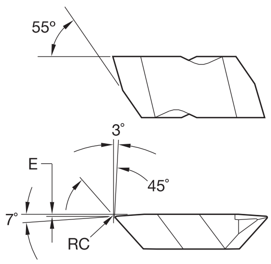
Stub ACME

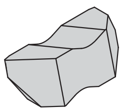
● first choice
○ alternate choice

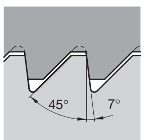
		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

NAS

catalogue number	CF	E	insert size	TPI	TN6010	TN6025	THM
right hand							
NAS3R8	1,21	3,79	3	8	–	3607856	–
left hand							
NAS3L12	0,83	3,79	3	12	–	3607844	–
NAS3L8	1,21	3,79	3	8	–	3607845	–
NAS3L6	1,66	3,79	3	6	–	3607829	–







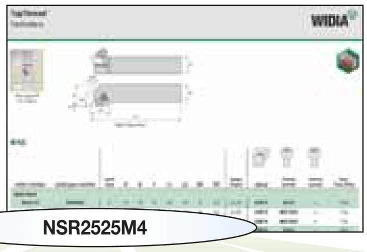
American
Buttress-Pull

NTB-B

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
left hand								
NTB3LB	0,17	0,31	3	8-16	–	–	3636563	–

Threading

TopThread
Holder Identification System

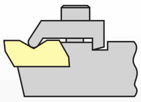


NSR2525M4

N	S	R		2525	M	4	
Insert Holding Method	Insert Mounting Location	Hand of Tool	Drop Head	Shank Size	Tool Length	Insert Size	Qualified Holder

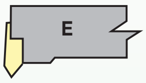
Insert Holding Method

N — TopThread™

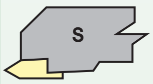


Insert Mounting Location

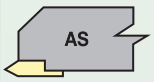
End mount



Side mount, offset



Side mount, no offset



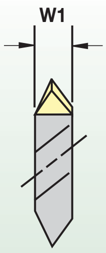
Shank Size

Shank height and width in mm and holder

Tool Length

L1	ISO
32	A
40	B
50	C
60	D
70	E
80	F
90	G
100	H
110	J
125	K
140	L
150	M
160	N
170	P
180	Q
200	R
250	S
300	T
350	U
400	V
450	W
500	Y
special length	x

Insert Size

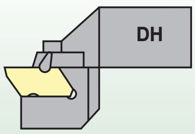


insert size	W1
2	3,81
3	4,95
4	6,98
5	9,65
6	9,73
8	11,13

Qualified Holder

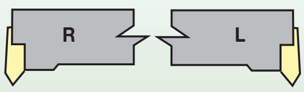
Q — Qualified holder

Drop Head

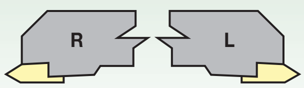


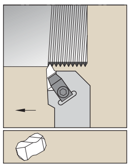
Hand of Tool

End mount

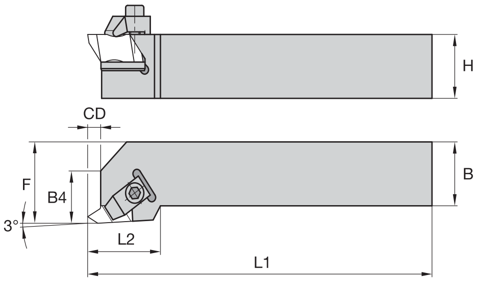


Side mount



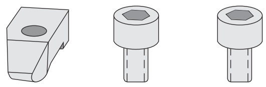


See page F8 for inserts.



Right Hand Tool

NS

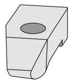
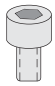
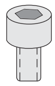


order number	catalogue number	seat size	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand														
3632147	**NSR062**	2	10	10	14	64	19	9	3,5	N.2R	**CM74**	**S310**	**–**	7/64
3641682	**NSR1010E2**	2	10	10	14	70	19	9	3,5	N.2R	**CM74**	**MS1200**	**–**	T10
3641660	**NSR1212F2**	2	12	12	16	80	19	9	3,5	N.2R	**CM74**	**MS1200**	**–**	T10
3639035	**NSR082V**	2	13	13	19	89	19	9	3,5	N.2R	**CM74**	**S310**	**–**	7/64
3639044	**NSR102B**	2	16	16	22	114	19	9	3,5	N.2R	**CM74**	**S310**	**–**	7/64
3636542	**NSR1616H2**	2	16	16	20	100	19	9	3,5	N.2R	**CM74**	**MS1200**	**–**	T10
3639026	**NSR122B**	2	19	19	25	114	19	9	3,5	N.2R	**CM74**	**S310**	**–**	7/64
3638589	**NSR2020K2**	2	20	20	25	125	19	9	3,5	N.2R	**CM74**	**MS1200**	**–**	T10
3638590	**NSR2525M2**	2	25	25	32	150	19	9	3,5	N.2R	**CM74**	**MS1200**	**–**	T10
3639025	**NSR162C**	2	25	25	32	127	19	9	3,5	N.2R	**CM74**	**S310**	**–**	7/64
3639027	**NSR123A**	3	19	19	25	102	32	13	5,3	N.3R	**CM72LP**	**–**	**S2112**	25 IP
3639023	**NSR123B**	3	19	19	25	114	32	13	5,3	N.3R	**CM72LP**	**–**	**S2112**	25 IP
3638588	**NSR2020K3**	3	20	20	25	125	32	13	5,3	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3636536	**NSR2525M3**	3	25	25	32	150	32	13	5,3	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3638592	**NSR163C**	3	25	25	32	127	32	13	5,3	N.3R	**CM72LP**	**–**	**S2112**	25 IP
3638591	**NSR163D**	3	25	25	32	152	32	13	5,3	N.3R	**CM72LP**	**–**	**S2112**	25 IP
3637496	**NSR853D**	3	32	25	32	152	32	13	5,3	N.3R	**CM72LP**	**–**	**S2112**	25 IP
3639028	**NSR203D**	3	32	32	38	152	32	13	5,3	N.3R	**CM72LP**	**–**	**S2112**	25 IP
3641664	**NSR3225P3**	3	32	25	32	170	32	13	5,3	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641666	**NSR3232P3**	3	32	32	40	170	32	13	5,3	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3637506	**NSR243D**	3	38	38	51	152	35	13	5,3	N.3R	**CM72LP**	**–**	**S2112**	25 IP
3637535	**NSR243E**	3	38	38	51	178	35	13	5,3	N.3R	**CM72LP**	**–**	**S2112**	25 IP
3636540	**NSR2525M4**	4	25	25	32	150	35	14	7,5	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641675	**NSR3225P4**	4	32	25	32	170	35	14	7,5	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641669	**NSR3232P4**	4	32	32	40	170	35	14	7,5	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3637509	**NSR205D**	5	32	32	38	152	51	15	10,5	N.5R	**CM80**	**S352**	**–**	1/4
3637540	**NSR245D**	5	38	38	51	152	51	16	10,5	N.5R	**CM80**	**S352**	**–**	1/4

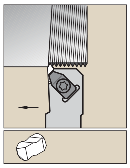
NOTE: F dimension measured over sharp point of insert.

(continued)

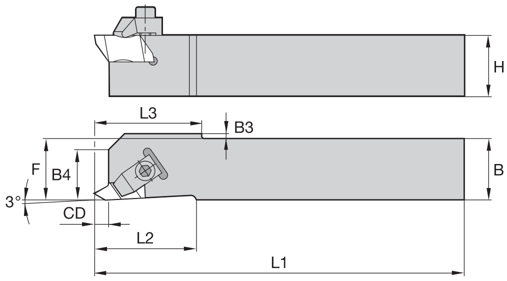
(NS — continued)

order number	catalogue number	seat size	H	B	F	L1	L2	B4	CD	gage insert	clamp 	clamp screw 	clamp screw 	hex/ Torx Plus
left hand														
3632161	**NSL062**	2	10	10	14	64	19	9	3,5	N.2L	**CM75**	**S310**	**–**	7/64
3641683	**NSL1010E2**	2	10	10	14	70	19	9	3,5	N.2L	**CM75**	**MS1200**	**–**	T10
3641681	**NSL1212F2**	2	12	12	16	80	19	9	3,5	N.2L	**CM75**	**MS1200**	**–**	T10
3637485	**NSL082V**	2	13	13	19	89	19	9	3,5	N.2L	**CM75**	**S310**	**–**	7/64
3637510	**NSL102B**	2	16	16	22	114	19	9	3,5	N.2L	**CM75**	**S310**	**–**	7/64
3636545	**NSL1616H2**	2	16	16	20	100	19	9	3,5	N.2L	**CM75**	**MS1200**	**–**	T10
3632145	**NSL122B**	2	19	19	25	114	19	9	3,5	N.2L	**CM75**	**S310**	**–**	7/64
3639045	**NSL2020K2**	2	20	20	25	125	19	9	3,5	N.2L	**CM75**	**MS1200**	**–**	T10
3639047	**NSL2525M2**	2	25	25	32	150	19	9	3,5	N.2L	**CM75**	**MS1200**	**–**	T10
3632138	**NSL162C**	2	25	25	32	127	19	9	3,5	N.2L	**CM75**	**S310**	**–**	7/64
3632152	**NSL123A**	3	19	19	25	102	32	13	5,3	N.3L	**CM73LP**	**–**	**S2112**	25 IP
3639032	**NSL123B**	3	19	19	25	114	32	13	5,3	N.3L	**CM73LP**	**–**	**S2112**	25 IP
3639046	**NSL2020K3**	3	20	20	32	125	32	13	5,3	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3636539	**NSL2525M3**	3	25	25	32	150	32	13	5,3	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3639029	**NSL163C**	3	25	25	32	127	32	13	5,3	N.3L	**CM73LP**	**–**	**S2112**	25 IP
3639024	**NSL163D**	3	25	25	32	152	32	13	5,3	N.3L	**CM73LP**	**–**	**S2112**	25 IP
3637508	**NSL853D**	3	32	25	32	152	32	13	5,3	N.3L	**CM73LP**	**–**	**S2112**	25 IP
3639037	**NSL203D**	3	32	32	38	152	32	13	5,3	N.3L	**CM73LP**	**–**	**S2112**	25 IP
3641670	**NSL3225P3**	3	32	25	32	170	32	13	5,3	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641671	**NSL3232P3**	3	32	32	40	170	32	13	5,3	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3637515	**NSL243D**	3	38	38	51	152	35	13	5,3	N.3L	**CM73LP**	**–**	**S2112**	25 IP
3637548	**NSL243E**	3	38	38	51	178	35	13	5,3	N.3L	**CM73LP**	**–**	**S2112**	25 IP
3636544	**NSL2525M4**	4	25	25	32	150	35	14	7,5	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641678	**NSL3225P4**	4	32	25	32	170	35	14	7,5	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641679	**NSL3232P4**	4	32	32	40	170	35	14	7,5	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3637536	**NSL205D**	5	32	32	38	152	51	15	10,5	N.5L	**CM81**	**S352**	**–**	1/4
3641688	**NSL3232P5**	5	32	32	40	170	51	16	10,5	N.5L	**CM81**	**MS352**	**–**	6 mm

NOTE: F dimension measured over sharp point of insert.

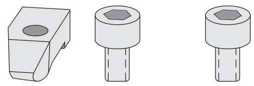


See page F8 for inserts.



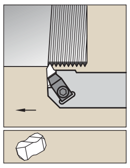
Right Hand Tool

NAS

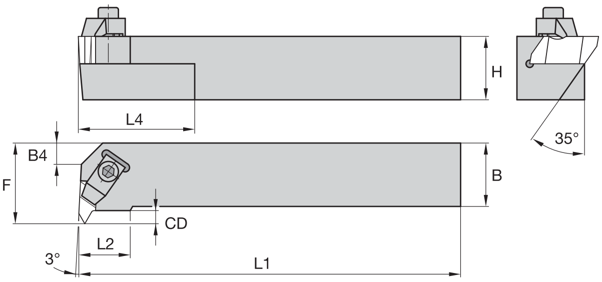


order number	catalogue number	seat size	H	B	F	L1	L2	B4	CD	B3	L3	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand																
3641667	**NASR1010M2Q**	2	10	10	10	150	19	9	3,5	2,03	19	N.2R	**CM182**	**MS1200**	–	T10
3641662	**NASR1212M2Q**	2	12	12	12	150	19	9	3,5	–	–	N.2R	**CM182**	**MS1200**	–	T10
3639048	**NASR1616K3Q**	3	16	16	16	125	32	12	5,3	–	–	N.3R	**CM184LP**	–	**MS2111**	25 IP
left hand																
3641691	**NASL1010M2Q**	2	10	10	10	150	19	9	3,5	2,03	19	N.2L	**CM183**	**MS1200**	–	T10
3641686	**NASL1212M2Q**	2	12	12	12	150	19	9	3,5	–	–	N.2L	**CM183**	**MS1200**	–	T10
3641687	**NASL1616K3Q**	3	16	16	16	125	32	12	5,3	–	–	N.3L	**CM185LP**	–	**MS2111**	25 IP

NOTE: F dimension measured over sharp point of insert.

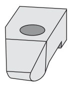
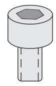
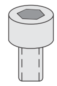


See page F8 for inserts.



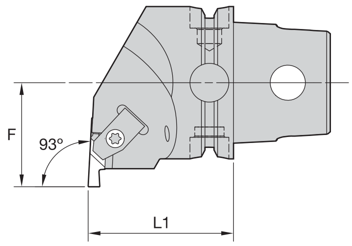
Right Hand Tool

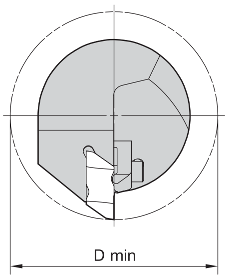
■ NE

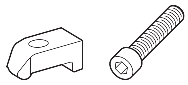
order number	catalogue number	seat size	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand														
3641674	**NER1616H2**	2	16	16	20	100	15	–	3,5	N.2L	**CM75**	**MS1200**	**–**	T10
3641658	**NER2020K2**	2	20	20	25	125	15	6	3,5	N.2L	**CM75**	**MS1200**	**–**	T10
3641665	**NER2525M2**	2	25	25	32	150	15	12	3,5	N.2L	**CM75**	**MS1200**	**–**	T10
3636541	**NER2525M3**	3	25	25	32	150	22	–	5,3	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641680	**NER3225P3**	3	32	25	32	170	22	–	3,8	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641672	**NER2525M4**	4	25	25	35	150	24	–	7,5	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641689	**NER3225P4**	4	32	25	35	170	24	–	7,5	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641693	**NER3232P4**	4	32	32	40	170	24	–	6,4	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641692	**NER3232P5**	5	32	32	50	170	35	–	10,5	N.5L	**CM81**	**MS352**	**–**	6 mm
left hand														
3641684	**NEL1616H2**	2	16	16	20	100	15	–	3,5	N.2R	**CM74**	**MS1200**	**–**	T10
3641677	**NEL2020K2**	2	20	20	25	125	15	6	3,5	N.2R	**CM74**	**MS1200**	**–**	T10
3641676	**NEL2525M2**	2	25	25	32	150	15	12	3,5	N.2R	**CM74**	**MS1200**	**–**	T10
3636543	**NEL2525M3**	3	25	25	32	150	22	–	5,3	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641685	**NEL3225P3**	3	32	25	32	170	22	–	3,8	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641668	**NEL2525M4**	4	25	25	35	150	24	–	7,5	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641694	**NEL3225P4**	4	32	25	35	170	24	–	7,5	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641696	**NEL3232P4**	4	32	32	40	170	24	–	6,4	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641695	**NEL3232P5**	5	32	32	50	170	35	–	10,5	N.5R	**CM80**	**MS352**	**–**	6 mm

NOTE: F dimension measured over sharp point of insert.

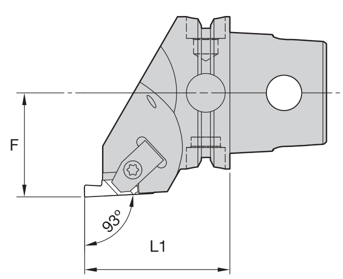


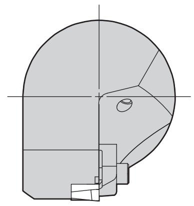


■ NE 93°



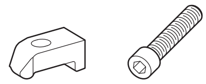
order number	catalogue number	L1 mm	L1 in	F mm	F in	D min mm	D min in	gage insert	clamp	clamp screw	kg	lbs
right hand												
3902285	**KM40TSNER2**	40	1.575	27	1.063	54	2.126	NG2L	**CM75**	**MS1488**	0,30	.66
3902286	**KM40TSNER3**	40	1.575	27	1.063	54	2.126	NG3L	**CM73**	**MS1489**	0,30	.67
3902287	**KM40TSNER4**	40	1.575	27	1.063	54	2.126	NG4L	**CM73**	**MS1489**	0,30	.65
left hand												
3902132	**KM40TSNEL2**	40	1.575	27	1.063	54	2.126	NG2R	**CM74**	**MS1488**	0,30	.66
3902283	**KM40TSNEL3**	40	1.575	27	1.063	54	2.126	NG3R	**CM-72**	**MS1489**	0,30	.67
3902284	**KM40TSNEL4**	40	1.575	27	1.063	54	2.126	NG4R	**CM-72**	**MS1489**	0,30	.65



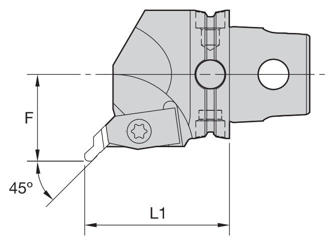


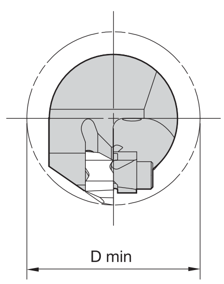
KM QUICK CHANGE

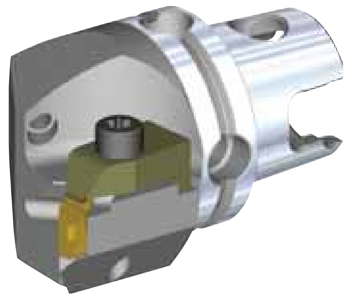
NS 93°



order number	catalogue number	L1 mm	L1 in	F mm	F in	gage insert	clamp	clamp screw	kg	lbs
right hand										
3902293	**KM40TSNSR2**	40	1.575	27	1.063	NG2R	**CM74**	**MS1488**	0,32	.70
3902294	**KM40TSNSR3**	47	1.850	27	1.063	NG3R	**CM-72**	**MS1489**	0,32	.71
3902295	**KM40TSNSR4**	47	1.850	27	1.063	NG4R	**CM-72**	**MS1489**	0,30	.66
left hand										
3902290	**KM40TSNSL2**	40	1.575	27	1.063	NG2L	**CM75**	**MS1488**	0,32	.70
3902291	**KM40TSNSL3**	47	1.850	27	1.063	NG3L	**CM73**	**MS1489**	0,33	.72
3902292	**KM40TSNSL4**	47	1.850	27	1.063	NG4L	**CM73**	**MS1489**	0,30	.66

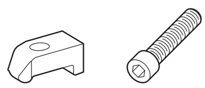






KM QUICK CHANGE

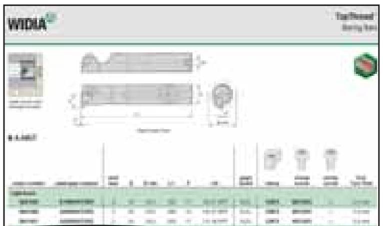
NR 45°



order number	catalogue number	L1 mm	L1 in	F mm	F in	D min mm	D min in	gage insert	clamp	clamp screw	kg	lbs
right hand												
3902289	**KM40TSNRR3045M**	45	1.772	27	1.063	54	2.126	NU3L	**CM73**	**MS1489**	0,34	.75
left hand												
3902288	**KM40TSNRL3045M**	45	1.772	27	1.063	54	2.126	NU3R	**CM-72**	**MS1489**	0,33	.74

Threading

TopThread
Boring Bar Identification System

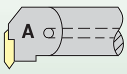


A25RNNT0R2

A	25	R	N	N	T	0	R	2
Bar Type	Bar Diameter	Bar Length	Insert Holding Method	Insert Shape	Insert Location	Rake Angle 0 = 0°	Hand of Tool	Insert Size

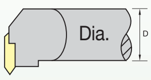
Bar Type

Steel
with coolant



Bar Diameter

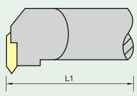
Bar in millimetres



Bar Length

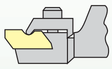
Bars

K = 125,0mm
M = 150,0mm
Q = 180,0mm
R = 200,0mm
S = 250,0mm
T = 300,0mm
U = 350,0mm



Insert Holding Method

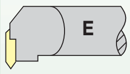
N – TopThread*



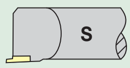
*Proprietary standard only.

Insert Location

End mount

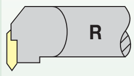


Side mount

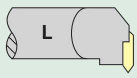


Hand of Tool

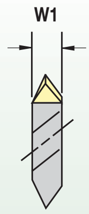
Right hand



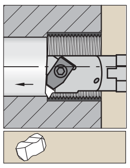
Left hand



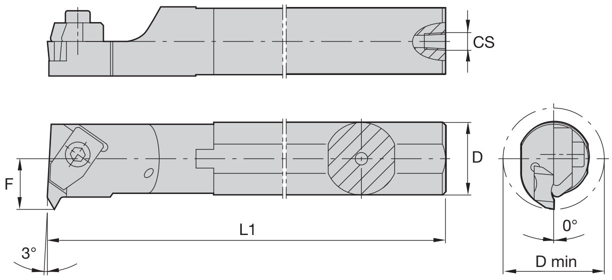
Insert Size



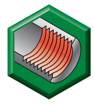
insert size	W1
2	3,81
3	4,95
4	6,98
5	9,65
6	9,73
8	11,13



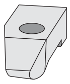
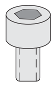
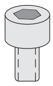
Steel shank with through coolant. See page F8 for inserts.



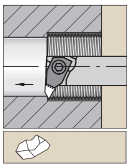
Right Hand Tool



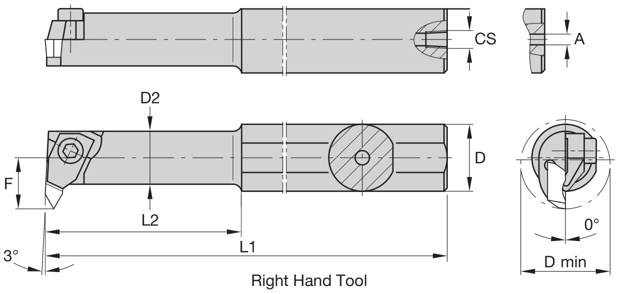
■ A-NNT

order number	catalogue number	seat size	D	D min	L1	F	CS	gage insert	 clamp	 clamp screw	 clamp screw	hex/ Torx Plus
right hand												
3641643	**A16MNNTOR2**	2	16	22,0	150	11	1/8-27 NPT	N.2L	**CM75**	**MS1200**	–	2.5 mm
3641645	**A20QNNTOR2**	2	20	26,0	180	13	1/8-27 NPT	N.2L	**CM75**	**MS1200**	–	2.5 mm
3641651	**A25RNNTOR2**	2	25	34,0	200	17	1/4-18 NPT	N.2L	**CM75**	**MS1200**	–	2.5 mm
3641622	**A25RNNTOR3**	3	25	34,0	200	17	1/8 - 27 NPT	N.3L	**CM73LP**	–	**MS2111**	25 IP
3641646	**A32SNNTOR3**	3	32	44,0	250	22	1/4-18 NPT	N.3L	**CM73LP**	–	**MS2111**	25 IP
3641653	**A40TNNTOR3**	3	40	54,0	300	27	1/4-18 NPT	N.3L	**CM73LP**	–	**MS2111**	25 IP
3641654	**A40TNNTOR4**	4	40	54,0	300	27	1/4-18 NPT	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641661	**A50UNNTOR4**	4	50	70,0	350	35	1/4-18 NPT	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641644	**A12MNNTOR2**	2	12	18,5	150	11	1/16-27 NPT	NG2L	**CM147**	**MS1200**	–	2.5 mm
left hand												
3641649	**A16MNNTOL2**	2	16	22,0	150	11	1/8-27 NPT	N.2R	**CM74**	**MS1200**	–	2.5 mm
3641652	**A20QNNTOL2**	2	20	26,0	180	13	1/8-27 NPT	N.2R	**CM74**	**MS1200**	–	2.5 mm
3641657	**A25RNNTOL2**	2	25	34,0	200	17	1/4-18 NPT	N.2R	**CM74**	**MS1200**	–	2.5 mm
3641650	**A25RNNTOL3**	3	25	34,0	200	17	1/4-18 NPT	N.3R	**CM72LP**	–	**MS2111**	25 IP
3641656	**A32SNNTOL3**	3	32	44,0	250	22	1/4-18 NPT	N.3R	**CM72LP**	–	**MS2111**	25 IP
3641659	**A40TNNTOL3**	3	40	54,0	300	27	1/4-18 NPT	N.3R	**CM72LP**	–	**MS2111**	25 IP
3641663	**A40TNNTOL4**	4	40	54,0	300	27	1/4-18 NPT	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641690	**A50UNNTOL4**	4	50	70,0	350	35	1/4-18 NPT	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641655	**A12MNNTOL2**	2	12	18,5	150	11	1/16-27 NPT	NG2R	**CM146**	**MS1200**	–	2.5 mm

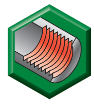
NOTE: F dimension measured over sharp point of insert.



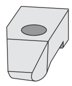
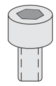
Necked steel shank with through coolant. See page F8 for inserts.



Right Hand Tool



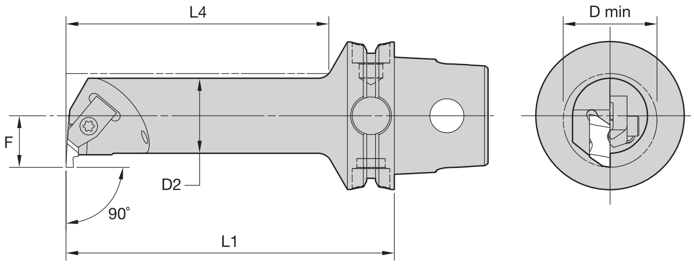
A-NNT-1

order number	catalogue number	seat size	D	D min	D2	L1	L2	F	A	CS	gage insert	clamp	clamp screw	hex/ Torx Plus
right hand														
3641647	**A12MNNTOR1**	1	12	11,5	8,7	150	31	7	4,0	1/16-27 NPT	N.1L	**CM109**	**MS1034**	1.5 mm
3641648	**A10KNNTOR1**	1	10	11,5	10,0	125	—	7	3,2	—	NG1L	**CM109**	**MS1034**	1.5 mm

NOTE: F dimension measured over sharp point of insert.

Threading



KM QUICK CHANGE

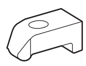
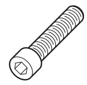
NE 90° • Steel

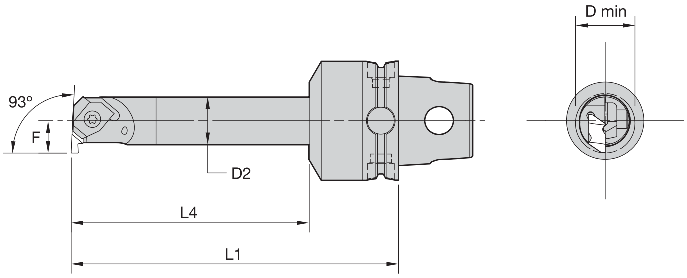
order number	catalogue number	D2 mm	D2 in	D min mm	D min in	F mm	F in	L4 mm	L4 in	L1 mm	L1 in	gage insert	kg	lbs
right hand														
3955481	KM40TSS12ENER2	12	.472	19	.73	11	.433	42	1.655	70	2.756	NG2L	0,27	.58
3955483	KM40TSS16FNER2	16	.630	20	.79	11	.433	56	2.209	80	3.150	NG2L	0,28	.62
3955485	KM40TSS20GNER2	20	.787	25	.98	13	.512	70	2.757	90	3.543	NG2L	0,35	.76
3955487	KM40TSS25ENER2	25	.984	32	1.26	17	.669	55	2.169	70	2.756	NG2L	0,34	.75
3955491	KM40TSS25ENER3	25	.984	34	1.34	17	.669	55	2.169	70	2.756	NG3L	0,35	.77
3955489	KM40TSS25HNER2	25	.984	32	1.26	17	.669	75	2.954	100	3.937	NG2L	0,49	1.08
3955493	KM40TSS25HNER3	25	.984	34	1.34	17	.669	75	2.954	100	3.937	NG3L	0,49	1.09
3955497	KM40TSS32GNER3	32	1.260	40	1.57	22	.866	76	2.993	90	3.543	NG3L	0,55	1.21
3955495	KM40TSS32JNER3	32	1.260	40	1.57	22	.866	96	3.780	110	4.331	NG3L	0,67	1.48
left hand														
3955480	KM40TSS12ENEL2	12	.472	19	.73	11	.433	42	1.655	70	2.756	NG2R	0,27	.59
3955482	KM40TSS16FNEL2	16	.630	20	.79	11	.433	56	2.209	80	3.150	NG2R	0,28	.62
3955484	KM40TSS20GNEL2	20	.787	25	.98	13	.512	70	2.757	90	3.543	NG2R	0,35	.76
3955486	KM40TSS25ENEL2	25	.984	32	1.26	17	.669	55	2.169	70	2.756	NG2R	0,34	.75
3955490	KM40TSS25ENEL3	25	.984	34	1.34	17	.669	55	2.169	70	2.756	NG3R	0,35	.77
3955488	KM40TSS25HNEL2	25	.984	32	1.26	17	.669	75	2.954	100	3.937	NG2R	0,49	1.08
3955492	KM40TSS25HNEL3	25	.984	34	1.34	17	.669	75	2.954	100	3.937	NG3R	0,49	1.09
3955496	KM40TSS32GNEL3	32	1.260	40	1.57	22	.866	76	2.993	90	3.543	NG3R	0,55	1.21
3955494	KM40TSS32JNEL3	32	1.260	40	1.57	22	.866	96	3.780	110	4.331	NG3R	0,67	1.48

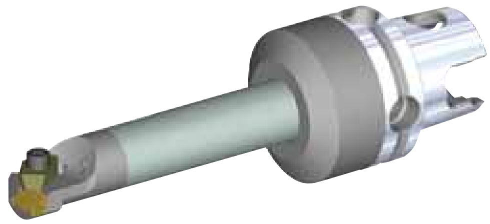
(continued)

(NE 90° • Steel — continued)

Spare Parts

catalogue number	 clamp	 clamp screw
right hand		
KM40TSS12ENER2	CM147	MS1488
KM40TSS16FNER2	CM147	MS1488
KM40TSS20GNER2	CM75	MS1488
KM40TSS25ENER2	CM75	MS1488
KM40TSS25ENER3	CM73	MS1489
KM40TSS25HNER2	CM75	MS1488
KM40TSS25HNER3	CM73	MS1489
KM40TSS32GNER3	CM73	MS1489
KM40TSS32JNER3	CM73	MS1489
left hand		
KM40TSS12ENEL2	CM146	MS1488
KM40TSS16FNEL2	CM146	MS1488
KM40TSS20GNEL2	CM74	MS1488
KM40TSS25ENEL2	CM74	MS1488
KM40TSS25ENEL3	CM-72	MS1489
KM40TSS25HNEL2	CM74	MS1488
KM40TSS25HNEL3	CM-72	MS1489
KM40TSS32GNEL3	CM-72	MS1489
KM40TSS32JNEL3	CM-72	MS1489



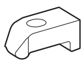


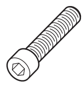
KM QUICK CHANGE

NE 90° • Carbide

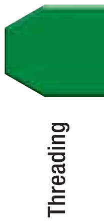
order number	catalogue number	D2 mm	D2 in	D min mm	D min in	F mm	F in	L4 mm	L4 in	L1 mm	L1 in	gage insert	kg	lbs
right hand														
3951836	**KM40TSE16JNER2**	16	.630	20	.79	11	.433	80	3.15	110	4.331	NG2L	0,41	.90
left hand														
3951835	**KM40TSE16JNEL2**	16	.630	20	.79	11	.433	80	3.15	110	4.331	NG2R	0,41	.90

Spare Parts





catalogue number	clamp	clamp screw
right hand		
KM40TSE16JNER2	**CM146**	**MS1488**
left hand		
KM40TSE16JNEL2	**CM147**	**MS1488**



The WIDIA™ high-performance carbide grades, coupled with our rigid TopThread clamping design, offer the metalworking industry optimum threading productivity.

When the large inventory of WIDIA standard products does not completely satisfy your productivity requirements, consider having TopThread inserts custom ground to meet your unique application needs.

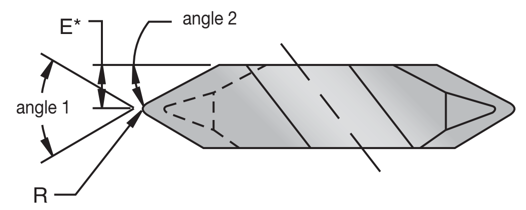
The large variety of TopThread blank sizes allows maximum flexibility in threading endform design, especially for extra wide or oil field applications.

Common examples of special forms are shown here. Please contact your local WIDIA representative for recommendations on satisfying your special threading needs.

Features and Benefits:

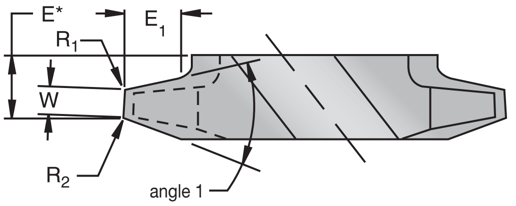
- Quotes are handled quickly and efficiently using state-of-the-art CAD design software and electronic database software.
- Our Carbide Custom Solutions Design Team is your link to one of the industry's largest electronic databases. They can solve your most challenging design problems.
- Where necessary or required, concept drawings are available to facilitate your engineering development.
- A large number of high-performance carbide grades are available to optimise your productivity. The option of producing standard insert styles in non-standard carbide grades allows you to optimise tool life performance.

style C2 RH shown



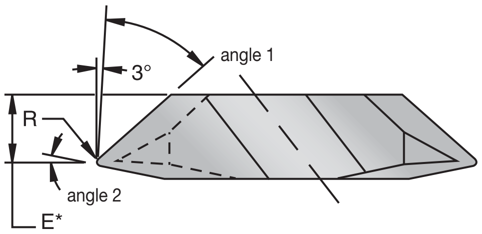
*to theoretical sharp point

style C3 RH shown



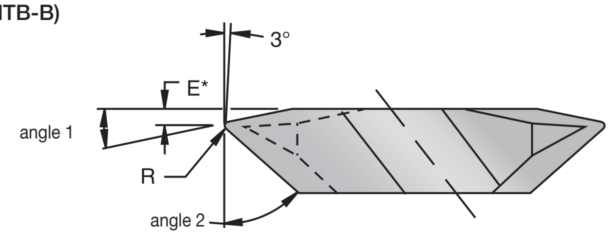
*to theoretical sharp point

style C4 (NTB-A) RH shown



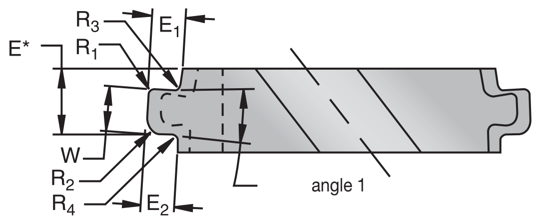
*to theoretical sharp point

style C5 (NTB-B) RH shown



*to theoretical sharp point

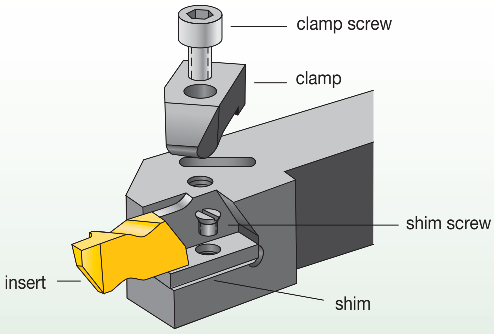
style C6 RH shown



*to theoretical sharp point

NOTE: Right-hand inserts shown; left-hand inserts are also available.

TopThread and TopGroove Toolholders and Boring Bars



insert size and style	clamp	clamp screw	shim	shim screw
NG-1L	CM-109	S-304	–	–
NG-2R	CM-182	S-310	–	–
NG-2L	CM-183	S-310	–	–
NG-2R	CM-74	S-310	–	–
NG-2L	CM-75	S-310	–	–
NG-3R	CM-184	S-412	–	–
NG-3L	CM-185	S-412	–	–
NG-3R	CM-72	S-412	–	–
NG-3L	CM-73	S-412	–	–
NG-3R*	CM-78	S-412	–	–
NG-3L*	CM-70	S-412	–	–
NG-4R	CM-72	S-412	SM-420	SL-344
NG-4L	CM-73	S-412	SM-420	SL-344
NG-5R	CM-80	S-352	–	–
NG-5L	CM-81	S-352	–	–
NG-6R	CM-120	S-412	SM-416	S-111
NG-6L	CM-121	S-412	SM-416	S-111
NG-8R	CM-144	S-422	SM-419	S-112
NG-8L	CM-145	S-422	SM-419	S-112
NG-8R**	CM-144	S-422	SM-427	S-111
NG-8L**	CM-145	S-422	SM-427	S-111
TopGroove relief grooving				
NU-3125R	CM-72	S-412	–	–
NU-3125L	CM-73	S-412	–	–
NU-3125R**	CM-72	S-618	–	–
NU-3125L**	CM-73	S-618	–	–

**25mm diameter boring head.*
***Boring head.*

WIDIA™ Laydown Threading

For increased reliability and productivity, look no further than the WIDIA Laydown Threading System for all of your I.D. and O.D. threading applications. The Laydown Threading System maximises tool life and thread quality.

Laydown

This specially engineered system meets all modern production standards. With an extensive range of inserts and toolholders available, the Laydown Threading platform is ideal for all of your threading requirements.

Laydown Insert Technology

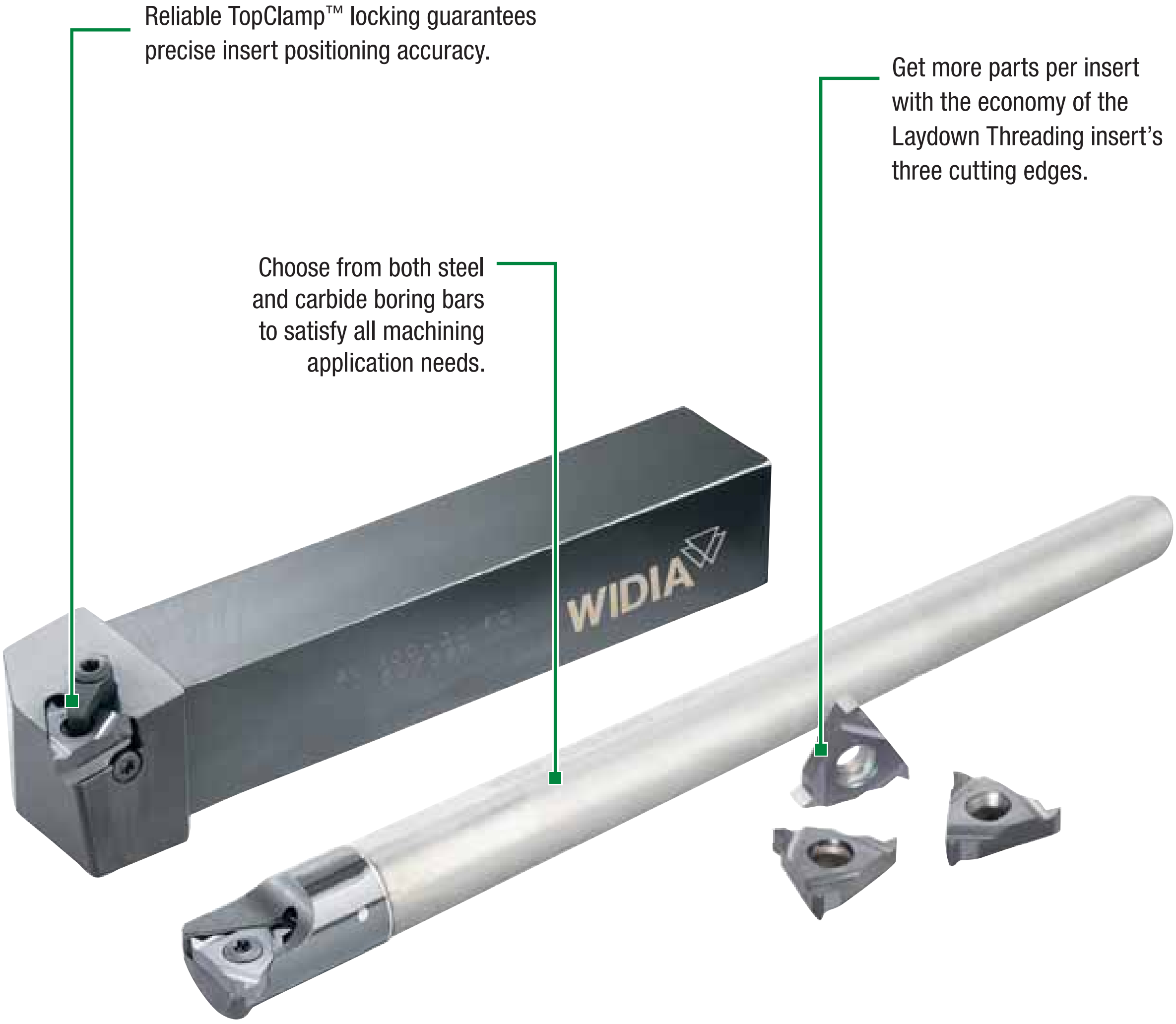
Laydown insert technology, with its wide range of available tools and inserts, guarantees increased tool life, minimised built-up edges, and precise cuts of most common materials.

- TN6025™ premium PVD TiAIN-coated grade outperforms conventional PVD grades.
- Enables superior chip control and reduced cutting forces.
- Partial and full profile insert options available for all common thread forms.

The Laydown Threading Solution

With the WIDIA™ Laydown Threading System, you experience reliable countersunk screw locking for unhindered chip flow and precise insert positioning accuracy.

- Industry-leading thread quality.
- Four insert sizes available to cover a wide range of thread-making operations.
- Ideal for high-helix/multi-start threads and single-point threading in small-diameter bores.
- Maximised tool life and low-profile design for unhindered chip flow and superior performance.

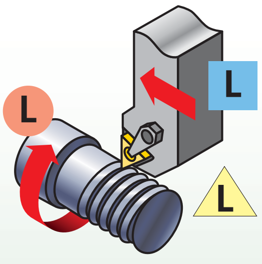

Reliable TopClamp™ locking guarantees precise insert positioning accuracy.
Get more parts per insert with the economy of the Laydown Threading insert's three cutting edges.
Choose from both steel and carbide boring bars to satisfy all machining application needs.
WIDIA

Step 1 • Select Threading Method and Hand of Tooling

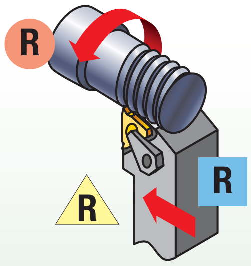
Required Information:
- External/internal operation.
- Spindle rotation/hand of thread.
- Feed direction.

hand of thread | hand of toolholder | hand of insert

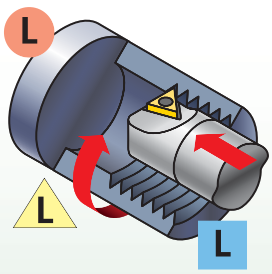
Feed direction toward the chuck • standard helix • RECOMMENDED



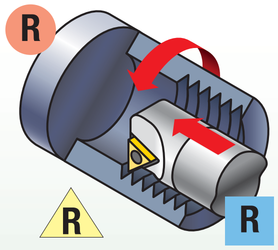
external left-hand thread



external right-hand thread

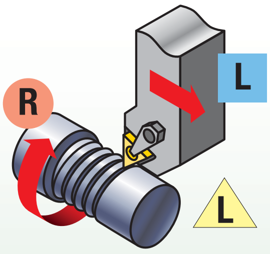


internal left-hand thread

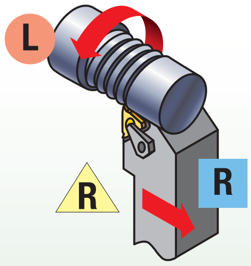


internal right-hand thread

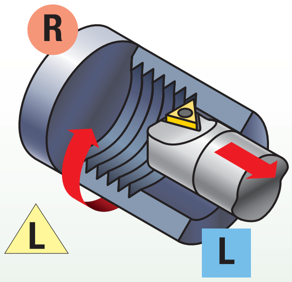
Feed direction away from the chuck • reverse helix*



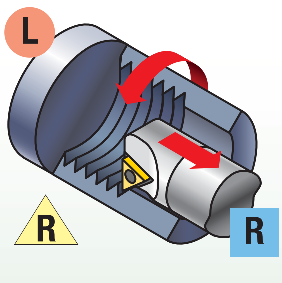
external right-hand thread



external left-hand thread



internal right-hand thread



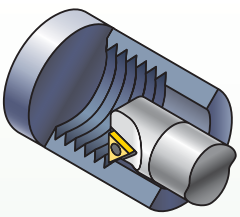
internal left-hand thread

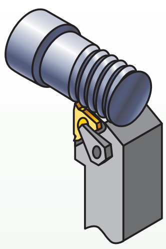
**Negative shim required*

Step 2 • Select Holder from Catalogue Page

Required Information:
- External/internal operation.
- Minimum bore diameter (for internal operations).
- Hand of tool.
- Insert size (gage insert).

Select the appropriate holder for the insert size and hand:



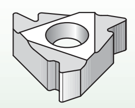


The insert size must match the gage insert size of your toolholder selection:

catalogue number	gage insert	minimum bore diameter	shim
S0812LSER2	2IRA60	16,5mm	–
S2020LSER3	3IR...	36,8mm	SM-YI3

Step 3 • Choose Insert for Application

- Select cresting inserts for fully controlled thread form including diameter.
- Cresting inserts eliminate the need for deburring and are optimised for the best tool life at that pitch.
- Non-cresting partial profile inserts offer the flexibility to cut a variety of thread pitches with one insert.
- Note insert size for toolholder selection.



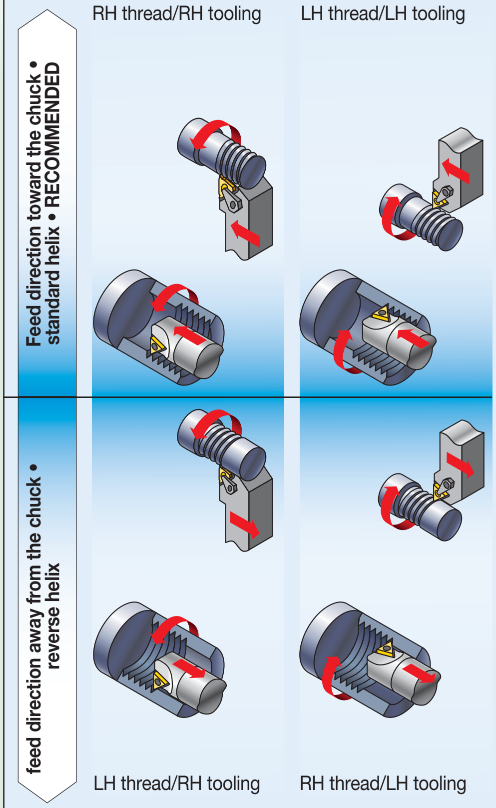
insert size	catalogue number	TN6025
11	**2IRA60**	•
16	**3IRAG60**	•

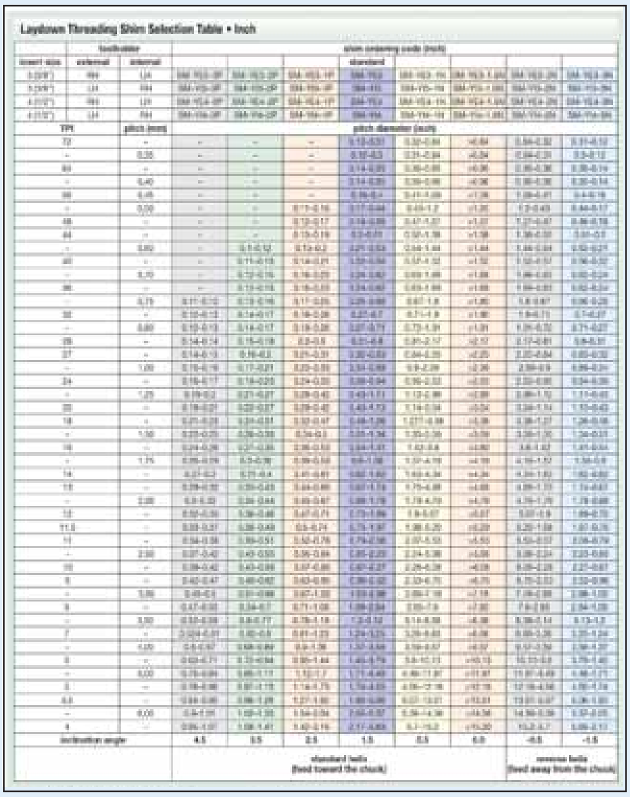
See threading insert overview on page F42.

Step 4 • Select Appropriate Shim

Required Information:
- Thread form (TPI or pitch).
- Pitch diameter.
- Helix method (hand of tool, feed direction, hand of thread).
- Number of starts.

Select the proper shim: SMYE... for external RH or internal LH
SMYI... for internal RH or external LH

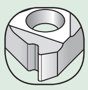


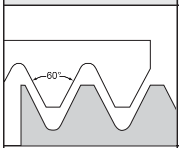
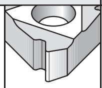
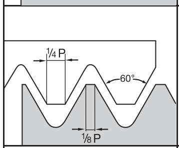
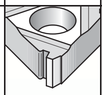
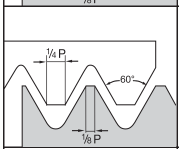
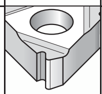
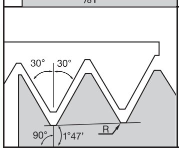
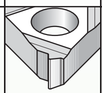
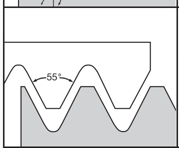
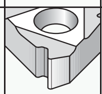
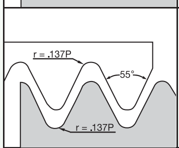
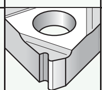
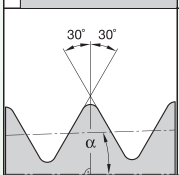
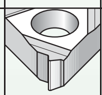
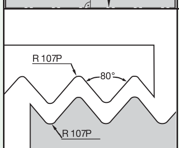
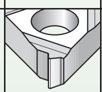
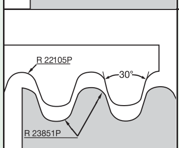
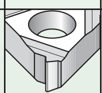
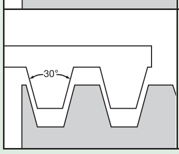
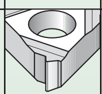

Laydown Threading Shim Selection Table • Inch

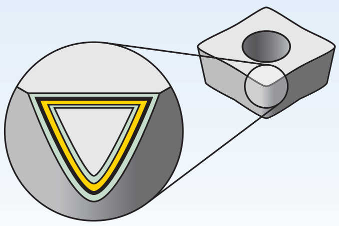
If recommended shim is different from shim supplied with toolholder, order shim separately.
NOTE: Optimise your threading operation by using the proper infeed angle and the recommended infeed values. See the Technical Section on pages F83–F105. Also see detailed shim selection information on pages F104–F105.

Step 5 • Select Grade and Speed

Recommendations for Grade and Speed Selection — m/min

workpiece material	steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys
insert style	 precision ground				
first choice	**TN6025**	**TN6025**	**TN6025**	**TN6025**	**TN6025**
	40–200 (130–650)	40–135 (130–450)	60–145 (200–475)	50–360 (160–1150)	10–100 (35–330)

style								
	flat top		thread profile	standard	tolerance class	cresting	application	page(s)
	60		Partial profile 60°	–	–	N	General use for 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	**F46–F47**
	ISO		Metric ISO	ISO R262, DIN 13	6g/6H	Y	Widely used metric 60° V-form for all industries.	**F48–F53**
	UN		American UN	ANSI B1.1:74	2A/2B	Y	Widely used inch-based 60° V-form for all industries.	**F54–F57**
	NPT		NPT	ANSI/ASME B1.20.1S1983	Standard NPT	N	National Pipe Thread standard 60° thread form for pipe fittings.	**F58–F59**
	55		Partial profile 55°	–	–	N	General use for 55° thread forms such as Whitworth, BSW, and BSP where non-cresting inserts are desired to cut a variety of pitches.	**F60–F61**
	W		Whitworth, BSW, BSF, BSP	BS 84:1956, ISO 228/1:1982, DIN 259	Medium Class A	Y	Widely used 55° form for gas and water connections.	**F62–F63**
	API-RD		API round	API STD. 5B:1979	Standard API RD	Y	60° V-form with large radius for casing, tubing, and line pipe in the oil and gas industry, including 8 and 10 round forms.	**F64**
	PG		PG	DIN 404B0		Y	80° steel conduit thread.	**F65**
	RD		Round	DIN 405	7e/7H	Y	Round thread form for tube fittings in the chemical and food industries.	**F65–F66**
	TR		Trapez	DIN 103	7e/7H	N	30° truncated metric thread form for motion applications.	**F67–F68**

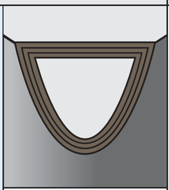


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

- Reduce cycle times — high speed capability.
- Longer tool life — new multilayer coating provides better wear resistance.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

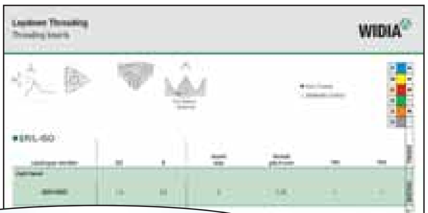
wear resistance ⟷ toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
TN6025	 HC-P25	PVD-TiAlN Nano-multilayer coated carbide. General-purpose machining for steels, stainless steels, cast irons, non-ferrous materials, and difficult-to-machine materials. Recommended at low to medium cutting speeds when higher toughness is required.	P									
			M									
			K									
			N									
			S									

Laydown Threading Thread Form Guide

- All Laydown Threading inserts are precision ground to provide accurate thread forms and indexing.
- Both cresting and non-cresting partial profile inserts are specifically designed for either external or internal threading operations.
- Cresting inserts provide a fully controlled thread form, including diameter for a given pitch. The need for deburring is eliminated and the inserts are optimised for the best tool life at that pitch.
- Non-cresting partial profile inserts offer the flexibility to cut a variety of thread pitches with one insert.
- Right-hand Laydown Threading toolholders use right-hand inserts. Left-hand Laydown Threading toolholders use left-hand inserts.
- Right-hand Laydown Threading boring bars use right-hand inserts. Left-hand Laydown Threading boring bars use left-hand inserts.

Laydown Threading
Insert Identification System



3ERAISO

3	E	R	A	ISO	
Insert Size	Insert Type	Hand of Insert	Thread Pitch	Thread Profile	Number of Teeth

Insert Type

E — External thread

I — Internal thread

Hand of Insert

R — Right-hand thread

L — Left-hand thread

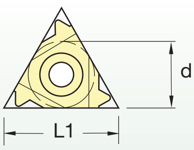
Number of Teeth

Single tooth profile — No symbol

Multi-tooth profile — Number of teeth (cutting edge and symbol)

Multi-tooth profile with two teeth — 2M

Insert Size



symbol	d	L1
2	0.250	11
3	0.375	16
4	0.500	22
5	0.625	27

Thread Pitch

Partial profile inserts

symbol	mm
A	0,5–1,5
AG	0,5–3,0
G	1,7–3,0
N	3,5–5,0
Q	5,5–6,0

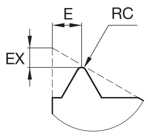
Full profile inserts

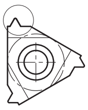
symbol	mm
Actual TPI	0,5–0,4

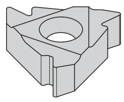
Thread Profile

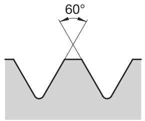
55	Partial Profile 55°
60	Partial Profile 60°
ISO	ISO Metric 60°
TR	ISO Metric 60°
UN	ISO Inch/American UN 60°
W	Whitworth 55°
NPT	American National Pipe Thread 60°
RD	Round
PG	Steel Conduit
APIRD	API Round

Material Group		Cutting Speed — vc m/min TN6025 min	Start	max
P	0/1	130	**140**	150
P	2	110	**145**	175
P	3	110	**145**	175
P	4	75	**95**	115
P	5	100	**125**	145
P	6	40	**55**	65
M	1	60	**75**	90
M	2	40	**50**	55
M	3	40	**50**	60
K	1	60	**80**	90
K	2	60	**75**	85
K	3	60	**75**	90
N	1	600	**750**	900
N	2	535	**685**	835
N	3	230	**300**	370
N	4	135	**180**	225
N	5	70	**90**	110
N	6	445	**565**	690
N	7	550	**700**	850
S	1	25	**35**	40
S	2	15	**20**	20
S	3	40	**60**	70
S	4	20	**30**	35









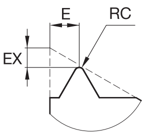
Partial Profile
60° External

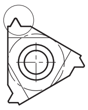
● first choice
○ alternate choice

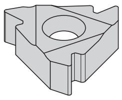
		TN6025
P		●
M		●
K		●
N		○
S		●
H		

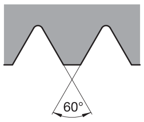
ER/L-60

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
2ERA60	0,05	0,9	0,8	2	0,50-1,5	48-16	–	2007404
3ERA60	0,05	0,8	0,9	3	0,50-1,5	48-16	–	2018214
3ERAG60	0,08	1,2	1,7	3	0,50-3,0	48-8	–	2018246
3ERG60	0,28	1,2	1,7	3	1,75-3,0	14-8	–	2018222
4ERN60	0,53	1,7	2,5	4	3,5-5,0	7-5	–	2018252
5ERQ60	0,64	2,1	3,1	5	5,5-6,0	4.5-4	–	2018256
left hand								
3ELAG60	0,08	1,2	1,7	3	0,50-3,0	48-8	–	2071904
3ELG60	0,28	1,2	1,7	3	1,75-3,0	14-8	–	2018236









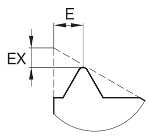
Partial Profile
60° Internal

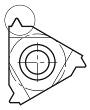
● first choice
○ alternate choice

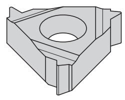
P		●
M		●
K		●
N		○
S		●
H		

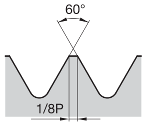
■ IR/L-60

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
2IRA60	0,05	0,8	0,9	2	0,50-1,5	48-16	–	2018262
3IRA60	0,05	0,8	0,9	3	0,50-1,5	48-16	–	2018272
3IRAG60	0,05	1,2	1,7	3	0,50-3,0	48-8	–	2018284
3IRG60	0,15	1,2	1,7	3	1,75-3,0	14-8	–	2018278
4IRN60	0,31	1,7	2,5	4	3,5-5,0	7-5	–	2018290
5IRQ60	0,30	1,8	2,7	5	5,5-6,0	4.5-4	–	2018295
left hand								
2ILA60	0,05	0,8	0,9	2	0,50-1,5	48-16	–	2021656
3ILAG60	0,05	1,2	1,7	3	0,50-3,0	48-8	–	2008275
3ILG60	0,15	1,2	1,7	3	1,75-3,0	14-8	–	2007419
4ILN60	0,31	1,7	2,5	4	3,5-5,0	7-5	–	2100489









ISO Metric-
External

● first choice
○ alternate choice

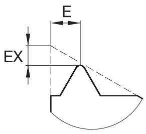
P		●
M		●
K		●
N		○
S		●
H		

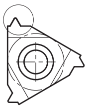
■ ER/L-ISO

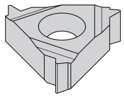
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
2ER15ISO	1,0	0,8	2	1,50	–	–	2007542
3ER05ISO	0,6	0,4	3	0,50	–	–	2018377
3ER07ISO	0,6	0,6	3	0,70	–	–	2018389
3ER075ISO	0,6	0,6	3	0,75	–	–	2018395
3ER08ISO	0,6	0,6	3	0,80	–	–	2018403
3ER10ISO	0,7	0,7	3	1,00	–	–	2018411
3ER125ISO	0,8	0,9	3	1,25	–	–	2018421
3ER15ISO	0,8	1,0	3	1,50	–	–	2018429
3ER175ISO	0,9	1,2	3	1,75	–	–	2018445
3ER20ISO	1,0	1,3	3	2,00	–	–	2018460
3ER25ISO	1,1	1,5	3	2,50	–	–	2018472
3ER30ISO	1,2	1,6	3	3,00	–	–	2008256
4ER40ISO	1,6	2,3	4	4,00	–	–	2018501
4ER35ISO	1,6	2,3	4	4,50	–	–	2018495
4ER45ISO	1,7	2,4	4	4,50	–	–	2018508

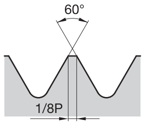
(continued)

(ER/L-ISO — continued)









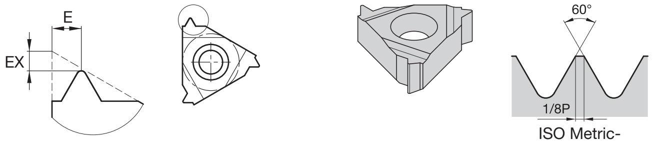
ISO Metric-
External

● first choice
○ alternate choice

	TN6025
P	●
M	●
K	●
N	○
S	●
H	

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
4ER50ISO	1,7	2,5	4	5,00	–	–	2018517
5ER55ISO	2,7	1,9	5	5,50	–	–	2018522
5ER60ISO	2,9	2,0	5	6,00	–	–	2018528
left hand							
2EL05ISO	0,6	0,4	2	0,50	–	–	3118234
2EL06ISO	0,6	0,6	2	0,60	–	–	3118236
2EL07ISO	0,6	0,6	2	0,70	–	–	3118240
2EL075ISO	0,6	0,6	2	0,75	–	–	3118238
2EL08ISO	0,6	0,6	2	0,80	–	–	3118242
2EL10ISO	0,7	0,7	2	1,00	–	–	3118374
2EL125ISO	0,8	0,9	2	1,25	–	–	3118376
2EL15ISO	0,8	1,0	2	1,50	–	–	3118378
2EL175ISO	0,8	1,1	2	1,75	–	–	3118380
3EL035ISO	0,8	0,4	3	0,35	–	–	3122015
3EL04ISO	0,7	0,4	3	0,40	–	–	3122018
3EL045ISO	0,7	0,4	3	0,45	–	–	3122017

(ER/L-ISO — continued)

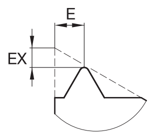


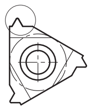
ISO Metric-
External

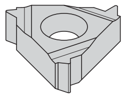
● first choice
○ alternate choice

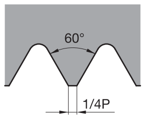
	TN6025
P	●
M	●
K	●
N	○
S	●
H	

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
3EL06ISO	0,6	0,6	3	0,60	–	–	3122021
3EL10ISO	0,7	0,7	3	1,00	–	–	2008187
3EL15ISO	0,8	1,0	3	1,50	–	–	2018435
3EL175ISO	0,9	1,2	3	1,75	–	–	2018447
3EL20ISO	1,3	1,0	3	2,00	–	–	2018466
3EL30ISO	1,2	1,6	3	3,00	–	–	2018489
4EL40ISO	1,6	2,3	4	4,00	–	–	2101539
4EL50ISO	1,7	2,5	4	5,00	–	–	2101597









ISO Metric-Internal

● first choice
○ alternate choice

P		●
M		●
K		●
N		○
S		●
H		

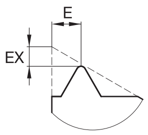
IR/L-ISO

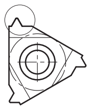
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
2IR075ISO	0,6	0,3	2	0,75	–	–	2007585
2IR10ISO	0,6	0,7	2	1,00	–	–	2007613
2IR125ISO	0,6	0,7	2	1,25	–	–	2007622
2IR15ISO	0,8	1,0	2	1,50	–	–	2018550
2IR175ISO	0,9	1,1	2	1,75	–	–	2018564
3IR05ISO	0,6	0,6	3	0,50	–	–	2018582
3IR075ISO	0,6	0,6	3	0,75	–	–	2018596
3IR10ISO	0,6	0,7	3	1,00	–	–	2018612
3IR125ISO	0,8	0,9	3	1,25	–	–	2018626
3IR15ISO	0,8	1,0	3	1,50	–	–	2018636
3IR175ISO	0,9	1,2	3	1,75	–	–	2018652
3IR20ISO	1,0	1,3	3	2,00	–	–	2018663
3IR25ISO	1,1	1,5	3	2,50	–	–	2018674
3IR30ISO	1,1	1,5	3	3,00	–	–	2018684
4IR35ISO	1,6	2,3	4	3,50	–	–	2018695

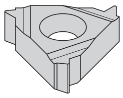
(continued)

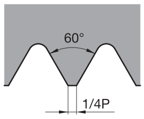
WIDIA

(IR/L-ISO — continued)









ISO Metric-Internal

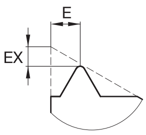
● first choice
○ alternate choice

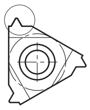
		TN6025
P		●
M		●
K		●
N		○
S		●
H		

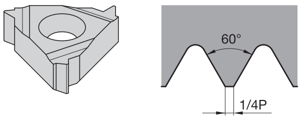
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
4IR40ISO	1,6	2,3	4	4,00	–	–	2018702
4IR45ISO	1,6	2,4	4	4,50	–	–	2018708
4IR50ISO	1,6	2,3	4	5,00	–	–	2018714
5IR55ISO	1,6	2,3	5	5,50	–	–	2021597
5IR60ISO	1,8	2,5	5	6,00	–	–	2018720
left hand							
2IL035ISO	0,8	0,4	2	0,35	–	–	3118382
2IL04ISO	0,7	0,4	2	0,40	–	–	3118384
2IL05ISO	0,6	0,4	2	0,50	–	–	3118386
2IL06ISO	0,6	0,6	2	0,60	–	–	3118387
2IL07ISO	0,6	0,6	2	0,70	–	–	3118390
2IL075ISO	0,6	0,6	2	0,75	–	–	3118389
2IL08ISO	0,6	0,6	2	0,80	–	–	3118392
2IL125ISO	0,8	0,9	2	1,25	–	–	3123198
2IL15ISO	0,8	1,0	2	1,50	–	–	2018557
2IL20ISO	0,9	1,1	2	2,00	–	–	2071923

(continued)

(IR/L-ISO — continued)







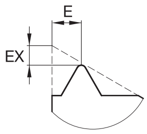
ISO Metric-Internal

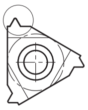
● first choice
○ alternate choice

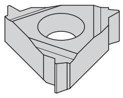
P		●
M		●
K		●
N		○
S		●
H		

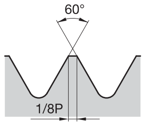
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
3IL035ISO	0,8	0,3	3	0,35	–	–	3124269
3IL04ISO	0,8	0,4	3	0,40	–	–	3124271
3IL05ISO	0,6	0,4	3	0,50	–	–	3124272
3IL06ISO	0,6	0,6	3	0,60	–	–	3124274
3IL07ISO	0,6	0,6	3	0,70	–	–	3124276
3IL075ISO	0,6	0,6	3	0,75	–	–	2018598
3IL15ISO	0,8	1,0	3	1,50	–	–	2018642
3IL20ISO	1,0	1,3	3	2,00	–	–	2018667
3IL25ISO	1,1	1,5	3	2,50	–	–	2018678
3IL30ISO	1,1	1,5	3	3,00	–	–	2018688
4IL40ISO	1,6	2,3	4	4,00	–	–	2102322
4IL45ISO	1,6	2,4	4	4,50	–	–	2102347
4IL50ISO	1,6	2,3	4	5,00	–	–	2076776
5IL55ISO	1,6	2,3	5	5,50	–	–	2642318
5IL60ISO	1,8	2,5	5	6,00	–	–	2642319

WIDIA









American
UN-External

● first choice
○ alternate choice

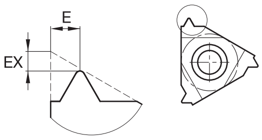
		TN6025
P		●
M		●
K		●
N		○
S		●
H		

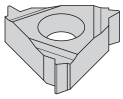
ER/L-UN

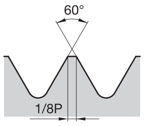
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3ER48UN	0,6	0,6	3	–	48	–	2018736
3ER40UN	0,6	0,6	3	–	40	–	2018744
3ER36UN	0,6	0,6	3	–	36	–	2018748
3ER32UN	0,6	0,6	3	–	32	–	2018752
3ER28UN	0,6	0,7	3	–	28	–	2018756
3ER27UN	0,8	0,7	3	–	27	–	2018760
3ER24UN	0,7	0,8	3	–	24	–	2018766
3ER20UN	0,8	0,9	3	–	20	–	2018772
3ER18UN	0,8	1,0	3	–	18	–	2018778
3ER16UN	0,9	1,1	3	–	16	–	2018782
3ER14UN	1,0	1,2	3	–	14	–	2018790

(continued)

(ER/L-UN — continued)





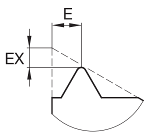


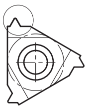
American
UN-External

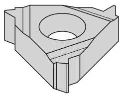
● first choice
○ alternate choice

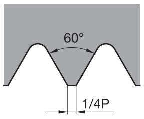
P		●
M		●
K		●
N		○
S		●
H		

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
3ER13UN	1,3	1,0	3	–	13	–	2018796
3ER12UN	1,1	1,4	3	–	12	–	2018802
3ER11UN	1,1	1,5	3	–	11	–	2018808
3ER10UN	1,1	1,5	3	–	10	–	2018814
3ER8UN	1,2	1,6	3	–	8	–	2018824
left hand							
3EL13UN	1,0	1,3	3	–	13	–	3122039
3EL12UN	1,1	1,4	3	–	12	–	2192607
3EL11UN	1,1	1,5	3	–	11	–	3122032
3EL10UN	1,1	1,5	3	–	10	–	3122028









American
UN-Internal

● first choice
○ alternate choice

		TN6025
P		●
M		●
K		●
N		○
S		●
H		

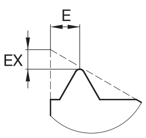
IR/L-UN

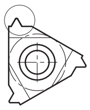
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
2IR32UN	0,6	0,6	2	–	32	–	2018860
3IR32UN	0,6	0,6	3	–	32	–	2018918
3IR28UN	0,6	0,7	3	–	28	–	2018922
3IR24UN	0,7	0,8	3	–	24	–	2018932
3IR20UN	0,8	0,9	3	–	20	–	2018938
2IR20UN	0,8	0,9	2	–	20	–	2018876
3IR18UN	0,8	1,0	3	–	18	–	2018944
2IR18UN	0,8	1,0	2	–	18	–	2018882
3IR16UN	0,9	1,1	3	–	16	–	2018950
2IR16UN	0,9	1,1	2	–	16	–	2018886
3IR14UN	0,9	1,2	3	–	14	–	2018955

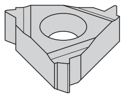
(continued)

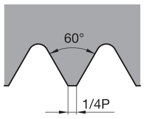
Threading

(IR/L-UN — continued)







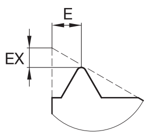


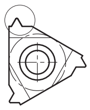
American
UN-Internal

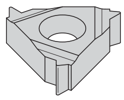
● first choice
○ alternate choice

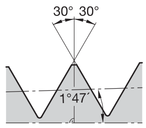
P		●
M		●
K		●
N		○
S		●
H		

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
3IR12UN	1,1	1,4	3	–	12	–	2018966
3IR10UN	1,1	1,5	3	–	10	–	2018979
3IR8UN	1,1	1,5	3	–	8	–	2018990
left hand							
3IL64UN	0,8	0,4	3	–	64	–	3122416
3IL56UN	0,7	0,4	3	–	56	–	3122414
2IL32UN	0,6	0,6	2	–	32	–	2102653
3IL12UN	1,1	1,4	3	–	12	–	2102749
3IL9UN	1,2	1,7	3	–	9	–	3122446
3IL8UN	1,1	1,5	3	–	8	–	3122444









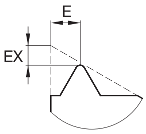
NPT-External

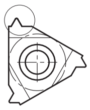
● first choice
○ alternate choice

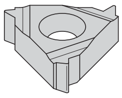
		TN6025
P		●
M		●
K		●
N		○
S		●
H		

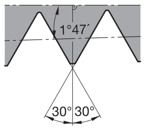
■ ER/L-NPT

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3ER115NPT	1,1	1,5	3	–	11.5	.7500	2019298
3ER14NPT	0,9	1,2	3	–	14	.7500	2019288
3ER18NPT	0,8	1,0	3	–	18	.7500	2019278
3ER8NPT	1,3	1,8	3	–	8	.7500	2019305









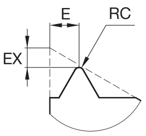
● first choice
○ alternate choice

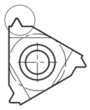
	TN6025
P	●
M	●
K	●
N	○
S	●
H	

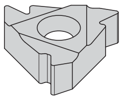
IR/L-NPT

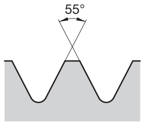
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3IR115NPT	1,1	1,5	3	–	11.5	.7500	2019335
3IR14NPT	0,9	1,2	3	–	14	.7500	2019329
3IR18NPT	0,8	1,0	3	–	18	.7500	2019323
3IR8NPT	1,3	1,8	3	–	8	.7500	2019339

Threading









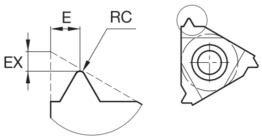
Partial Profile
55° External

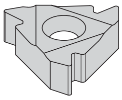
● first choice
○ alternate choice

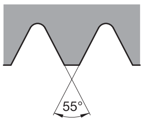
		TN6025
P		●
M		●
K		●
N		○
S		●
H		

ER/L-55

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3ERA55	0,05	0,8	0,9	3	0,50-1,5	48-16	–	2018301
3ERAG55	0,08	1,2	1,7	3	0,50-3,0	48-8	–	2018314
3ERG55	0,20	1,2	1,7	3	1,75-3,0	14-8	–	2018308
4ERN55	0,43	1,7	2,5	4	3,5-5,0	7-5	–	2018320
left hand								
3ELG55	0,20	1,2	1,7	3	1,75-3,0	14-8	–	2008190







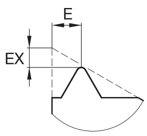
Partial Profile
55° Internal

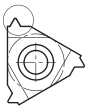
● first choice
○ alternate choice

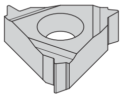
		TN6025
P		●
M		●
K		●
N		○
S		●
H		

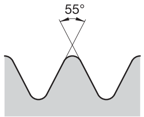
■ IR/L-55

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
2IRA55	0,05	0,8	0,9	2	0,50-1,5	48-16	–	2018328
3IRA55	0,05	0,8	0,9	3	0,50-1,5	48-16	–	2018334
3IRAG55	0,07	1,2	1,7	3	0,50-3,0	48-8	–	2018346
3IRG55	0,21	1,2	1,7	3	1,75-3,0	14-8	–	2018340
4IRN55	0,43	1,7	2,5	4	3,5-5,0	7-5	–	2018354
left hand								
3ILA55	0,05	0,8	0,9	3	0,50-1,5	48-16	–	3122449
3ILAG55	0,07	1,2	1,7	3	0,50-3,0	48-8	–	2018348









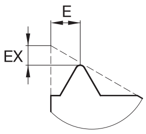
Whitworth BSW,
BSF, BSP-External

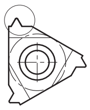
● first choice
○ alternate choice

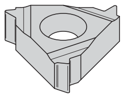
		TN6025
P		●
M		●
K		●
N		○
S		●
H		

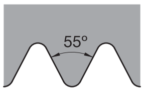
■ ER/L-W

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3ER32W	0,6	0,6	3	–	32	–	2019023
3ER28W	0,6	0,7	3	–	28	–	2019029
3ER19W	0,8	1,0	3	–	19	–	2019055
3ER18W	0,8	1,0	3	–	18	–	2021677
3ER16W	0,9	1,1	3	–	16	–	2019061
3ER14W	1,0	1,2	3	–	14	–	2019071
3ER12W	1,1	1,4	3	–	12	–	2019077
3ER11W	1,1	1,5	3	–	11	–	2019083
3ER10W	1,1	1,5	3	–	10	–	2019089
3ER8W	1,2	1,5	3	–	8	–	2019101
4ER6W	1,6	2,3	4	–	6	–	2021725
left hand							
3EL11W	1,1	1,5	3	–	11	–	2065289
3EL8W	1,2	1,5	3	–	8	–	2103046









Whitworth
BSW, BSF,
BSP-Internal

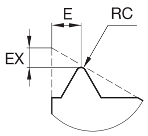
● first choice
○ alternate choice

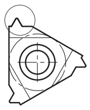
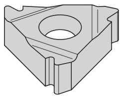
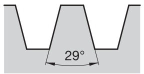
	TN6025
P	●
M	●
K	●
N	○
S	●
H	

■ IR/L-W

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
2IR19W	0,8	1,0	2	–	19	–	2019121
2IR14W	0,9	1,1	2	–	14	–	2019136
3IR19W	0,8	0,9	3	–	19	–	2019172
3IR16W	0,9	1,1	3	–	16	–	2019178
3IR14W	1,0	1,2	3	–	14	–	2019189
3IR12W	1,1	1,4	3	–	12	–	2019195
3IR11W	1,1	1,5	3	–	11	–	2019205
3IR8W	1,2	1,5	3	–	8	–	2019224
4IR6W	1,6	2,3	4	–	6	–	2019234

WIDIA



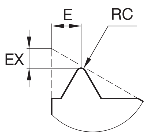
API Round-External

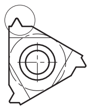
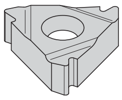
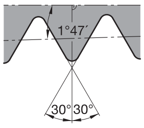
● first choice
○ alternate choice

		TN6025
P		●
M		●
K		●
N		○
S		●
H		

■ ER-APIRD

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3ER10APIRD	0,34	1,2	1,4	3	–	10	.750	2019608



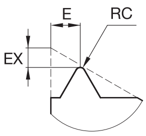




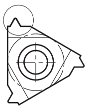
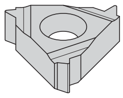
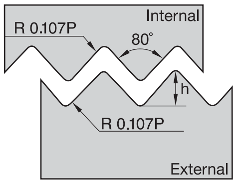
API Round-Internal

■ IR-APIRD

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3IR10APIRD	0,34	1,2	1,4	3	–	10	.750	2019618
3IR8APIRD	0,40	1,3	1,5	3	–	8	.750	2019622

Threading



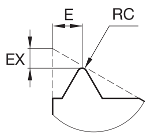
Defined by: DIN 40430

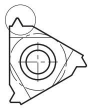
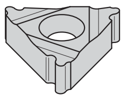
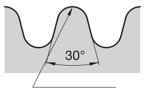
● first choice
○ alternate choice

		TN6025
P		●
M		●
K		●
N		○
S		●
H		

■ IR-PG

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3IR16PG	0,11	1,1	0,8	3	–	16	–	2019441

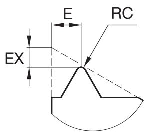


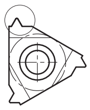




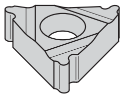
Round External

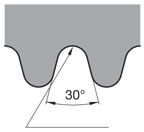
■ ER/L-RD

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3ER8RD	0,76	1,4	1,3	3	–	8	–	2019347
4ER6RD	1,01	1,5	1,7	4	–	6	–	2019359
left hand								
3EL8RD	0,76	1,4	1,3	3	–	8	–	2071943









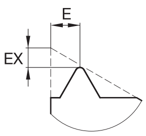
Round-Internal
R = 0,221P

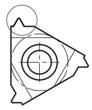
● first choice
○ alternate choice

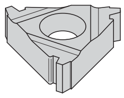
	TN6025
P	●
M	●
K	●
N	○
S	●
H	

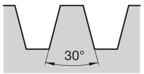
IR/L-RD

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3IR10RD	0,70	1,1	1,2	3	–	10	–	2019375
3IR8RD	0,70	1,4	1,4	3	–	8	–	2019381
4IR6RD	0,93	1,5	1,7	4	–	6	–	2019394
4IR4RD	1,40	2,3	2,2	4	–	4	–	2019400
left hand								
3IL8RD	0,06	1,4	1,4	3	–	8	–	3122422









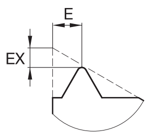
Trapez-External

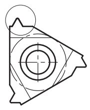
● first choice
○ alternate choice

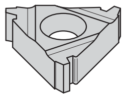
	TN6025
P	●
M	●
K	●
N	○
S	●
H	

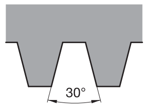
■ ER/L-TR

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3ER2TR	1,1	1,3	3	2,00	–	–	2019453
3ER3TR	1,3	1,5	3	3,00	–	–	2019461
4ER4TR	1,7	1,9	4	4,00	–	–	2019469
4ER5TR	2,1	2,5	4	5,00	–	–	2019479
5ER6TR	2,3	2,7	5	6,00	–	–	2019487
left hand							
3EL3TR	1,3	1,5	3	3,00	–	–	2019463
4EL4TR	1,7	1,9	4	4,00	–	–	2019471









Trapez-Internal

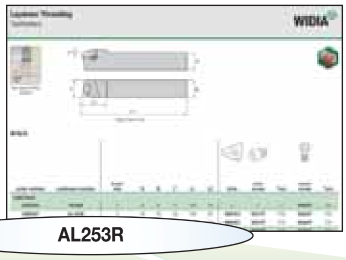
● first choice
○ alternate choice

		TN6025
P		●
M		●
K		●
N		○
S		●
H		

■ IR/L-TR

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3IR3TR	1,3	1,5	3	3,00	–	–	2019511
4IR4TR	1,7	1,9	4	4,00	–	–	2019520
4IR5TR	2,1	2,5	4	5,00	–	–	2019528
5IR6TR	2,3	2,7	5	6,00	–	–	2019534

Laydown Threading
Toolholder Identification System



A	L	25	3	R
Toolholder Construction	Tool Type	Shank Size	Insert Size	Hand of Tool

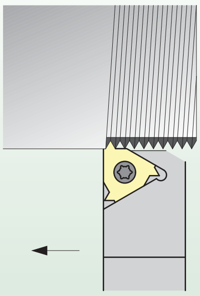
A — Toolholder Construction

A —
Shim required

N —
Without shim

L — Tool Type

L — External Thread

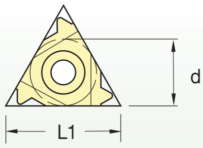


25 — Shank Size

Toolholders

- First two numbers are shank height in mm.

3 — Insert Size

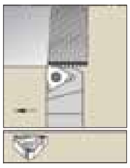


symbol	d	L1
2	6,35	11
3	9,52	16
4	12,7	22
5	15,88	27

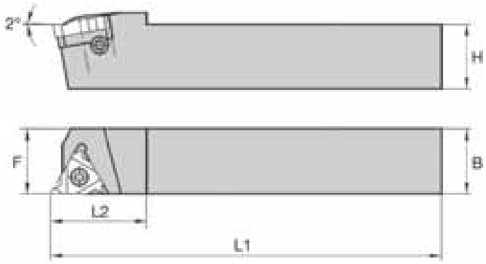
R — Hand of Tool

RH —
Thread symbol R

LH —
Thread symbol L

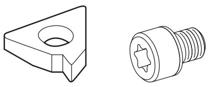
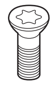


See page F42 for inserts.

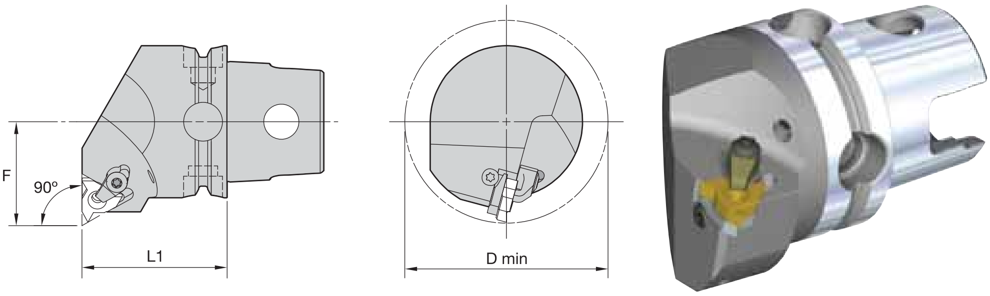


Right Hand Tool

■ N/A

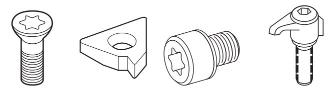



order number	catalogue number	insert size	H	B	F	L1	L2	shim	shim screw	Torx	insert screw	Torx
right hand												
2022340	**NL82R**	2	8	8	11	136	18	**–**	**–**	–	**SSN2T**	T8
2009587	**AL163R**	3	16	16	16	100	25	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009591	**AL203R**	3	20	20	20	128	30	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009594	**AL253R**	3	25	25	25	153	30	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009597	**AL254R**	4	25	25	25	155	36	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2009600	**AL323R**	3	32	32	32	173	30	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009603	**AL324R**	4	32	32	32	175	36	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2022589	**AL325R**	5	32	32	32	176	40	**SMYE5**	**SSY5T**	T25	**SSA5T**	T25
2016118	**AL404R**	4	40	40	40	205	36	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2016122	**AL405R**	5	40	40	40	206	40	**SMYE5**	**SSY5T**	T25	**SSA5T**	T25
left hand												
2071294	**AL163L**	3	16	16	16	100	25	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2071295	**AL203L**	3	20	20	20	125	30	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2114772	**AL254L**	4	25	25	25	150	36	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20



KM QUICK CHANGE

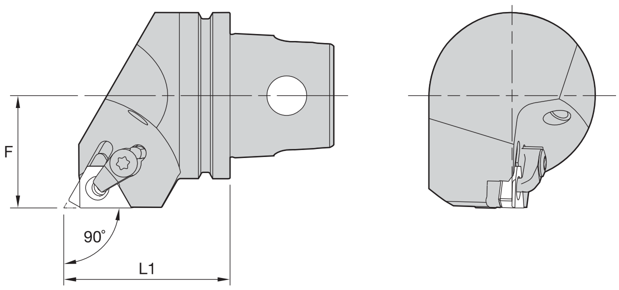
LSE-N 90° • Internal Only

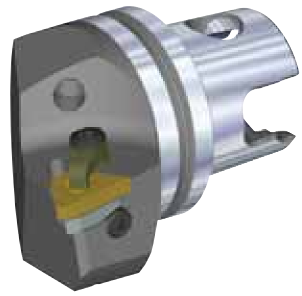


order number	catalogue number	L1 mm	L1 in	F mm	F in	D min mm	D min in	gage insert	insert screw	shim	shim screw	clamp assembly	kg	lbs
right hand														
3950832	**KM40TSLSER16N**	40	1.575	27	1.063	54	2.126	LT16NR	**SSA3T**	**SMYI3**	**SSY3T**	**CKC3**	0,35	.77
3950854	**KM40TSLSER22N**	40	1.575	27	1.063	54	2.126	LT22NR	**SSA4T**	**SMYI4**	**SSY4T**	**CKC4**	0,35	.77
3959399	**KM40TSLSER27N**	45	1.772	27	1.063	54	2.126	LT27NR	**SSA5T**	**SMYI5**	**SSY5T**	**CKC5**	0,39	.86
left hand														
3950831	**KM40TSLSEL16N**	40	1.575	27	1.063	54	2.126	LT16NL	**SSA3T**	**SMYE3**	**SSY3T**	**CKC3**	0,35	.77
3950853	**KM40TSLSEL22N**	40	1.575	27	1.063	54	2.126	LT22NL	**SSA4T**	**SMYE4**	**SSY4T**	**CKC4**	0,35	.77
3959398	**KM40TSLSEL27N**	45	1.772	27	1.063	54	2.126	LT27NL	**SSA5T**	**SMYE5**	**SSY5T**	**CKC5**	0,39	.86

NOTE: Cutting units are supplied with insert screw and clamp assembly. However, tools are designed to use either the insert screw or the clamp assembly, not both.

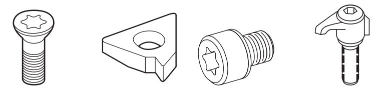
Threading





KM QUICK CHANGE

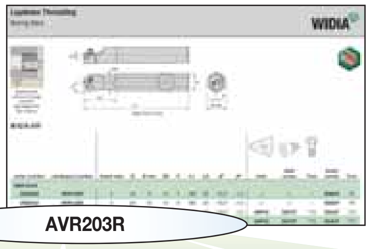
LSS 90°



order number	catalogue number	L1 mm	L1 in	F mm	F in	gage insert	insert screw	shim	shim screw	clamp assembly	kg	lbs
right hand												
3950857	**KM40TSLSSR16**	40	1.575	27	1.063	LT16ER	**SSA3T**	**SMYE3**	**SSY3T**	**CKC3**	0,31	.68
3950858	**KM40TSLSSR22**	40	1.575	27	1.063	LT22ER	**SSA4T**	**SMYE4**	**SSY4T**	**CKC4**	0,30	.66
3959401	**KM40TSLSSR27**	45	1.772	27	1.063	LT27ER	**SSA5T**	**SMYE5**	**SSY5T**	**CKC5**	0,37	.82
left hand												
3950855	**KM40TSLSSL16**	40	1.575	27	1.063	LT16EL	**SSA3T**	**SMYI3**	**SSY3T**	**CKC3**	0,32	.70
3950856	**KM40TSLSSL22**	40	1.575	27	1.063	LT22EL	**SSA4T**	**SMYI4**	**SSY4T**	**CKC4**	0,31	.68
3959400	**KM40TSLSSL27**	45	1.772	27	1.063	LT27EL	**SSA5T**	**SMYI5**	**SSY5T**	**CKC5**	0,37	.82

NOTE: Cutting units are supplied with insert screw and clamp assembly. However, tools are designed to use either the insert screw or the clamp assembly, not both.

Laydown Threading
Boring Bar Identification System



AVR203R

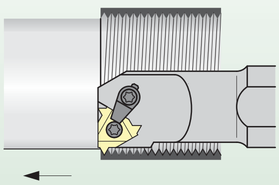
A	VR		20	3	R
Shim Requirement	Tool Type	Coolant Capability	Shank Head Diameter	Insert Size	Hand of Tool

A — Shim Requirement

- **A —** Shim required
- **N —** No shim required
- **O —** Miniature holder

VR — Tool Type

VR — Internal round shank



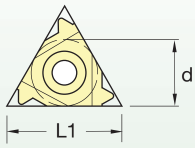
Coolant Capability

- **C —** With coolant

20 — Shank Head Diameter

- 10, 12, 13, 16, 20, 25, 32, 40, 50
- 6.2 (Mini adjust)
- 8.0 (Mini adjust)

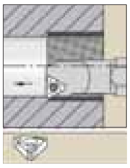
3 — Insert Size



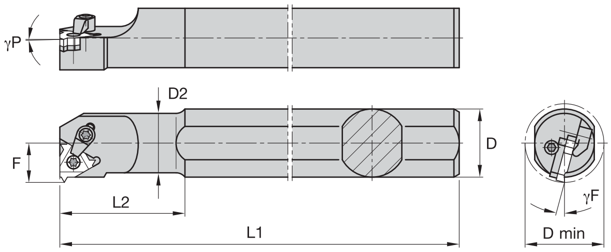
symbol	d	L1
2	6,35	11
3	9,52	16
4	12,7	22
5	15,88	27

R — Hand of Tool

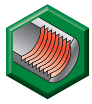
- **RH —** Thread symbol R
- **LH —** Thread symbol L



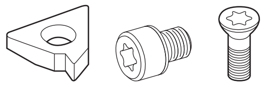
Steel shank without through coolant.
See page F42 for inserts.



Right Hand Tool

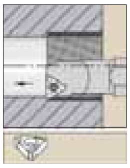


N/A-VR

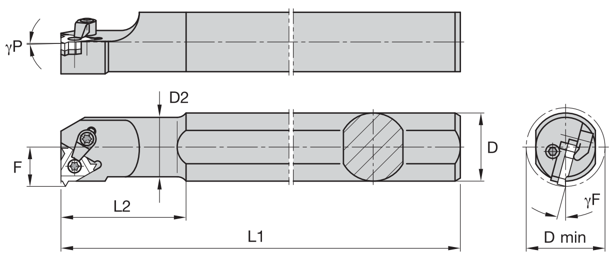


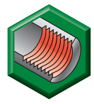
order number	catalogue number	insert size	D	D min	D2	F	L1	L2	γF°	γP°	shim	shim screw	Torx	insert screw	Torx
right hand															
2025828	**NVR102R**	2	20	13	10	7	180	25	-15,0°	-1,5	**–**	**–**	–	**SSN2T**	T8
2022342	**NVR132R**	2	20	16	13	9	180	32	-15,0°	-1,5	**–**	**–**	–	**SSN2T**	T8
2012307	**NVR163R**	3	20	20	16	12	180	40	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2009609	**AVR203R**	3	20	24	20	13	180	50	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2022343	**NVR204R**	4	20	27	20	16	180	50	-15,0°	-1,5	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20
2009628	**AVR25D3R**	3	25	29	25	16	200	45	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2009631	**AVR25D4R**	4	25	32	25	17	200	45	-15,0°	-1,5	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20
2009612	**AVR253R**	3	32	29	25	16	250	60	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2009625	**AVR254R**	4	32	32	25	17	250	60	-15,0°	-1,5	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20
2009640	**AVR32D3R**	3	32	36	32	20	250	60	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2009634	**AVR324R**	4	32	39	32	22	250	60	-15,0°	-1,5	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20
2009637	**AVR325R**	5	32	40	32	22	250	60	-15,0°	-1,5	**SMYI5**	**SSY5T**	T25	**SSA5T**	T25
2009643	**AVR403R**	3	40	44	40	24	300	60	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2009646	**AVR405R**	5	40	48	40	26	300	60	-15,0°	-1,5	**SMYI5**	**SSY5T**	T25	**SSA5T**	T25
2009649	**AVR505R**	5	50	58	50	31	350	75	-15,0°	-1,5	**SMYI5**	**SSY5T**	T25	**SSA5T**	T25
left hand															
2071317	**NVR163L**	3	20	20	16	12	180	40	-15,0°	-1,5	**SMYE3**	**SSY3T**	–	**SSA3T**	T10
2071318	**AVR203L**	3	20	24	20	13	180	40	-15,0°	-1,5	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2065134	**AVR25D3L**	3	25	29	25	16	200	45	-15,0°	-1,5	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2065135	**AVR25D4L**	4	25	32	25	17	200	45	-15,0°	-1,5	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2114832	**AVR253L**	3	32	29	25	16	250	60	-15,0°	-1,5	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10

NOTE: Items listed without a shim are designed for a 1,5° inclination angle.

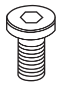
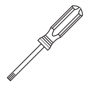


See page F42 for inserts.



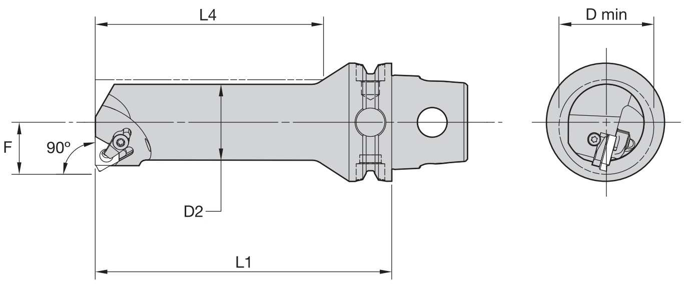


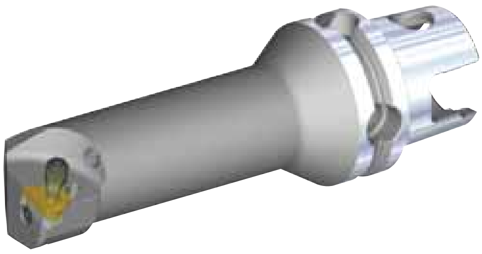
■ OVR

order number	catalogue number	insert size	D	D min	D2	F	L1	L2	γF°	γP°	screw	Torx driver	Torx
right hand													
2012325	**OVR122R**	2	12	13	10	7	100	25	-15,0°	-0,5	**12147789100**	**12148001100**	T8
2022345	**OVR152R**	2	15	16	13	9	100	32	-15,0°	-0,5	**12147789100**	**12148001100**	T8

NOTE: WIDIA™ miniature holders are for use on automatic machines as used in the optical and precision mechanics industries. The shank dimensions correspond to conventional hardmetal or HSS tools. Holders with round or square shanks are available. An internal RH tool can also be used for external LH threads in the same way an internal LH tool can be used for external RH threads. Please use correct inserts. The inclination angle on this tool is 0,5°. Tools are always clamped with the shank parallel to the part.





KM QUICK CHANGE

Threading

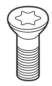
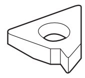
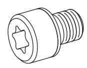
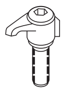
LSE 90°

order number	catalogue number	D min mm	D min in	D 2 mm	D 2 in	F mm	F in	L4 mm	L4 in	L1 mm	L1 in	gage insert	kg	lbs
right hand														
3955464	KM40TSS10DLSER11	13	.51	10	.39	7	.276	35	1.38	60	2.362	LT11NR	0,22	.49
3955466	KM40TSS12ELSER11	16	.63	12	.47	9	.354	42	1.66	70	2.756	LT11NR	0,25	.56
3955468	KM40TSS16FLSER16	20	.79	16	.63	11	.433	56	2.21	80	3.150	LT16NR	0,28	.61
3955470	KM40TSS20GLSER16	25	.98	20	.79	13	.512	70	2.76	90	3.543	LT16NR	0,34	.75
3955472	KM40TSS25HLSER16	32	1.26	25	.98	17	.669	75	2.95	100	3.937	LT16NR	0,50	1.11
3955474	KM40TSS32JLSER16	40	1.57	32	1.26	22	.866	96	3.78	110	4.331	LT16NR	0,72	1.58
3955476	KM40TSS32JLSER22	40	1.57	32	1.26	22	.866	96	3.78	110	4.331	LT22NR	0,71	1.56
left hand														
3955463	KM40TSS10DLSEL11	13	.51	10	.39	7	.276	35	1.38	60	2.362	LT11NL	0,22	.49
3955465	KM40TSS12ELSEL11	16	.63	12	.47	9	.354	42	1.65	70	2.756	LT11NL	0,25	.55
3955467	KM40TSS16FLSEL16	20	.79	16	.63	11	.433	56	2.21	80	3.150	LT16NL	0,28	.61
3955469	KM40TSS20GLSEL16	25	.98	20	.79	13	.512	70	2.76	90	3.543	LT16NL	0,34	.75
3955471	KM40TSS25HLSEL16	32	1.26	25	.98	17	.669	75	2.95	100	3.937	LT16NL	0,50	1.11
3955473	KM40TSS32JLSEL16	40	1.57	32	1.26	22	.866	96	3.78	110	4.331	LT16NL	0,72	1.58
3955475	KM40TSS32JLSEL22	40	1.57	32	1.26	22	.866	96	3.78	110	4.331	LT22NL	0,71	1.56

(continued)

(LSE 90° — continued)

Spare Parts

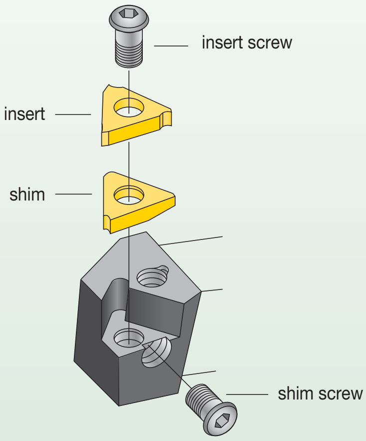
catalogue number	 insert screw	 shim	 shim screw	 clamp assembly
right hand				
KM40TSS10DLSER11	SSN2T	–	–	–
KM40TSS12ELSER11	SSN2T	–	–	–
KM40TSS16FLSER16	SN3TPKG	–	–	–
KM40TSS20GLSER16	SSA3T	SMYI3	SSY3T	CKC3
KM40TSS25HLSER16	SSA3T	SMYI3	SSY3T	CKC3
KM40TSS32JLSER16	SSA3T	SMYI3	SSY3T	CKC3
KM40TSS32JLSER22	SSA4T	SMYI4	SSY4T	CKC4
left hand				
KM40TSS10DLSEL11	SSN2T	–	–	–
KM40TSS12ELSEL11	SSN2T	–	–	–
KM40TSS16FLSEL16	SN3TPKG	–	–	–
KM40TSS20GLSEL16	SSA3T	SMYE3	SSY3T	CKC3
KM40TSS25HLSEL16	SSA3T	SMYE3	SSY3T	CKC3
KM40TSS32JLSEL16	SSA3T	SMYE3	SSY3T	CKC3
KM40TSS32JLSEL22	SSA4T	SMYE4	SSY4T	CKC4

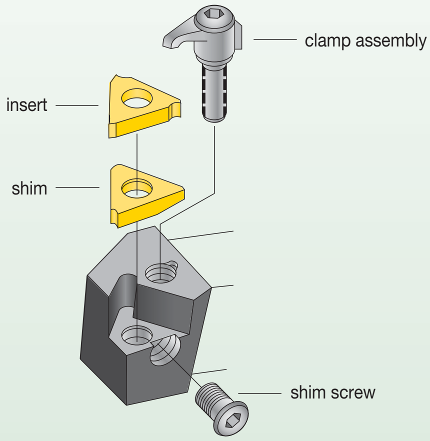
NOTE: Items listed without a shim are designed for a 1,5° inclination angle.
Cutting units are supplied with insert screw and clamp assembly. However, tools are designed to use either the insert screw or the clamp assembly, not both.

Laydown Threading Toolholders

In all cases, the proper shim selection is important.

WIDIA™ toolholders are supplied with a shim for a 1,5° lead angle. Change the shim if your thread is more than 1° different. For more details on proper shim selections, see pages F100–F101.





insert size and screw	insert screw	shim	shim screw and washer	clamp assembly
3ER	S-SA3T	SM-YIE3	S-SY3T	CK-C3
3EL	S-SA3T	SM-YI3	S-SY3T	CK-C3
4ER	S-SA4T	SM-YIE4	S-SY4T	CK-C4
4EL	S-SA4T	SM-YI4	S-SY4T	CK-C4
Laydown Threading boring bars				
2IR	S-SN2T	–	–	–
2IL	S-SN2T	–	–	–
3IR	S-SA3T	SM-YI3	S-SY3T	CK-C3
3IL	S-SA3T	SM-YIE3	S-SY3T	CK-C3
4IR	S-SA4T	SM-YI4	S-SY4T	CK-C4
4IL	S-SA4T	SM-YIE4	S-SY4T	CK-C4

SM	—	Y	E	3	—	2N
Shim		Y-shim for Laydown standard inserts	**E** — External **I** — Internal	**iC** — 16mm		Shim Angle

2P	2° positive
1P	1° positive
–	0°
1N	1° negative
2N	2° negative
3N	3° negative

resultant angle		3.5°	2.5°	1.5°	0.5°	-0.5°	-1.5°
insert size (iC)	toolholder	shim ordering code					
16mm	ex. RH/in. LH ex. LH/in. RH	SM-YE3-2P SM-YI3-2P	SM-YE3-1P SM-YI3-1P	SM-YE3 SM-YI3	SM-YE3-1N SM-YI3-1N	SM-YE3-2N SM-YI3-2N	SM-YE3-3N SM-YI3-3N
22mm	ex. RH/in. LH ex. LH/in. RH	SM-YE4-2P SM-YI4-2P	SM-YE4-1P SM-YI4-1P	SM-YE4 SM-YI4	SM-YE4-1N SM-YI4-1N	SM-YE4-2N SM-YI4-2N	SM-YE4-3N SM-YI4-3N

Slanted Shim Kit

Because you might occasionally need different shims than those supplied with our standard toolholders, we strongly recommend that shim kits be readily available in every tool shop.

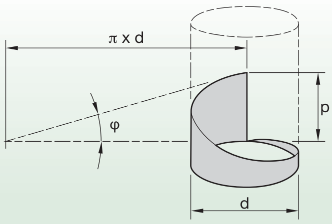
insert size	shim size (D)	ordering code	contains slanted shims
3x	16mm	ABY3	SM-YE3-2P, 1P, 1N, 2N, 3N SM-YI3-2P, 1P, 1N, 2N, 3N
4x	22mm	ABY4	SM-YE4-2P, 1P, 1N, 2N, 3N SM-YI4-2P, 1P, 1N, 2N, 3N

The Helix Angle

Example:
d = 48,06mm (1.892")
p = 3,175mm (.125")

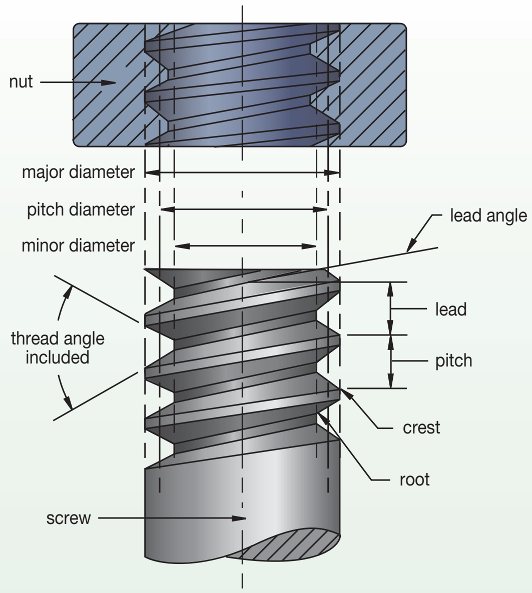
ϕ = Helix angle
p = pitch
d = pitch diameter

$$\phi = \arctan\left(\frac{p * \text{starts}}{\pi * \varnothing}\right) = 1.13°$$



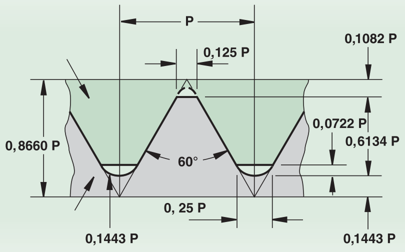
Screw Thread Definitions

1. Major diameter — The largest diameter of a straight screw thread. This applies to both internal and external threads.
2. Pitch diameter — On a straight thread, it is the diameter which passes through the thread profiles at such points which make the thread width of the groove equal to one-half of the basic pitch. On a "perfect thread," this occurs at the point where the widths of the thread and groove are equal.
3. Thread angle (included) — The included angle between the individual flanks of the thread form.
4. Minor diameter — The smallest diameter of a straight screw thread. This applies to both internal and external threads.
5. Lead angle — On a straight thread, the lead angle is the angle created by the helix of the thread at the pitch diameter with a plane perpendicular to the axis.
6. Lead — The distance a screw thread advances axially in one revolution. On a single start, the pitch and lead are identical. The lead is equal to the pitch times the number of starts.
7. Pitch — The distance from a point on a screw thread to a corresponding point on the next thread measured parallel to the thread axis.
8. Crest — The outer most surface of the thread form which joins the flanks.
9. Root — The inner most surface of the thread form which joins the flanks.



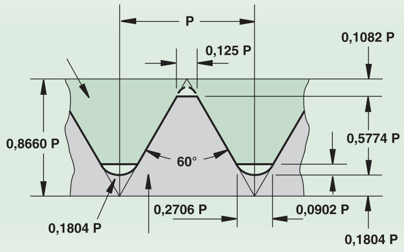
NOTE: Threads per inch (TPI) not shown:
The number of threads per inch measured axially.
The terms pitch and TPI are often used interchangeably. TPI = 1/pitch

ISO M (Metric) and UN (Unified National)



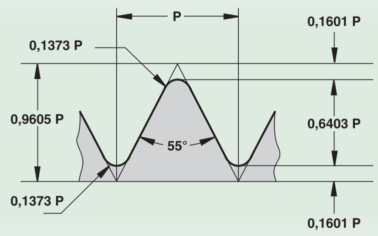
Use: All branches of mechanical industry.

UNJ (controlled root radius)



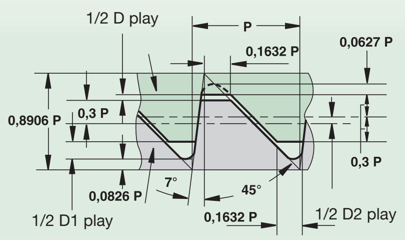
Use: Aircraft and space industry.

Whitworth (BSW)



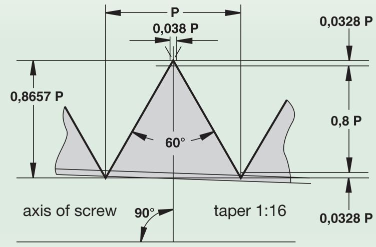
Use: Fittings and pipe couplings for gas, water, and sewer lines (replaced by ISO).

American Buttress



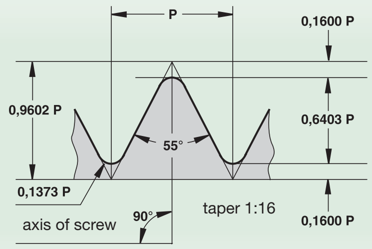
Use: Fittings and pipe couplings.

NPT (American National Pipe Thread)



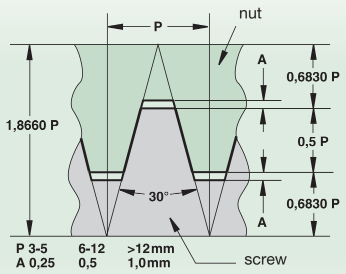
Use: Fittings and pipe couplings.

BSPT (British Standard Pipe Thread)



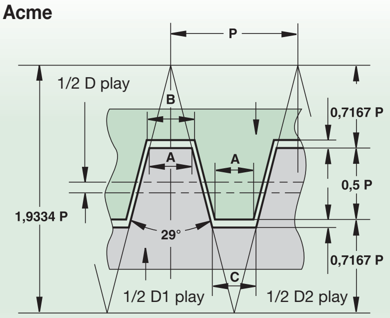
Use: Pipe thread for steam, gas, and water lines.

TR DIN 103



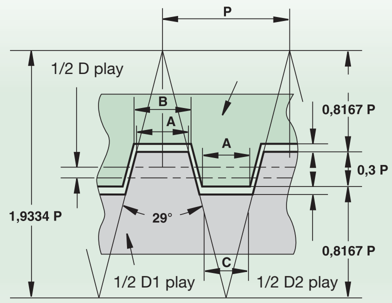
Use: Mechanical industry for motion transmission screws.

Acme



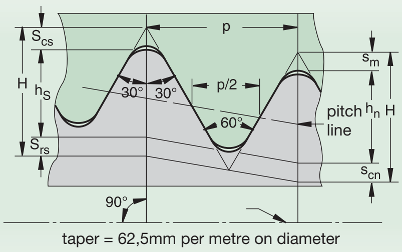
A = 0,0307 P
B = 0,3707 P—x D play
C = 0,3707 P—(D1 play—D2 play)
Use: Acme-General is used in mechanical industry for motion transmission screws.

Acme, truncated (Stub)



A = 0,4224 P
B = 0,4224 P—x D play
C = 0,4224 P—(D1 play—D2 play)
Use: Where normal Acme is too deep.

API Casing and Tubing Round Thread Form



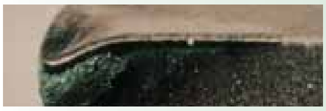
NOTE: Taper shown exaggerated.

Suggested Grades and Speeds for Threading Various Workpiece Materials

workpiece group	workpiece material	recommended surface speed — SFM		
		uncoated	PVD coated	
		THM	TN6010	TN6025
free-machining carbon steel	10L18, 10L45, 1213, 12L13, 12L14, 1140, 1141, 11L44, 1151, 10L50	–	91–98	45–198
plain carbon steel	10063, 1008, 1010, 1015, 1018, 1020, 1025, 1026, 1108, 1117	–	76–198	45–175
alloy steels/tool steels 150–325 HB (up to 35 HRC)	1042, 1045, 1070, 1080, 1085, 1090, 1095, 1541, 1561, 1572, 5140, 8620, W1, O1, S1, P20, H13, D2, A6, H13, L6	–	76–198	38–167
alloy steels/tool steels 330–450 HB (36–47 HRC)		–	61–160	–
martensitic/ferritic stainless/precipitation hardening	416, 420F, 440F, 405, 409, 429, 430, 434, 436, 442, PH	–	45–160	30–120
austenitic stainless steel	201, 202, 301, 302, 303, 304, 304, 305, 321, 347, 348, 310, 314, 316, 316L, 330	61–106	61–198	46–137
grey cast iron 135–270 HB	class 20, 30, 35, 45	61–91	61–237	46–122
grey cast iron 275–450 HB	class 50, 55, 60	45–76	45–175	15–76
alloy/ductile iron	A536, J434C, 60-40-18, 80-55-06, 100-70-03	45–76	45–650	100–525
free-machining aluminium alloys	2024-T4, 2014-T6, 6061-T6 2011-T3, 3003-H18, A2, Alcan, Alcoa 510, Duralumin	122—244	122—265	–
high-silicon aluminium alloys	A380, A390, A380-1, A390-1, A380-2	–	–	–
copper/zinc/brass		76–183	76–304	46–236
non-metallics	Graphite, Nylon, Plastics, Rubbers, Phenolics, Carbon	122–457	122–396	46–305
high-temperature alloys 125–269 HB (up to 27 HRC)	Nickel 200, Monel, R405, Monel K500, INCONEL 600, INCONEL® 625/901x750/718, Waspaloy, Hastelloy C	24–37	24–122	13–76
high-temperature alloys 260–450 HB (26–47 HRC)	Rene 95, Waspaloy A286, Incoloy 800, Haynes 188, Stellite F, Haynes 25	24–30	30–76	6—61
titanium alloys	Ti-6Al-4V, TI-5Al-2.5Sn	34–55	34–99	–

NOTE: When workpiece hardness levels are at the top of a range, starting m/min should be at the lower end. Regularly inspect insert clamps for worn flats.

Edge preparation:
Uncoated — sharp
PVD coated — light hone except positive top rake, top rake-sharp

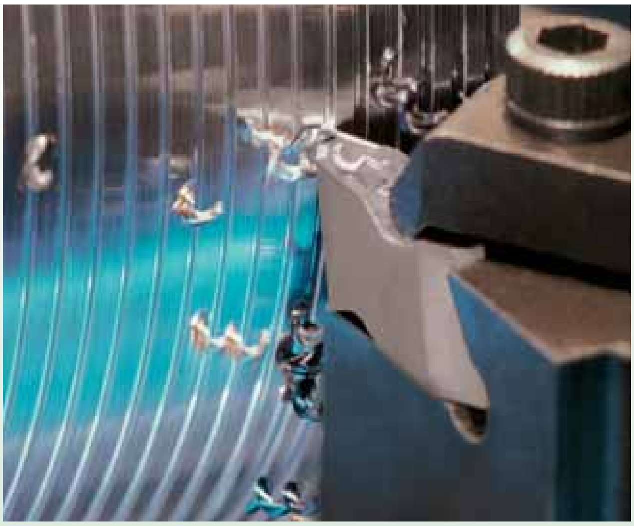
problem	cause	possible solution
thread with torn finish 	• Burs. • Torn finish. • Steps. • Improper shim. • Improper infeed.	• Use modified flank infeed. • Use full profile insert. • Increase coolant concentration. • Increases m/min. • Check machine “Z” travel axis. • Check insert form. • Check for correct shim in LT system. • Calculate flank clearance.
chatter 	• Poor rigidity. • Insert movement. • Improper infeed. • Off centreline.	• Use modified flank infeed. • Minimise tool overhang. • Check for workpiece deflection. • Check insert and clamp. • Verify that tool cutting position is at workpiece centreline. • Adjust number of passes. Fewer passes reduce chatter.
built-up edge 	• Speed too low. • Insufficient coolant. • Chip load.	• Increase m/min. • Increase coolant concentration and/or flow. • Adjust infeed angle. • Increase depth of cut per pass.
deformation 	• Wrong grade. • Speed too high. • Improper infeed angle. • Insufficient coolant.	• Use modified flank infeed. • Use a more wear-resistant grade (e.g., TN6010™). • Reduce m/min. • Increase coolant flow.
chipping 	• Improper infeed. • Chip load. • Wrong grade. • Incorrect speed. • Poor rigidity.	• Use modified flank infeed. • Increase or decrease number of passes. • Eliminate spring passes. • Use tougher grade (e.g., TN6025™). • Increase m/min if chipping on trailing edge. • Decrease m/min if chipping on leading edge. • Minimise tool overhang. • Check for insert movement/check clamp. Torque screw or clamp to correct value. • Check for possible part deflection. • Calculate flank clearance. • Ensure correct shim.
broken nose 	• Heavy chip load. • Small nose radius. • Wrong grade. • Improper infeed.	• Use modified flank infeed. • Decrease chip load. • Use large nose radius if possible. • Use tougher grade (e.g., TN6025).
flank wear 	• Improper shim. • Wrong grade. • Insufficient coolant. • Off centreline. • Insufficient flank clearance. • Improper infeed angle.	• Ensure correct shim. • Use a more wear-resistant grade (e.g., TN6025). • Increase coolant flow. • Check the centreline height of the tool. (The smaller the diameter, the more critical the need for centreline accuracy.) • Calculate flank clearance and change shim to increase clearance on worn flank. • If wear is on trailing flank, increase infeed angle clearance.

problem	increase m/min	reduce m/min	increase chip load	decrease chip load where failure occurs	use tougher carbide grade	use harder carbide grade	apply coolant	use coated carbide	use topping insert	change infeed angle	check for insert movement and reseat	reduce tool overhang	reselect shim	apply chipbreaker style	reduce DOC	adjust centre height	begin cutting threads 12mm before workpiece	change infeed method
chatter	•			•							•	•				•		•
bur on crest	•								•									•
short tool life		•	•	•		•		•										•
chipped leading edge			•	•	•													
chipped trailing edge					•					•								
broken nose (first pass)	•														•	•		
broken nose (after first pass)				•	•					•			•					•
built-up on cutting edge	•		•				•	•										•
premature topping													•					
splitting threads																	•	
poor chip evacuation														•				•

WIDIA™ insert technology brings chip control to your threading operations with the TopThread™ platform. The proprietary WIDIA recessed chip groove, when used according to our recommendations, controls the chip in most applications. Our positive rake design lowers cutting pressures, which in turn lowers damaging heat generation thus providing better tool life. Long, stringy chips no longer mar the workpiece surface finish. The danger to operators when removing long chips from the workpiece and chuck is eliminated. All of these benefits combine to improve the productivity of your threading operations.

The Last Pass

Some CNC controls require the last pass to be at a 0° infeed angle because the chip will not break on the last pass. On most carbon and alloy steels, the last pass can remain at 0,127mm depth of cut and produce an acceptable finish. For some materials, a 0,025mm to 0,076mm (spring) pass may be used to improve surface finish, however, chipbreaking action may be compromised.

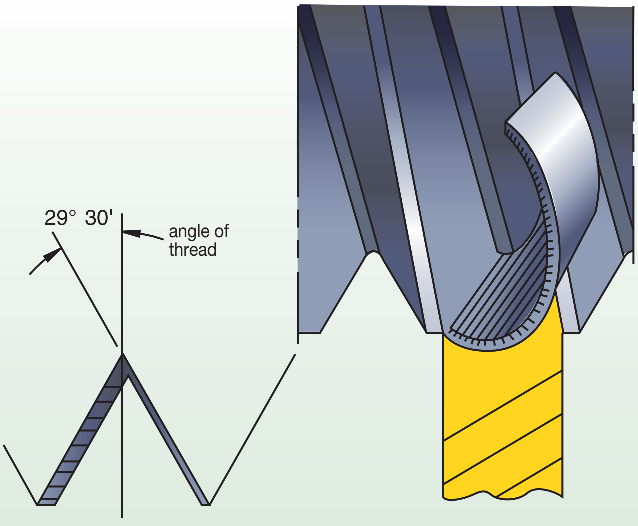


Machine Programming

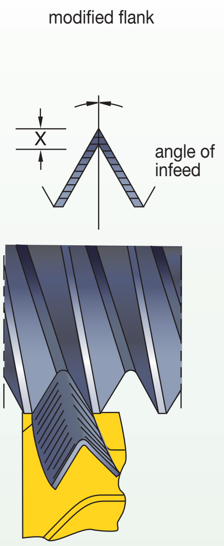
Modern CNC controls allow the programmer to easily adjust infeed angle, the number of passes, and depth of cut for each pass. The chip control threading insert performs best at an infeed angle of 29° 30’, although 15° to 30° is acceptable. Also, it is important to maintain a minimum of 0,127mm depth of cut on every pass. In most applications, use of CNC canned cycles produce only marginally successful results. Custom written programmes are better and are recommended.

Infeed Angle

In order to effectively and consistently break the chip, it is important to use an infeed angle between 28° and 29° 30'. Do not apply chip control inserts at infeed angles less than 15°.



Radial



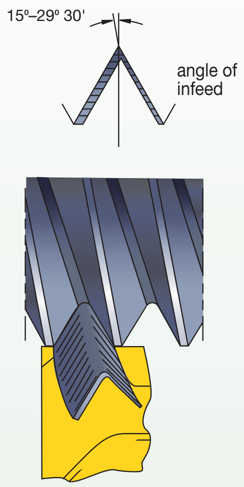
Advantage –

- Cutting on both sides of the thread form places all of the cutting edge in the cut and protects edge from chipping.
- Even wear on the insert.

Disadvantage –

- Tool develops a channel chip that may be difficult to handle.
- Tip chipping occurs when cutting high-tensile materials.
- Bur condition is increased.
- Entire cutting edge is engaged at finish of thread, causing increased tendency to chatter.

Modified flank



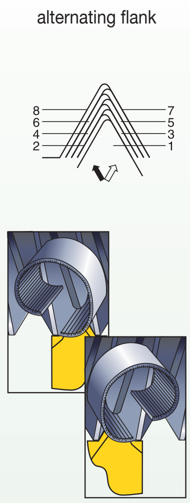
Advantage –

- Tool cuts both sides of thread form, so it is protected from chipping similar to 0° infeed. Channel-type chip develops, but uneven chip thickness helps remove the chip similar to flank infeed.
- This is the preferred method, especially when used with a chip control insert.
- Combined radial and/or alternating flank infeed.
- Results in good tool life, with wear evenly distributed over both flanks.

Disadvantage –

- Similar disadvantages as with 0° infeed, although reduced somewhat in magnitude as cutting forces are better equalised and chip flow is much less of a problem.

Alternating flank



Advantage –

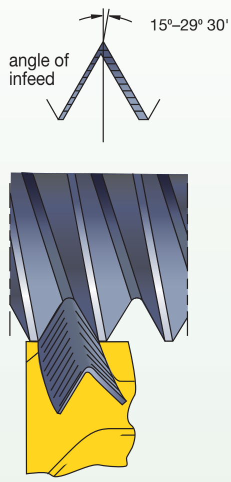
- Increased tool life because both edges are used equally.

NOTE: Some machine tools may require special programming techniques to achieve this method of infeed.

Disadvantage –

- Difficult to cut on conventional machinery.

Reversed modified flank



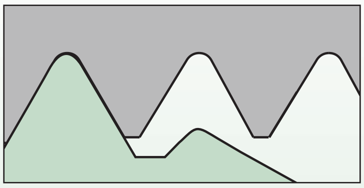
Advantage –

- Tool cuts both sides of thread form, so it is protected from chipping similar to 0° infeed. Channel-type chip develops, but uneven chip thickness helps remove the chip similar to flank infeed.
- This is the preferred method, especially when used with a chip control insert.
- Combined radial and/or alternating flank infeed.
- Results in good tool life, with wear evenly distributed over both flanks.
- As chip flow is the reversed feed direction, it is an excellent choice for internal threading.

Disadvantage –

- Programming needs to be done line by line.

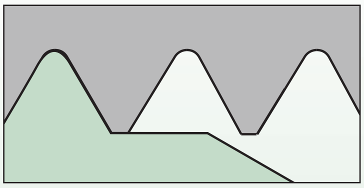
Partial Profile



Tooth profile with universal profile shape:

- 55° or 60° without cutting edges for the tooth tapers.
- Reduced inventory.
- For various pitches in a limited range.
- Preferably one time production.
- Major/minor diameters must be accurately pre-turned.

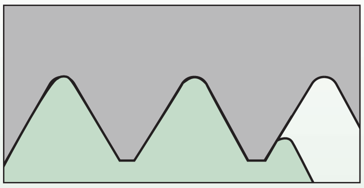
Full Profile



Tooth profile with full profile shape including tooth height:

- For bur-free, precise threads in the specified pitch.
- General application.
- Machining allowance for outside/core diameter around 0,1–0,15mm.

Multi-Tooth Profile



Multi-tooth full profile generally with 2–3 teeth:

- Highly productive threading with fewer passes and longer tool life.
- Requires a rigid setup and long thread pass through.
- Minimum clearance width approximately 1.25 x E as per indexable insert dimensions table.

Formulas

Metric Formula		
to find	**given**	**formula**
m/min	D (mm) RPM	m/min = $\frac{\pi \times D}{1000}$ x RPM
RPM	D (mm) m/min	RPM = $\frac{\text{m/min} \times 1000}{D \times \pi}$

Legend

m/min = metres per minute
RPM = revolutions per minute
D = part diameter
π = 3.1416

Maximum Cutting Speeds

On older machines, cutting speed is often limited by the maximum travel speed mm/min of the tool allowed by the machine.

Check your maximum speed with the following formulas:

metric formula: maximum cutting speed (m/min) =
part diameter (mm) x 3.14 x (1/pitch) x $\frac{\text{max mm/min}}{\text{1000mm}}$

Flank clearance

γ = arctan (sin (β/2) * tan(α))
γ = side (flank) clearance
β = included angle of thread form
α = radial inclination angle

Thread	Angle	External	Internal
UN & ISO	60	5.3	8
BSW	55	4.8	7.3
TR	30	2.6	4
ACME	29	2.6	3.9
AMBUT	7	.6	.9
AMBUT	45	4	6

Recommendation for Threading Infeed Passes

TPI	48–32	28–24	20–16	14–12	11.5–9	8–6	5–4	3–2
metric pitch (mm)	0,50–0,75	0,80–1	1,25–1,5	1,75–2	2,5–3	3,5–4	4,5–6	8
Thread Type	**recommended number of passes**							
Common V-thread forms ISO, UN, UNJ, NPT, Whitworth, BSPT, API Rotary Shoulder	4–5	5–6	6–8	8–10	9–12	12–15	14–16	15–25
Acme, Trapez, Round, API Round	–	–	5–6	7–8	10–11	12–13	13–15	18–20
Stub Acme, API Buttress	–	–	5	5–6	7–8	8–10	10–12	14–16
American Buttress	–	–	7–8	9–10	11–12	13–15	17–19	22–24

Maintain minimum 0,05mm infeed on last passes to avoid work hardening and excessive abrasion of the threading tool.

Constant Volume Infeed Values for Threading Operations

In most applications, use of CNC canned cycles produces only marginally successful results. For example, an 8-pitch external thread has a depth of 2mm (.0789").

$$\Delta ap_X = \frac{ap}{\sqrt{nap-1}} * \sqrt{\phi}$$

Formula for constant chip load infeed

Δap	=	radial infeed
x	=	actual pass (from 1 to the nap)
nap	=	number of passes
ϕ	=	1st pass, 0.3
		2nd pass, 1
		3rd pass and up, x-1

Using Radial Infeed

Bending stress on the cutting edge caused by V-shaped chips from long-chipping steel workpiece materials.

High cutting forces with small cutting thicknesses require sharp edges with high strength.

Using Flank Infeed

Lower bending stress and stabilised cutting edges produce more favourable chip shapes and larger cutting thicknesses.

Carbides with high hardness, good wear resistance, and temperature stability are advantageous.

Guidelines for Infeeds –
How to Determine the Number and the Size of Passes

The number of passes “s” per thread is decisive for successful threading and crest turning. The following tables give standard values for the application condition when machining steel. The proper number of passes must be determined empirically.

If insert breakage occurs, the number of passes must be increased. With increased wear, we recommend decreasing the number of passes. The chip thickness should not be less than 0,05mm. The allowance at the diameter should not exceed 0,2mm.

Metric ISO, External Thread Cutting

pitch (mm)	0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,50	3,00	3,50	4,00	4,50	5,00
T Ap (mm)	0,305	0,457	0,610	0,762	0,914	1,067	1,219	1,524	1,829	2,159	2,464	2,769	3,073
N Ap	4	4	5	6	6	8	8	10	12	14	15	15	16
	values for flank infeed (X/Z)												
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,096	0,145	0,167	0,187	0,224	0,221	0,252	0,278	0,302	0,328	0,361	0,405	0,435
2	0,080	0,119	0,138	0,154	0,185	0,182	0,208	0,230	0,249	0,271	0,298	0,335	0,359
3	0,073	0,109	0,126	0,141	0,169	0,167	0,191	0,210	0,228	0,248	0,273	0,306	0,329
4	0,056	0,084	0,097	0,108	0,130	0,128	0,146	0,161	0,175	0,190	0,209	0,235	0,252
5			0,082	0,091	0,110	0,108	0,123	0,136	0,148	0,160	0,176	0,198	0,213
6				0,080	0,097	0,095	0,109	0,120	0,130	0,141	0,155	0,175	0,187
7						0,086	0,098	0,108	0,118	0,128	0,141	0,158	0,169
8						0,079	0,090	0,100	0,108	0,118	0,129	0,145	0,156
9								0,093	0,101	0,109	0,120	0,135	0,145
10								0,087	0,095	0,103	0,113	0,127	0,136
11									0,089	0,097	0,107	0,120	0,129
12									0,085	0,092	0,102	0,114	0,122
13										0,088	0,097	0,109	0,117
14										0,085	0,093	0,105	0,112
15											0,090	0,101	0,108
16													0,104
T Ap (mm)	0,305	0,457	0,610	0,762	0,914	1,067	1,219	1,524	1,829	2,159	2,464	2,769	3,073

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

Metric ISO, Internal Thread Cutting

thread pitch P (mm)	0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,50	3,00	3,50	4,00	4,50	5,00
T Ap (mm)	0,279	0,406	0,533	0,686	0,813	0,940	1,092	1,346	1,626	1,905	2,159	2,438	2,718
N Ap	4	4	5	6	6	8	8	10	11	12	14	15	16
	values for flank infeed (X/Z)												
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,088	0,129	0,146	0,168	0,199	0,195	0,226	0,246	0,282	0,315	0,328	0,357	0,384
2	0,073	0,106	0,121	0,139	0,164	0,161	0,187	0,203	0,232	0,260	0,271	0,295	0,317
3	0,067	0,097	0,110	0,127	0,151	0,147	0,171	0,186	0,213	0,238	0,248	0,270	0,291
4	0,051	0,075	0,085	0,097	0,116	0,113	0,131	0,143	0,163	0,183	0,190	0,207	0,223
5			0,071	0,082	0,097	0,095	0,111	0,120	0,138	0,154	0,160	0,175	0,188
6				0,072	0,086	0,084	0,097	0,106	0,121	0,136	0,141	0,154	0,166
7						0,076	0,088	0,096	0,110	0,123	0,128	0,139	0,150
8						0,070	0,081	0,088	0,101	0,113	0,118	0,128	0,138
9								0,082	0,094	0,105	0,109	0,119	0,128
10								0,077	0,088	0,099	0,103	0,112	0,120
11									0,083	0,093	0,097	0,106	0,114
12									0,000	0,089	0,092	0,101	0,108
13										0,000	0,088	0,096	0,103
14										0,000	0,085	0,092	0,099
15											0,000	0,089	0,096
16													0,092
T Ap (mm)	0,279	0,406	0,533	0,686	0,813	0,940	1,092	1,346	1,626	1,905	2,159	2,438	2,718

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

UN Thread, External Thread Cutting

TPI	24	20	18	16	14	12	11	10	9	8	7	6	5
T Ap (mm)	0,660	0,787	0,864	0,965	0,914	1,067	1,219	1,524	1,829	2,159	2,464	2,769	3,073
N Ap	5	6	6	7	9	9	10	11	12	13	14	15	16
	values for flank infeed (X/Z)												
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,181	0,193	0,212	0,216	0,177	0,207	0,223	0,264	0,302	0,341	0,374	0,405	0,435
2	0,149	0,159	0,175	0,178	0,146	0,171	0,184	0,218	0,249	0,282	0,309	0,335	0,359
3	0,137	0,146	0,160	0,163	0,134	0,156	0,168	0,200	0,228	0,258	0,283	0,306	0,329
4	0,105	0,112	0,123	0,125	0,103	0,120	0,129	0,153	0,175	0,198	0,217	0,235	0,252
5	0,088	0,094	0,103	0,106	0,087	0,101	0,109	0,129	0,148	0,167	0,183	0,198	0,213
6		0,083	0,091	0,093	0,076	0,089	0,096	0,114	0,130	0,147	0,161	0,175	0,187
7				0,084	0,069	0,080	0,087	0,103	0,118	0,133	0,146	0,158	0,169
8					0,063	0,074	0,080	0,095	0,108	0,122	0,134	0,145	0,156
9					0,059	0,069	0,074	0,088	0,101	0,114	0,125	0,135	0,145
10							0,070	0,083	0,095	0,107	0,117	0,127	0,136
11								0,078	0,089	0,101	0,111	0,120	0,129
12									0,085	0,096	0,105	0,114	0,122
13										0,092	0,101	0,109	0,117
14											0,097	0,105	0,112
15												0,101	0,108
16													0,104
T Ap (mm)	0,660	0,787	0,864	0,965	0,914	1,067	1,219	1,524	1,829	2,159	2,464	2,769	3,073

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

UN Thread, Internal Thread Cutting

TPI	24	20	18	16	14	12	11	10	9	8	7	6	5
T Ap (mm)	0,584	0,686	0,762	0,864	0,991	1,143	1,245	1,372	1,524	1,727	1,956	2,286	2,743
N Ap	5	6	6	7	8	9	9	10	11	12	13	14	15
	values for flank infeed (X/Z)												
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,160	0,168	0,187	0,193	0,205	0,221	0,241	0,250	0,264	0,285	0,309	0,347	0,402
2	0,132	0,139	0,154	0,159	0,169	0,183	0,199	0,207	0,218	0,236	0,255	0,287	0,332
3	0,121	0,127	0,141	0,146	0,155	0,167	0,182	0,189	0,200	0,216	0,234	0,263	0,304
4	0,093	0,097	0,108	0,112	0,119	0,128	0,140	0,145	0,153	0,166	0,179	0,202	0,233
5	0,078	0,082	0,091	0,094	0,100	0,108	0,118	0,123	0,129	0,140	0,151	0,170	0,196
6		0,072	0,080	0,083	0,088	0,095	0,104	0,108	0,114	0,123	0,133	0,150	0,173
7				0,075	0,080	0,086	0,094	0,098	0,103	0,111	0,120	0,135	0,156
8					0,073	0,079	0,086	0,090	0,095	0,102	0,111	0,124	0,144
9						0,074	0,080	0,084	0,088	0,095	0,103	0,116	0,134
10								0,078	0,083	0,089	0,097	0,109	0,126
11									0,078	0,085	0,092	0,103	0,119
12										0,080	0,087	0,098	0,113
13											0,083	0,094	0,108
14											0,080	0,090	0,104
15													0,100
16													
T Ap (mm)	0,584	0,686	0,762	0,864	0,991	1,143	1,245	1,372	1,524	1,727	2,036	2,286	2,743

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

NPT Thread, External, and Internal Machining

TPI	27	18	14	11,5	8
T Ap (mm)	0,762	1,118	1,422	1,727	2,489
N Ap	6	8	10	12	14
	values for flank infeed (X/Z)				
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,187	0,231	0,260	0,285	0,378
2	0,154	0,191	0,214	0,236	0,312
3	0,141	0,175	0,196	0,216	0,286
4	0,108	0,134	0,151	0,166	0,219
5	0,091	0,113	0,127	0,140	0,185
6	0,080	0,100	0,112	0,123	0,163
7		0,090	0,101	0,111	0,147
8		0,083	0,093	0,102	0,135
9			0,087	0,095	0,126
10			0,081	0,089	0,118
11				0,085	0,112
12				0,080	0,107
13					0,102
14					0,098
15					
16					
T Ap (mm)	0,762	1,118	1,422	1,727	2,489

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

BSPT Thread, External, and Internal Machining

TPI	28	19	14	11
T Ap (mm)	0,584	0,864	1,168	1,448
N Ap	5	8	10	12
	values for flank infeed (X/Z)			
order of passes	X/Z	X/Z	X/Z	X/Z
1	0,160	0,179	0,213	0,239
2	0,132	0,148	0,176	0,197
3	0,121	0,135	0,161	0,181
4	0,093	0,104	0,124	0,139
5	0,078	0,087	0,104	0,117
6		0,077	0,092	0,103
7		0,070	0,083	0,093
8		0,064	0,076	0,086
9			0,071	0,080
10			0,067	0,075
11				0,071
12				0,067
13				
14				
15				
16				
T Ap (mm)	0,584	0,864	1,168	1,448

Trapezoid Thread to DIN 103, External, and Internal Machining

pitch	1,5	2	3	4	5
T Ap (mm)	1,016	1,245	1,753	2,261	2,743
N Ap	6	8	10	12	14
	values for flank infeed (X/Z)				
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,249	0,258	0,320	0,373	0,417
2	0,206	0,213	0,264	0,308	0,344
3	0,188	0,195	0,242	0,282	0,315
4	0,144	0,150	0,186	0,217	0,242
5	0,122	0,126	0,157	0,183	0,204
6	0,107	0,111	0,138	0,161	0,180
7		0,100	0,125	0,145	0,162
8		0,092	0,115	0,134	0,149
9			0,107	0,125	0,139
10			0,100	0,117	0,131
11				0,111	0,123
12				0,105	0,117
13					0,112
14					0,108
15					
16					
T Ap (mm)	1,016	1,245	1,753	2,261	2,743

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

Round Thread to DIN 405, External, and Internal Machining

pitch	10	8	6
T Ap (mm)	1,321	1,626	2,159
N Ap	8	10	12
	values for flank infeed (X/Z)		
order of passes	X/Z	X/Z	X/Z
1	0,273	0,297	0,357
2	0,226	0,245	0,294
3	0,207	0,224	0,270
4	0,159	0,172	0,207
5	0,134	0,145	0,174
6	0,118	0,128	0,154
7	0,107	0,116	0,139
8	0,098	0,106	0,128
9		0,099	0,119
10		0,093	0,112
11			0,106
12			0,100
13			
14			
15			
16			
T Ap (mm)	1,321	1,626	2,159

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

Whitworth, External, and Internal Thread Cutting

TPI	28	20	19	16	14	12	11	10	9	8	7	6	5
T Ap (mm)	0,584	0,813	0,813	0,864	1,016	1,346	1,473	1,626	1,803	2,032	2,311	2,718	3,251
N Ap	5	6	6	8	8	9	9	10	11	12	14	15	16
	values for flank infeed (X/Z)												
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,160	0,199	0,199	0,179	0,210	0,261	0,285	0,297	0,312	0,336	0,351	0,398	0,460
2	0,132	0,164	0,164	0,148	0,174	0,215	0,236	0,245	0,258	0,277	0,290	0,329	0,380
3	0,121	0,151	0,151	0,135	0,159	0,197	0,216	0,224	0,236	0,254	0,266	0,301	0,348
4	0,093	0,116	0,116	0,104	0,122	0,151	0,166	0,172	0,181	0,195	0,204	0,231	0,267
5	0,078	0,097	0,097	0,087	0,103	0,128	0,140	0,145	0,153	0,164	0,172	0,195	0,225
6		0,086	0,086	0,077	0,091	0,112	0,123	0,128	0,135	0,145	0,151	0,171	0,198
7				0,070	0,082	0,102	0,111	0,116	0,122	0,131	0,137	0,155	0,179
8				0,064	0,075	0,093	0,102	0,106	0,112	0,120	0,126	0,143	0,165
9						0,087	0,095	0,099	0,104	0,112	0,117	0,133	0,153
10								0,093	0,098	0,105	0,110	0,125	0,144
11									0,093	0,099	0,104	0,118	0,136
12										0,095	0,099	0,112	0,130
13											0,095	0,107	0,124
14											0,091	0,103	0,119
15												0,099	0,114
16													0,110
T Ap (mm)	0,584	0,813	0,813	0,864	1,016	1,346	1,473	1,626	1,803	2,032	2,311	2,718	3,251

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

Multi-Tooth Threads, Internal

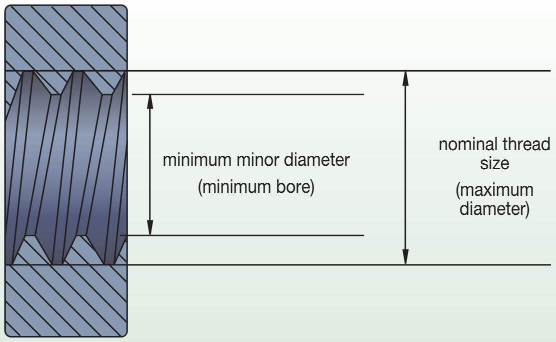
	ISO metric						ISO UN					Whitworth	NPT		
type	3M	2M	3M	2M	3M	2M	2M	3M	2M	3M	2M	2M	2M	3M	2M
pitch (mm)	1,0	1,5	1,5	2,0	2,0	3,0	–	–	–	–	–	–	–	–	–
TPI	–	–	–	–	–	–	16	16	12	12	8	11	11.5	11.5	8
total depth (mm)	0,609	0,838	0,838	1,168	1,168	1,778	0,939	0,939	1,245	1,245	1,880	1,575	1,753	1,753	2,540
pass 10mm	0,330	0,381	0,508	0,508	0,711	0,558	0,431	0,558	0,558	0,762	0,584	0,736	0,584	0,812	0,889
2	0,279	0,254	0,330	0,381	0,457	0,482	0,304	0,381	0,406	0,482	0,508	0,482	0,508	0,558	0,635
3	–	0,203	–	0,279	–	0,431	0,203	–	0,279	–	0,431	0,355	0,355	0,381	0,558
4	–	–	–	–	–	0,304	–	–	–	–	0,355	–	0,304	–	0,457

Recommendations for Steel Workpieces (<300 BHN)

			total depth – on radius		
catalogue number	insert size	TPI profile	1st pass	2nd pass	3rd pass
NTC-8R/L8EM	8	8 UN	1,21	1,63	2,00
NTC-8R/L8IM	8	8 UN	1,19	1,55	1,88
NTC-8R/L10EM	8	10 UN	0,92	1,27	1,60
NTC-8R/L10IM	8	10 UN	0,90	1,22	1,52
NTC-8R/L12EM	8	12 UN	0,76	1,04	1,32
NTC-8R/L12IM	8	12 UN	0,76	0,93	1,20
NTC-8R/L14EM	8	14 UN	0,68	0,95	1,12
NTC-8R/L14IM	8	14 UN	0,60	0,78	1,04
NTC-8R/L16EM 8	8	16 UN	0,58	0,81	0,96
NTC-8R/L16IM	8	16 UN	0,50	0,68	0,93
NTC-8R/L18EM	8	18 UN	0,48	0,66	0,86
NTC-8R/L18IM	8	18 UN	0,48	0,60	0,83
NDC-68RDR/L-75M	8	8 round	1,47	1,65	1,85
NDC-61RDR/L-75M	8	10 round	1,11	1,29	1,45
NDC-88RDRD/L-75M	8	8 round	1,29	1,75	1,85
NDC-88VR/L-75M	8	8 NPT	1,01	1,72	2,45
NDC-8115VR/L-75M	8	11.5 NPT	0,96	1,37	1,70
NDN-814VR/L-75M	8	14 NPT	0,96	1,22	1,36

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

The following charts list the largest thread pitch that can be applied on internal applications using TopThread threading inserts for 60° V-threading and Acme threading.



Metric-sized 60° V-Threading Limits

internal threading limitations
NT-1, NT-2 60° V-threading inserts

TPI	nominal thread size		minimum thread diameter (mm)	
	NT-1	NT-2	NT-1	NT-2
4,00	M48 x 4.00	–	43,67	–
3,00	M42 x 3.00	–	38,75	–
2,50	M39 x 2.50	M24 x 2,50	36,29	21,29
2,00	M33 x 2.00	M15 x 2,00	30,84	12,84
1,75	M32 x 1.75	M15 x 1,75	30,11	13,11
1,50	M32 x 1.50	M15 x 1,50	30,38	13,38
1,25	M29 x 1.29	M14 x 1,25	27,65	12,65
1,00*	M27 x 1.00	M14 x 1,00	25,92	12,92
0,75	M22 x 0.75	M12 x 0,75	21,19	11,19

**Thread pitch of 1mm and less can be cut with an NT-2 insert provided the core thread diameter is 25mm or larger (11mm or larger with NT-1).*

internal threading limitations
NT-3 and NT-4 60° V-threading inserts

TPI	nominal thread size	minimum thread diameter (mm)
6,00**	M76 x 6.00	69,50
5,50**	M73 x 5.50	67,05
5,00	M70 x 5.00	64,59
4,00	M64 x 4.00	59,67
3,00	M52 x 3.00	48,75
2,50	M48 x 2.50	45,29
2,00	M42 x 2.00	39,84
1,75	M40 x 1.75	38,11
1,50*	M38 x 1.50	36,38

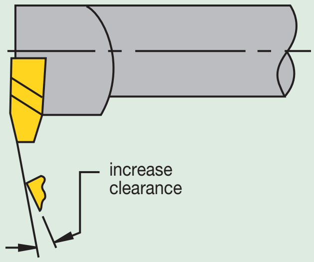
**Thread pitch of 1,5mm and less can be cut provided core thread diameter is 35mm or larger.*
***NT-4-insert only.*

Acme Threading Limits

internal threading limitations
NA and NAS-2, -3, -4, and -6 Acme threading inserts

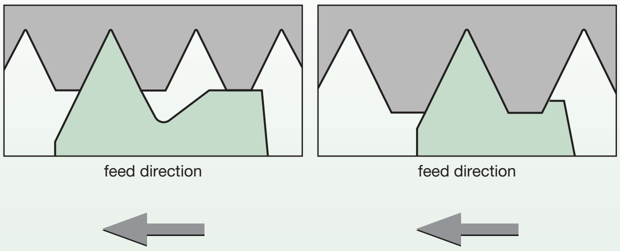
TPI	nominal thread size	minimum thread diameter (mm)	
	NT-1	NT-1	NT-2
2**	5	4.500	114.3
2-1/2**	4-1/2	4.100	104.1
3**	4	3.665	93.1
4	3-1/2	3.250	82.6
5	3	2.800	71.1
6	2-1/2	2.333	59.3
8	2-1/4	2.125	54.0
10	2	1.900	48.3
12	1-3/4	1.667	42.4
14	1-5/8	1.554	39.5
16*	1-1/2	1.438	36.5

**Sixteen threads per inch and finer can be cut provided minor diameter is 36,5mm or larger.*
***NA-6 insert only.*



Additional secondary clearance can be ground on leading edge of insert to provide sufficient helical clearance for machining coarser threads and multiple start threads. Modified standard inserts may be furnished for machining threads outside of the limits shown.

60° V-Thread Crest Turning Application Data



NTC crest turning insert
for (P ≤ 2mm) and finer.

NTC crest turning insert
for (P ≥ 3mm) and coarser.

NOTE: NTC inserts automatically control root to crest dimensions. Therefore, in setting up threading operations with NTC inserts, check the O.D. or I.D. at the thread crest for correct dimensions.

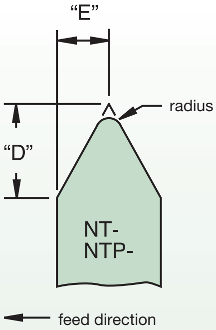
60° V-Thread Crest Turning Application Data

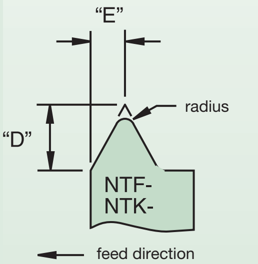
insert catalogue number	nose radius on insert (mm)	thread radius per MIL-S-8879A (mm)
NJ-3014R/L12	0,317/0,342	0,317/0,381
NJK-3008R/L20	0,190/0,215	0,190/0,0228

"J" thread note for catalogue

The controlled root radius thread form (SAE8879C) is defined for the external thread only. To machine the corresponding internal thread, choose any insert that will cut a unified class 2B thread, then bore the minor diameter to size. Refer to SAE8879C and MIL-S-8879C and SAEAS8879D for the correct "J" thread minor diameter values.

60° V-Thread Application Data





insert	D (mm)	E (mm)	recommended TPI* external	recommended TPI* internal	recommended TP* external	recommended TP* internal
NT-1	1,90	1,11	–	24–12	–	1,00–2,00
NT-2	28,70	1,90	36–8	20–7	0,70–3,00	1,25–3,50
NT-2-K	28,70	1,90	36–8	20–7	0,70–3,00	1,25–3,50
NTF-2	15,75	1,01	44–14	24–12	0,60–1,75	1,00–2,00
NTK-2	15,75	1,01	44–14	24–12	0,60–1,75	1,00–2,00
NTP-2	28,70	1,90	36–8	20–7	0,70–3,0	1,25–3,50
NT-3	37,59	2,46	20–6	12–5	1,25–4,00	2,00–5,00
NT-3-K	37,59	2,46	20–6	12–5	1,25–4,00	2,00–5,00
NT-3-C	37,59	2,46	11–6	6 (only)	2,50–4,00	4,00 (only)
NT-3-CK	37,59	2,46	11–6	6 (only)	2,50–4,00	4,00 (only)
NTF-3	21,08	1,37	44–10	24–9	0,60–2,50	1,00–2,50
NTK-3	21,08	1,37	44–10	24–9	0,60–2,50	1,00–2,50
NTP-3	37,59	2,46	20–6	12–5	1,25–4,00	2,00–5,00
NT-4	49,78	3,22	20–4	12–4	1,25–6,25	2,00–6,25
NT-4-K	49,78	3,22	20–4	12–4	1,25–6,25	2,00–6,25
NT-4-C	49,78	3,22	11–4 1/2	6–4 1/2	2,50–5,50	4,00–5,50
NT-4-CK	49,78	3,22	11–4 1/2	6–4 1/2	2,50–5,50	4,00–5,50
NTF-4	21,08	1,37	44–10	24–9	0,60–2,50	1,00–2,50
NTK-4	21,08	1,37	44–10	24–9	0,60–2,50	1,00–2,50
NTP-4	49,78	3,22	20–4	12–4	1,25–6,25	2,00–6,25

**Based on maximum insert radius size and class 2A and 2B thread specifications.*

WIDIA

API Thread Forms • Insert Applications Chart for API Rotary Shouldered Connections

thread form	WIDIA™ insert cresting	WIDIA™ insert non-cresting	tool joint application	minimum box size*
V-.038R 2" TPF 4 TPI	NDC-4038R/L2 4-E/IR4API382	ND-3038R/L	2-3/8 API internal flush 2-7/8 API internal flush 3-1/2 API internal flush 4 API internal flush 4-1/2 API internal flush 5-1/2 API internal flush 6-5/8 API internal flush 4 API full hole API #23, API #26, API #31, API #35, API #38, API #40, API #44, API #46, API #50	API #31 2-7/8 IF
V-.038R 3" TPF 4 TPI	NDC-4038R/L3 4-E/IR4API383	ND-3038R/L	API #56 API #61 API #70 API #77	API #56
V-.050 2" TPF 4 TPI	NDC-4050R/L2 4-E/IRAPI502	ND-4050R/L	5-1/2 API full hole 6-5/8 API regular 6-5/8 API full hole	5-1/2 API full hole
V-.050 3" TPF 4 TPI	NDC-4050R/L3 4-E/IR4API503	ND-4050R/L	5-1/2 API regular 7-5/8 API regular 8-5/8 API regular	5-1/2 API regular
V-.040 3" TPF 5 TPI	NDC-3040R/L3 NDC-4040R/L3 4-E/IR5API403	ND-3040R/L ND-4040R/L	2-3/8 API regular 2-7/8 API regular 3-1/2 API regular 4-1/2 API regular	3-1/2 API regular

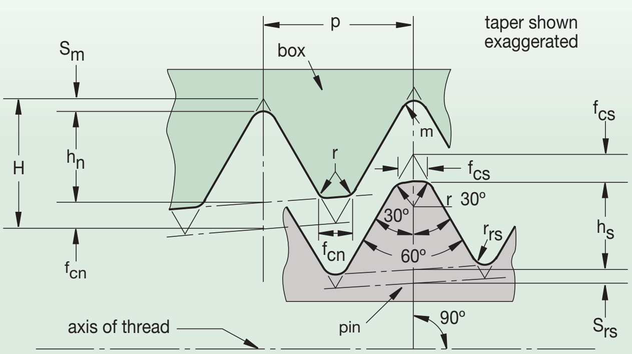
Minimum box size that can be threaded with a standard TopThread insert due to minimum bore equipment.

API Thread Forms
Product Thread Dimensions • Rotary Shouldered Connections (Inch)

threadform	taper inch per ft.	thread height, not truncated H	thread height, truncated $h_n=h_s$	root truncation $S_m=S_{rs}$ $f_m=f_{rs}$	crest truncation $f_{cn}=f_{cs}$	width of flat: crest $f_{cn}=f_{cs}$	width of flat: crest $f_m=f_{rs}$	root radius $r_m=r_{rs}$	radius at thread corners r	pitch p
V-.038R V-.038R V-.040 V-.050 V-.050	2 3 3 3 2	.216005 .215379 .172303 .215379 .216005	.121844 .121381 .117842 .147303 .147804	.038000 .038000 .020000 .025000 .025000	.056161 .055998 .034461 .043076 .043201	.065 .065 .040 .050 .050	– – – – –	.038 .038 .020 .025 .025	.015 .015 .015 .015 .015	.250 .250 .250

NOTE: All dimensions in inches.

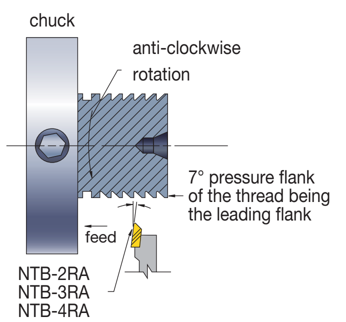
V-.040 and V-.050 Product Thread Form



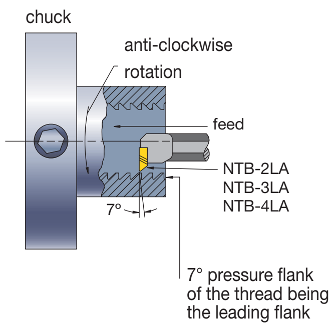
Casing and Tubing Round Thread (Height Dimensions)

thread element		10 TPI p= .1000	8 TPI p= .1250
H	= .866p	.08660	.10825
$H_s = h_n$	= .626p - .007	.05560	.07125
$S_{rs} = S_m$	= .120p + .002	.01400	.01700
$S_{cs} = S_{cn}$	= .120p + .005	.01700	.02000

American Buttress (7° Pressure Flank Leading) NTB-A Inserts • Push Type

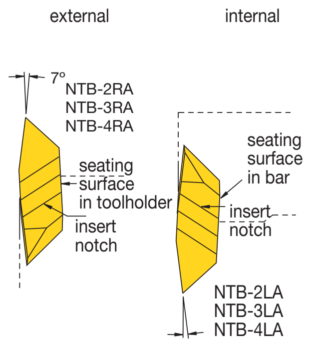


external buttress
7° pressure flank leading

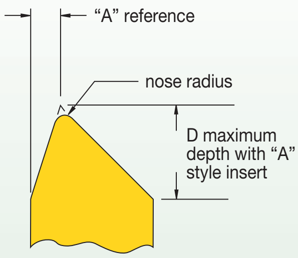


internal buttress
7° pressure flank leading

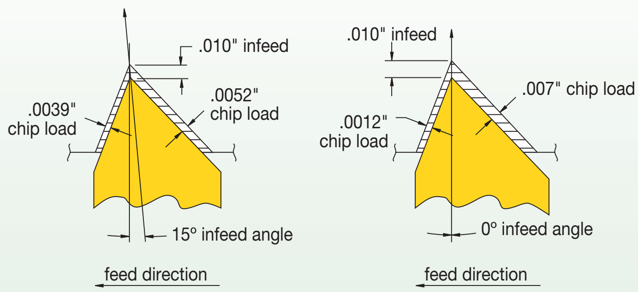
Insert vs. Toolholder Orientation



Reference Dimensions



Infeed Angle vs. Chip Load: 7° Pressure Flank Leading



NTB-A insert

insert	D (inch)	"A" ref. (inch)	nose radius (inch)	pitch based on maximum radius
NTB-2A	.133	.024	.002–.004	16–20 TPI
NTB-3A	.171	.031	.005–.008	8–16 TPI
NTB-4A	.218	.049	.008–.012	4–6 TPI

NOTE: For balanced chip load, 15° infeed angle is suggested.

Internal Threading Limitations

internal threading limitations
NTB-2A Buttress threading inserts

TPI	nominal thread size	minimum minor diameter (inch)
8	1-3/4	1.600
10	1-5/8	1.505
12	1-1/2	1.400
16	1-1/4	1.175
20	1-1/16	1.002

internal threading limitations
NTB-3 and NTB-4A Buttress threading inserts

TPI	nominal thread size	minimum minor diameter (inch)
4*	2-1/2	2.200
5	2-1/4	2.010
6	2	1.800
8	1-3/4	1.600
10	1-5/8	1.505
12**	1-1/2	1.400

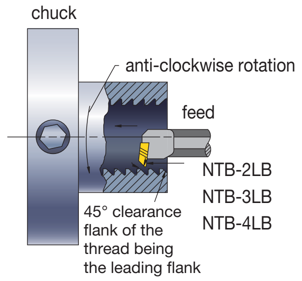
**NTB-4A insert only.*
***Can cut 16 or 20 threads per inch provided minor diameter is 1.375" or larger.*

Threads per Inch vs. Maximum Root Radius Chart (Inch)

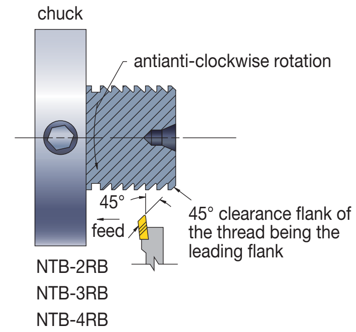
TPI	20	16	12	10	8	6	5	4	3	2-1/2	2	1-1/2	1-1/4	1
maximum root radius	.0036	.0045	.0059	.0071	.0089	.0119	.0143	.0179	.0238	.0268	.0375	.0476	.0572	.0714

NOTE: Special Buttress forms are available upon request.

American Buttress (45° Clearance Flank Leading): NTB-B Inserts • PULL-type

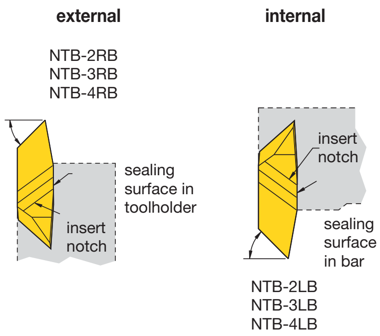


Internal Buttress
45° clearance flank leading



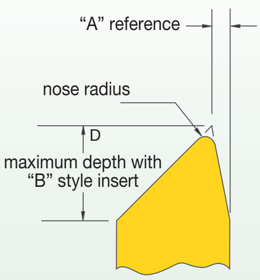
External Buttress
45° clearance flank leading

Insert vs. Toolholder Orientation

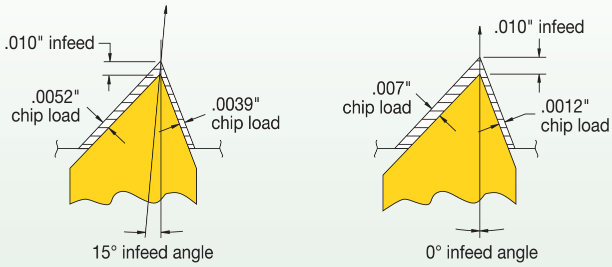


45° clearance flank leading

Reference Dimensions



Infeed Angle vs. Chip Load: 45° Clearance Flank Leading



NTB-B insert

insert	D (inch)	"A" reference (inch)	nose radius (inch)	pitch based on maximum radius
NTB-3B	.171	.031	.005–.004	8–16 TPI

NOTE: For balanced chip load, a reverse 15° infeed angle is suggested.

Internal Threading Limitations

internal threading limitations NTB-2B Buttress threading inserts		
TPI	**nominal thread size**	**minimum minor diameter (inch)**
8	1-3/4	1.600
10	1-5/8	1.505
12	1-1/2	1.400
16	1-1/4	1.175
20	1-1/16	1.002

internal threading limitations NTB-3 and NTB-4B Buttress threading inserts		
TPI	**nominal thread size**	**minimum minor diameter (inch)**
4*	2-7/8	2.575
5	2-3/4	2.510
6	2-3/8	2.175
8	2-1/8	1.975
10	1-7/8	1.755
12	1-5/8	1.525
16	1-1/2	1.407
20	1-7/16	1.378

**NTB-4B insert only.*

Laydown Threading System

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

The specially engineered WIDIA™ Laydown Threading System ensures the highest accuracy and quality available to meet all modern production standards. With an extensive range of inserts and toolholders available, the Laydown Threading platform is ideal for all of your internal and external threading applications.

- Low-profile design enables unrestricted chip flow.
- Precision-ground thread forms for industry-leading thread quality.
- Ideal choice for high-helix/multi-start threads and single-point threading in small-diameter bores.

To learn more, contact your local Authorised Distributor or visit **widia.com.**

WIDIA™

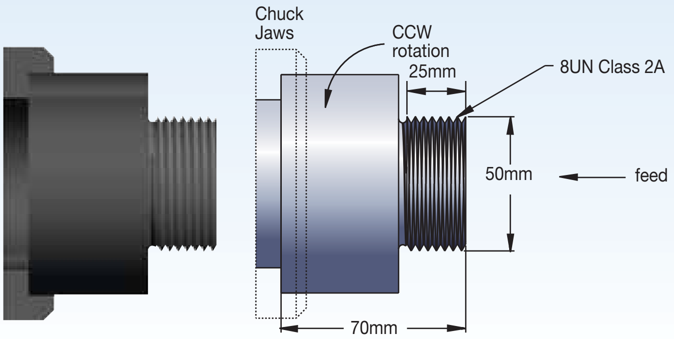
Required Information

From Part Drawing:

material: 316SS, 200 HB
thread form: 8UN
tolerance: class 2A
operation: external threading
pitch diameter: 50mm x 25mm deep

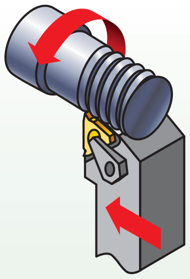
From Machine Setup Data:

tooling: 20mm x 20mm
spindle rotation: anti-clockwise
feed: toward chuck



Steps for a Successful Threading Operation

Step 1 •
Determine Threading Method



Need to Know:

- Operation (external).
- Spindle rotation (CCW).
  Anti-clockwise rotation.
- Feed direction (toward chuck).
- Right-hand toolholder.
- Right-hand insert (ER).
- Standard helix method.

Step 2 •
Select Insert

Need to Know:

- Thread form (ISO R262 1mm pitch).
- Hand of insert (right hand — ER).

Choose the High-Performance Solution

catalogue number	insert size	TN6025
3ER10ISO	3	•

High-Performance Selection

NOTE: Use insert with largest insert size available.
insert: 3ER10ISO
grade: TN6025
speed: 150 m/min

Step 3 •
Select the Grade and Speed

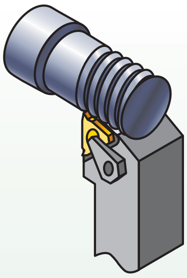
Need to Know:

- Workpiece material (316SS-200HB).
- Operation (external).

Options: Grade and Speed
Selection Guidelines

threading operation	stainless steel
external	general purpose and high performance
	TN6025
	50–360 m/min

Step 4 •
Select Toolholder



Need to Know:

- External or internal operation (external).
- Pitch diameter to determine minimum bore diameter (N/A).
- Type of tooling — toolholder, boring bar (toolholder).
- Hand of tool (right hand).
- Insert size (16).

Options:

catalogue number	insert size	shim
AL203R	3	SM-YE3

Step 5 •
Select Shim

Need to Know:

- Thread form — TPI or pitch (8 TPI).
- Pitch diameter (50mm).
- Helix method (standard).
  See Laydown Threading (LT) shim selection chart.

Select SM-YE3 shim

NOTE: For this application, the standard shim supplied should be replaced with the recommended shim, SM-YE3.

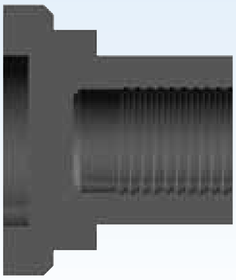
Required Information

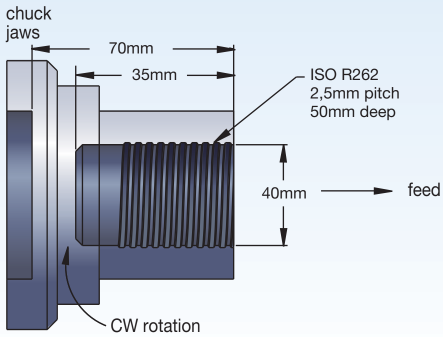
From Part Drawing:

material: 4140 steel
thread form: ISO R262 2,5mm pitch
tolerance: ISO Metric Class 6G/6H
operation: internal threading
pitch diameter: 40mm x 35mm deep

From Machine Setup Data:

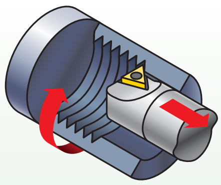
tooling: 20mm boring bar
spindle rotation: clockwise
feed: away from chuck





Steps for a Successful Threading Operation

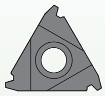
Step 1 •
Determine Threading Method



Need to Know:

- Operation (internal).
- Spindle rotation (CW).
  Clockwise rotation.
- Feed direction (away from chuck).
- Left-hand toolholder.
- Left-hand insert (NL).
- Reverse helix method.

Step 2 •
Select Insert



Need to Know:

- Thread form (ISO Metric Class 6G/6H).
- Hand of insert (left hand — NL).

Choose the High-Performance Solution

catalogue number	insert size	TN6025
3IL25ISO	3	•

High-Performance Selection

NOTE: Use insert with largest possible insert size to go into the bore.
insert: 3IL25ISO
grade: TN6025
speed: 130 m/min

Step 3 •
Select the Grade and Speed

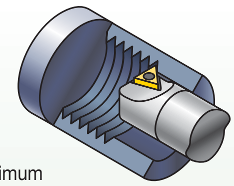
Need to Know:

- Workpiece material (4010 steel).
- Operation (internal).

Options: Grade and Speed
Selection Guidelines

threading operation	steel
internal	general purpose and high performance
	TN6025
	40–200 m/min

Step 4 •
Select Toolholder



Need to Know:

- External or internal operation (internal).
- Pitch diameter to determine minimum bore diameter for internal operations (40mm).
- Type of tooling — toolholder, boring bar (boring bar).
- Hand of tool (left hand).
- Insert size (16).

Options:

catalogue number	insert size	shim
AVR32D3R	3	SM-YE3

Step 5 •
Select Shim

Need to Know:

- Thread form — TPI or pitch (2,5mm pitch).
- Pitch diameter (40mm).
- Helix method (reverse).
  See Laydown Threading (LT) shim selection chart.

Select SM-YE3

NOTE: For this application, the standard shim supplied should be replaced with the recommended shim, SM-YE3.

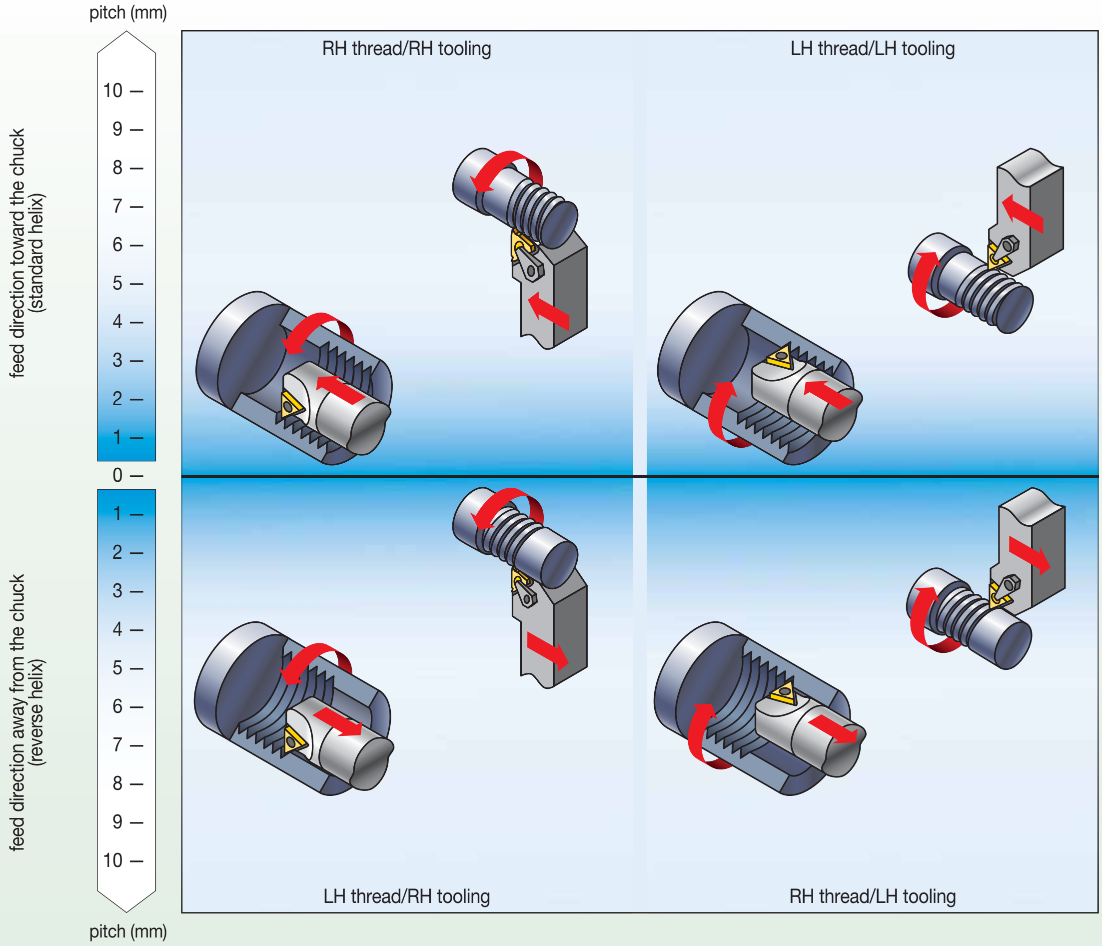
Laydown Threading Shim Selection Guidelines

It is essential to select the correct shim to ensure thread quality and maximum tool life. These parameters are needed:

- Pitch
- Pitch diameter
- Number of starts
- Feed direction

NOTE: When considering method of thread cutting, the part's shape and stability and the flow of chips are determining factors in your decision.

Laydown Selection Chart



NOTE: For multi-start threads, use the lead value instead of the pitch.

Diagram of Thread Lead Angles

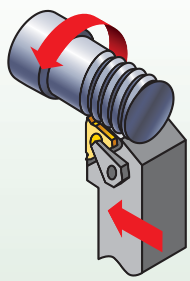
To calculate the lead angle of a given thread, use this formula:

$$\beta = \text{Arctan} \frac{P \bullet S}{\pi D_e}$$

ß = thread lead angle
De = effective pitch diameter of thread wear
P = 1/TPI
TPI = threads per inch
S = number of starts
single-start, lead = pitch
multiple-start, lead = pitch (x) number of starts

All toolholders are designed with an inclination angle = 1.5°. When turning standard threads with a lead angle of 1–2°, this guarantees adequate clearance at the flanks of the insert's thread tooth. The thread lead angle and the required inclination angle of the insert are given by ß.

Cutting edge height is constant at every shim and insert combination. All toolholders are supplied with 1-1/2° lead angle.



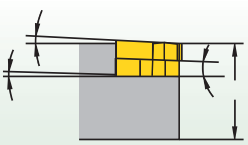
Laydown Threading Shim Selection Table • Metric

insert size	toolholder external	toolholder internal	shim ordering code (mm)			standard				
3 (9,52)	RH	LH	SM–YE3–3P	SM–YE3–2P	SM–YE3–1P	SM–YE3	SM–YE3–1N	SM–YE3–1.5N	SM–YE3–2N	SM–YE3–3N
3 (9,52)	LH	RH	SM–YI3–3P	SM–YI3–2P	SM–YI3–1P	SM–YI3	SM–YI3–1N	SM–YI3–1.5N	SM–YI3–2N	SM–YI3–3N
4 (12,7)	RH	LH	SM–YE4–3P	SM–YE4–2P	SM–YE4–1P	SM–YE4	SM–YE4–1N	SM–YE4–1.5N	SM–YE4–2N	SM–YE4–3N
4 (12,7)	LH	RH	SM–YI4–3P	SM–YI4–2P	SM–YI4–1P	SM–YI4	SM–YI4–1N	SM–YI4–1.5N	SM–YI4–2N	SM–YI4–3N

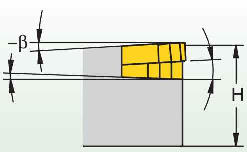
TPI	pitch (mm)	pitch diameter (mm)							
72	–	–	–	–	3,1–8	8–21,4	>21,4	21,4–8	8–3,1
–	0,35	–	–	–	3,0–8	8–21,3	>21,3	21,3–8	3–8
64	–	–	–	–	3,4–9	9–24,1	>24,1	24,1–9	9–3,4
–	0,40	–	–	–	3,5–9,1	9,1–24,3	>24,3	24,3–9,1	9,1–3,5
56	0,45	–	–	–	3,9–10,3	10,3–27,6	>27,6	27,6–10,3	10,3–3,9
–	0,50	–	–	2,8–4,3	4,3–11,4	11,4–30,4	>30,4	30,4–11,4	11,4–4,3
48	–	–	–	3–4,6	4,6–12,1	12,1–32,2	>32,2	32,2–12,1	12,1–4,6
44	–	–	–	3,3–5	5–13,2	13,2–35,1	>35,1	35,1–13,2	13,2–5
–	0,60	–	2,6–3,4	3,4–5,2	5,2–13,7	13,7–36,5	>36,5	36,5–13,7	13,7–5,2
40	–	–	2,8–3,6	3,6–5,5	5,5–14,5	14,5–38,6	>38,6	38,6–14,5	14,5–5,5
–	0,70	–	3,0–4	4–6,1	6,1–16	16–42,6	>42,6	42,6–16	16–6,1
36	–	–	3,1–4	4–6,1	6,1–16,1	16,1–42,9	>42,9	42,9–16,1	16,1–6,1
–	0,75	2,8–3,2	3,3–4,3	4,3–6,5	6,5–17,1	17,1–45,6	>45,6	45,6–17,1	17,1–6,5
32	–	3–3,4	3,4–4,5	4,5–6,9	6,9–18,1	18,1–48,3	>48,3	48,3–18,1	18,1–6,9
–	0,80	3–3,5	3,5–4,6	4,6–6,9	6,9–18,2	18,2–48,6	>48,6	48,6–18,2	18,2–6,9
28	–	3,4–3,9	3,9–5,2	5,2–7,9	7,9–20,7	20,7–55,1	>55,1	55,1–20,7	20,7–7,9
27	–	3,6–4,1	4,1–5,4	5,4–8,2	8,2–21,4	21,4–57,2	>57,2	57,2–21,4	21,4–8,2
–	1,00	3,8–4,3	4,3–5,7	5,7–8,7	8,7–22,8	22,8–60,8	>60,8	60,8–22,8	22,8–8,7
24	–	4–4,6	4,6–6	6–9,2	9,2–24,1	24,1–64,3	>64,3	64,3–24,1	24,1–9,2
–	1,25	4,7–5,4	5,4–7,1	7,1–10,8	10,9–28,5	28,5–76	>76,0	76–28,5	28,5–10,8
20	–	4,8–5,5	5,5–7,2	7,2–11	11–28,9	29–77,2	>77,2	77,2–28,9	29–11
18	–	5,3–6,1	6,1–8	8–12,2	12,2–32,2	32,2–85,8	>85,8	85,8–32,2	32,2–12,2
–	1,50	5,7–6,5	6,5–8,5	8,5–13	13–34,2	34,2–91,2	>91,2	91,2–34,2	34,2–13
16	–	6–6,9	6,9–9	9–13,8	13,8–36,2	36,2–96,5	>96,5	96,5–36,2	36,2–13,8
–	1,75	6,6–7,96	7,6–10	10–15,2	15,2–39,9	39,9–106,4	>106,4	106,4–39,9	39,9–15,2
14	–	6,9–7,9	7,9–10,3	10,3–15,7	15,7–41,4	41,4–110,3	>110,3	110,3–41,4	41,4–15,7
13	–	7,4–8,5	8,5–11,1	11,1–17	17–44,5	44,5–118,8	>118,8	118,8–44,5	44,5–17
–	2,00	7,6–8,7	8,7–11,4	11,4–17,4	17,4–45,6	45,6–121,6	>121,6	121,6–45,6	45,6–17,4
12	–	8–9,2	9,2–12	12,1–18,4	18,4–48,2	48,3–128,7	>128,7	128,7–48,2	48,2–18,4
11.5	–	8,4–9,6	9,6–12,6	12,6–19,2	19,2–50,3	50,3–134,3	>134,3	134,3–50,3	50,3–19,2
11	–	8,8–10	10–13,1	13,1–20	20–52,6	52,6–140,4	>140,4	140,4–52,6	52,6–20
–	2,50	9,5–10,8	10,8–14,2	14,2–21,7	21,7–57	57–152	>152,0	152–57	57–21,7
10	–	9,6–11	11–14,5	14,5–22	22–57,9	57,9–154,4	>154,4	154,4–57,9	57,9–22
9	–	10,7–12,2	12,2–16,1	16,1–24,5	24,5–64,3	64,3–171,6	>171,6	171,6–64,3	64,3–24,5
–	3,00	11,4–13	13–17,1	17,1–26	26–68,4	68,4–182,4	>182,4	182,4–68,4	68,4–26
8	–	12–13,8	13,8–18,1	18,1–27,6	27,6–72,4	72,4–193	>193,0	193–72,4	72,4–27,6
–	3,50	13,3–15,2	15,2–19,9	19,9–30,4	30,4–79,8	79,8–212,8	>212,8	212,8–79,8	79,8–30,4
7	–	13,8–15,7	15,7–20,7	20,7–31,5	31,5–82,7	82,7–220,6	>220,6	220,6–82,7	82,7–31,5
–	4,00	15,2–17,3	17,3–22,8	22,8–34,7	34,7–91,2	91,2–243,2	>243,2	243,2–91,2	91,2–34,7
6	–	16–18,3	18,3–24,1	24,1–36,7	36,7–96,5	96,5–257,4	>257,4	257,4–96,5	96,5–36,7
–	5,00	19–21,7	21,7–28,5	28,5–43,4	43,4–114	114–304	>304,0	304–114	114–43,4
5	–	19,3–22	22–28,9	28,9–44,1	44,1–115,8	115,8–308,8	>308,8	308,8–115,8	115,8–44,1
4,5	–	21,4–24,5	24,5–32,1	32,1–49	49–128,7	128,7–343,1	>343,1	343,1–128,7	128,7–49
–	6,00	22,7–26	26–34,2	34,2–52,1	52,1–136,8	136,8–364,8	>364,8	364,8–136,8	136,8–52,1
4	–	24,1–27,5	27,5–36,2	36,2–55,1	55,1–144,8	144,8–386	>386	386–144,8	144,8–55,1
inclination angle		4.5	3.5	2.5	1.5	0.5	0.0	-0.5	-1.5
		standard helix (feed toward the chuck)						reverse helix (feed away from the chuck)	

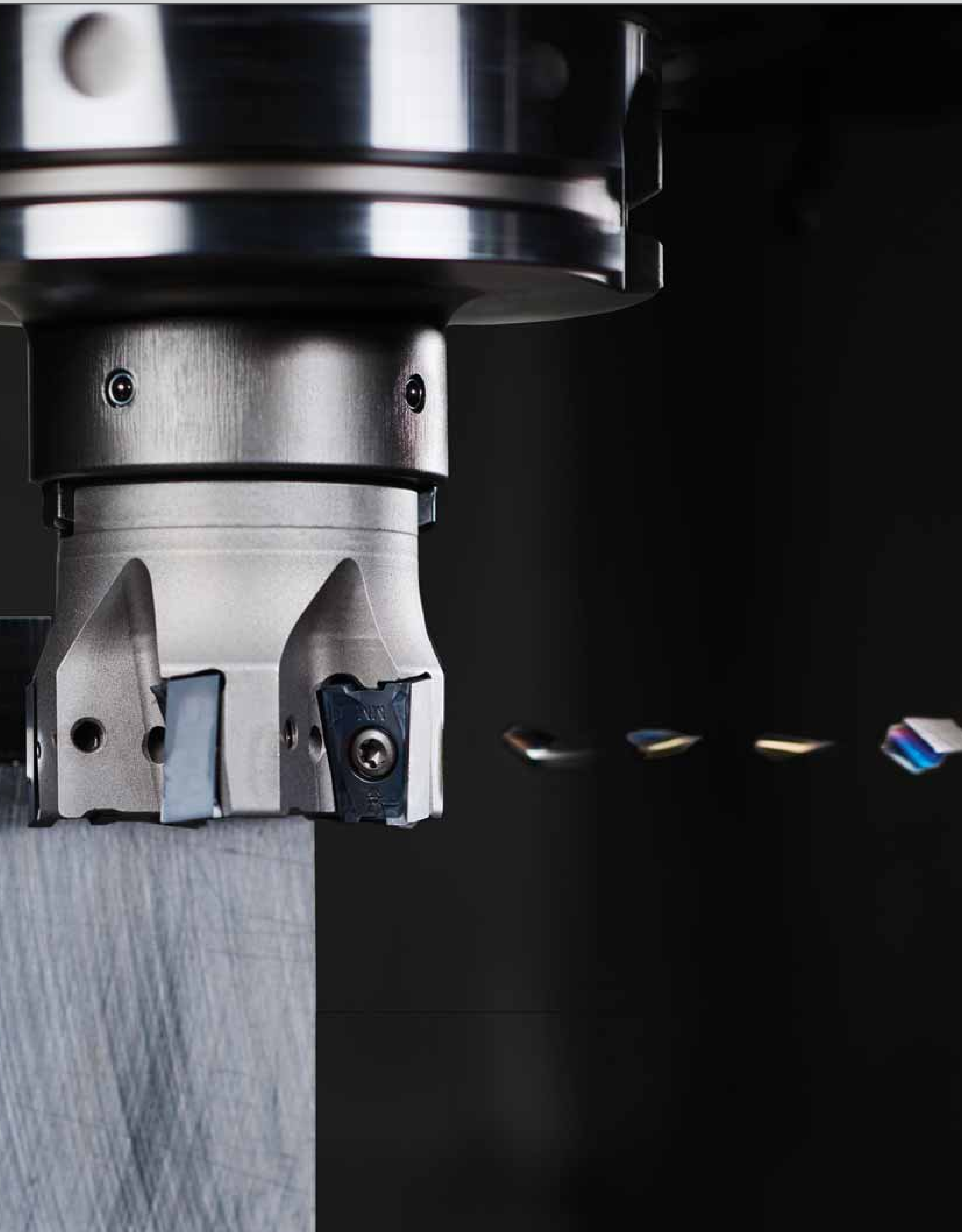
1. Select TPI or pitch from the left-hand columns.
2. Follow row to specified pitch diameter and the correct feed direction.
3. Follow the column to the top for the required shim based on the toolholder and insert size.

standard helix method:
Used when RH thread is cut with RH tool or LH thread with LH tool.



reverse helix method:
Used when RH thread is cut with LH tool or when LH thread is cut with RH tool.





Indexable Milling

NEW PRODUCTS

Our latest metalcutting innovations are designed to deliver higher productivity, longer tool life, and increased application versatility.

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Victory™ Milling Grades

- WP40PM™ — New best-in-class Victory milling grade for machining steel materials in ISO material group P40 in rough milling applications.
- WK15CM™ — New milling grade for cast irons for higher tool life and increased productivity.
- WS30PM™ — A new high-performance milling grade for machining titanium and stainless steels.

VSM11™

- Step down capabilities.
- Effective internal coolant supply for screw-on, end mill, and shell mill cutters.
- The max ramp angle for VSM11 is 10°.

VSM490™

- Four cutting edges on a double-sided strong insert.
- Lower cutting forces; high-positive geometry.
- Excellent wall and surface finish capabilities.
- When using multiple steps, this is a “stepless” solution.

VSM17™

- Depth-of-cut capabilities up to 16,3mm.
- Step down capabilities.
- Effective internal coolant supply for screw-on, end mill, and shell mill cutters.

SuperFeed™

- Protective cutter body.
- Increased flexibility with five PCD cartridge options.
- User-friendly axial adjustment.
- Reconditioning options reduce overall cost.

The Most Advanced Milling Solutions in the Industry

For unsurpassed quality, value, and performance, you can trust WIDIA™ to provide the most comprehensive line of reliable metalcutting tools. Whatever your indexable milling product requirements, be assured that you will find the appropriate solution in this all-inclusive, easy-to-use guide.

For every milling application, workpiece, or equipment need, we offer the best tools on the market, designed to reduce your machining time, provide superior surface finishes, and outperform the competition.

NOVO™

You can also use our NOVO app to guide you to the correct choice!

For more information, please visit **widia.com/novo**.

1. Choose your application:

- Face Mills
- Shoulder Mills
- Helical Mills
- Slotting Mills
- Copy Mills
- Chamfer Mills

2. Identify material to be machined:

Each tool has a material grid marked with a letter indicating the materials that can be machined.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

Tool name

Face Mills

Victory™ M1200 45°

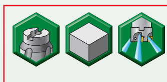
Max depth of cut: 4,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 40–315mm

Pages: H30–H37

P M K N S H

Product photo



Informational icons (Connection type and possible operations)

3. Select tool based on maximum depth of cut and diameter required:

Information is given in this area to provide specific detail as a quick reference.

Location of introduction detail, tool bodies, inserts, and cutting data

Selecting Tool Body, Insert, and Cutting Data

4. Choose the tool body:

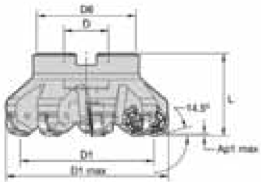
Choose diameter (D1) and pitch (Z) of tool body.

NOTE: Make sure you select the correct shank style for your toolholder. For toolholders, visit **widia.com**.

Face Mills • Victory™ M1200 Series
Victory M1200 HF • Shell Mills

WIDIA

- Twelve cutting edges.
- High feed rates for rough face milling.
- Use standard M1200 inserts.



■ Shell Mills

order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
3750370	M1200HF050Z04HN09	50	67,9	22	36	40	2,2	4	11400	Yes	0,65

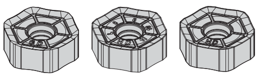
5. Choose the inserts with the WIDIA™ insert selection guide:

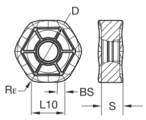
A Determine light machining, general purpose, or heavy machining according to workpiece material. See the Material Overview at the end of the catalogue for material descriptions.

B Select the grade given in the insert selection guide. Use the six digit order number to easily place your order.

■ Insert Selection Guide

Material Group	Light Machining		General Purpose	5A	Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM





● first choice
○ alternate choice

5B

■ HNGJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P									●	●	●		●		●	●
M									○	●	○		●	○	●	●
K								●	○	○	○	●	○			
N																
S										●			●	●	●	○
H													○			
HNGJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3119541	3614650	3037596	3093721	5427370	–	5528974	5895349	5895350

6. Determine cutting data — with the WIDIA Recommended Speeds and Feeds tables:

A Choose the recommended speed value according to the workpiece material and grade.

B Choose the recommended starting feed rate according to the insert geometry and % of radial engagement ae.

Starting values are given in **bold**.

■ Recommended Starting Speeds [SFM]

6A

Material Group		WP25PM			WP35CM			WS30PM			WP40PM			TN6501			THM-U		
P	1	395	**340**	325	545	**475**	445	–	–	–	355	**310**	295	–	–	–	–	–	–
	2	330	**290**	240	335	**305**	275	–	–	–	300	**260**	215	–	–	–	–	–	–
	3	305	**260**	210	305	**275**	245	–	–	–	275	**235**	190	–	–	–	–	–	–
	4	270	**220**	180	230	**210**	190	–	–	–	245	**205**	160	–	–	–	–	–	–
	5	220	**205**	180	310	**275**	250	–	–	–	205	**185**	160	–	–	–	–	–	–
	6	200	**150**	120	190	**160**	130	–	–	–	180	**140**	110	–	–	–	–	–	–
M	1	245	**215**	200	245	**220**	185	270	**240**	220	235	**205**	185	–	–	–	–	–	–
	2	220	**190**	155	220	**190**	170	245	**215**	175	210	**180**	150	–	–	–	–	–	–
	3	170	**145**	115	175	**155**	140	185	**160**	125	155	**140**	110	–	–	–	–	–	–
K	1	275	**245**	220	355	**320**	290	–	–	–	–	–	–	–	–	–	–	–	–
	2	215	**190**	180	280	**250**	230	–	–	–	–	–	–	–	–	–	–	–	–
	3	180	**160**	145	235	**210**	190	–	–	–	–	–	–	–	–	–	–	–	–

6A 6A

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)														Insert Geometry
	5%			10%			20%			30%			40–100%		
.F..LDJ	0,17	**0,32**	0,65	0,13	**0,23**	0,47	0,09	**0,17**	0,35	0,08	**0,15**	0,31	0,08	**0,14**	0,28	.F..LDJ
.E..LD	0,17	**0,50**	1,00	0,13	**0,36**	0,72	0,09	**0,27**	0,54	0,08	**0,23**	0,47	0,08	**0,21**	0,43	.E..LD
.S..GD	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	.S..GD
.S..HD	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	.S..HD

6B 6B 6B

NOTE: Use "Light Machining" value as starting feed rate.

Face Mills

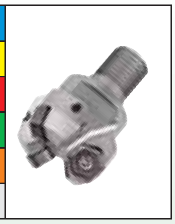
Victory™ M1200 Mini HF 15°

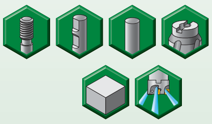
Max depth of cut: 1,7mm

Lead angle: 15°
Indexes per insert: 12
Diameter: 25–80mm

Pages: H5–H11

P M K N S





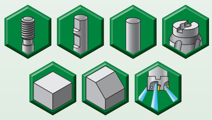
Victory™ M1200 Mini 45°

Max depth of cut: 3,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 25–120mm

Pages: H12–H19

P M K N S H



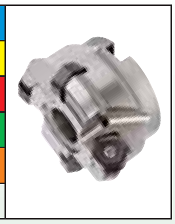
Victory™ M1200 Mini HD 59°

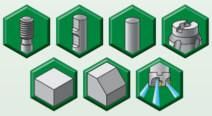
Max depth of cut: 4,7mm

Lead angle: 59°
Indexes per insert: 12
Diameter: 40–125mm

Pages: H20–H23

P M K N S





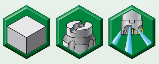
Victory™ M1200 HF 14.5°

Max depth of cut: 2,2mm

Lead angle: 14.5°
Indexes per insert: 12
Diameter: 50–160mm

Pages: H26–H29

P M K N S



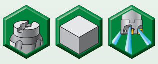
Victory™ M1200 45°

Max depth of cut: 4,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 40–315mm

Pages: H30–H37

P M K N S H



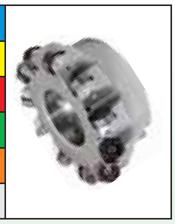
Victory™ M1200 HD 59°

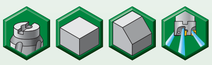
Max depth of cut: 6mm

Lead angle: 59°
Indexes per insert: 12
Diameter: 50–160mm

Pages: H38–H41

P M K N S





(continued)

Face Mills
(continued)

M640

Max depth of cut: 4,8mm

Lead angle: 58°
Indexes per insert: 6
Diameter: 32–125mm

Pages: H44–H49

P M K N S H

M660 SN1205..

Max depth of cut: 6,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 20–160mm

Pages: H52–H57

P M K N S H

M660 SN1505..

Max depth of cut: 8,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 100mm

Pages: H58–H60

P M K

SuperFeed™

Max depth of cut: 6,35mm
(can be less depending
on the cartridge)

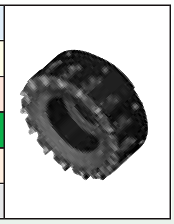
Lead angle: 90°

Indexes per insert:
1 edge per PCD cartridge

Diameter: Standard Platform
63–200mm

Pages: H64–H68

N



PCD

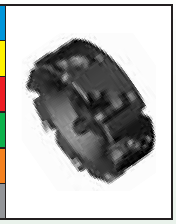
M4000
Cartridge Milling System

All front line insert styles available.

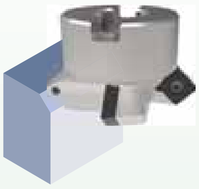
Diameter: 125–315mm

Pages: H72–H74

P M K N S H



Chamfer Mills

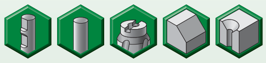


M25™ SD0903..

Max depth of cut: 6,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 25–40mm

Pages: I4–I6, I8, I10

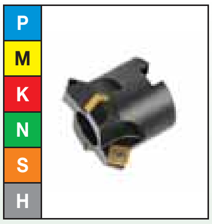


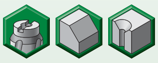
M25 SP1204..

Max depth of cut: 8,3mm

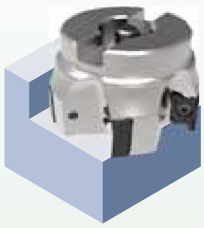
Lead angle: 45°
Indexes per insert: 4
Diameter: 50–63mm

Pages: I7, I9–I10





90° Shoulder Mills



VSM11™

Max depth of cut: 11,7mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 16–125mm

Pages: J4–J16

P M K N S H

VSM490™-15

Max depth of cut: 15mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 25–160mm

Pages: J32–J40

P M K S

VSM17™

Max depth of cut: 16,33mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 25–160mm

Pages: J20–J29

P M K N S

M690 SD1204..

Max depth of cut: 10mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–160mm

Pages: J44–J47

P M K S H

M690 SD1506..

Max depth of cut: 12mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–125mm

Pages: J48–J51

P M K S H

Helical Mills

M390 SD1204...

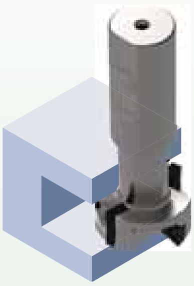
Max depth of cut: 17mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–80mm

Pages: K4–K9

P M K S H

Slotting Mills



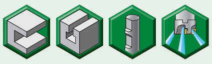
M16

Slot Width Range:
11–21,9mm

Indexes per insert: 2
Diameter: 25–50mm

Pages: L4–L7

P M K



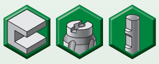
M94

Slot Width Range:
1,93–5,23mm

Indexes per insert: 3
Diameter: 25–80mm

Pages: L10–L14

P M K



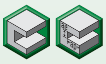
M95

Slot Width Range:
4–10mm

Indexes per insert: 4
Diameter: 100–200mm

Pages: L18–L21

P M K



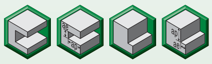
M900™

Slot Width Range:
12–22mm

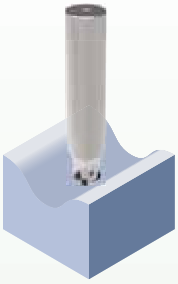
Indexes per insert: 2
Diameter: 100–315mm

Pages: L24–L30,
L32–L33

P M K S



Copy Mills



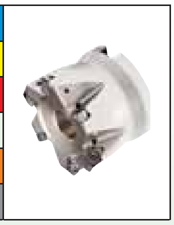
M370™

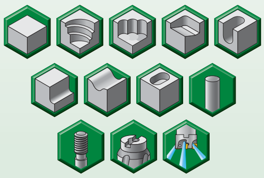
Max depth of cut: up to 2mm

Indexes per insert: 6
Diameter: 25–125mm

Pages: M4–M16

P M K S H





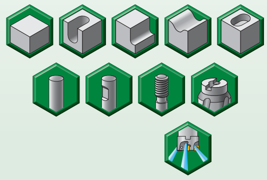
M200™

Max depth of cut: up to 5mm

Indexes per insert: up to 12
Diameter: 25–125mm

Pages: M20–M39

P M K S H



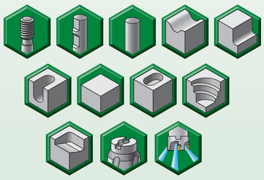
M170™

Max depth of cut: 8mm

Diameter: 12–125mm

Pages: M42–M70

P M K S H



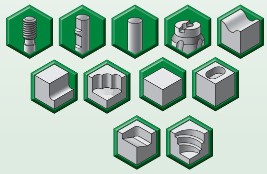
M100™

Max depth of cut: 6mm

Diameter: 24–125mm

Pages: M74–M99

P M K S H



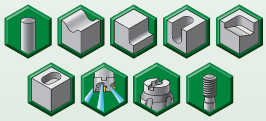
M270™ Ball Nose

Max depth of cut: 5–16mm

Diameter: 10–32mm

Pages: M102–M117

P M K S H



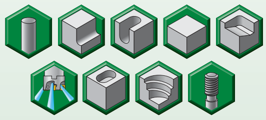
M270 Toroidal

Max depth of cut: 0,3–4mm

Diameter: 10–20mm

Pages: M118–M123

P M K S H



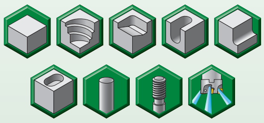
M270 High Feed

Max depth of cut: 0,6–1,1mm

Diameter: 10–20mm

Pages: M124–M130

P M K S H



How Do Catalogue Numbers Work?

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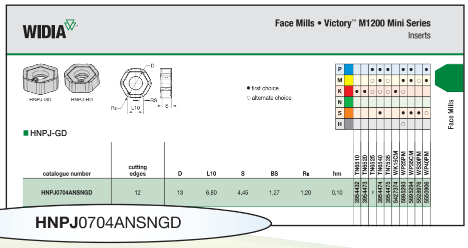
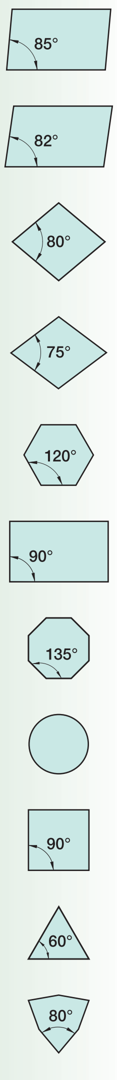
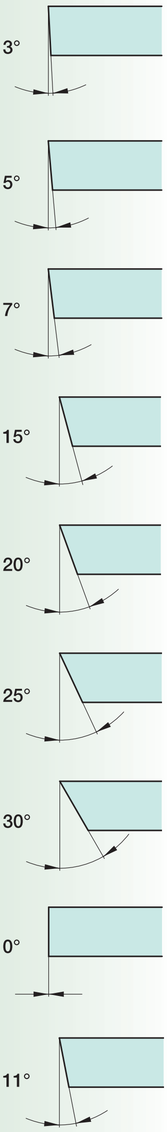


HNPJ0704ANSNGD

H — Insert Shape



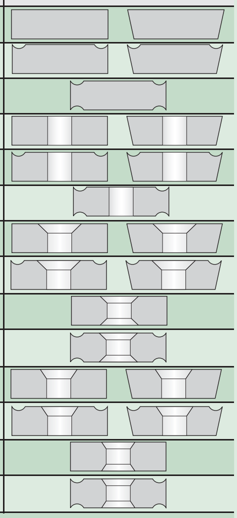
N — Insert Clearance Angle



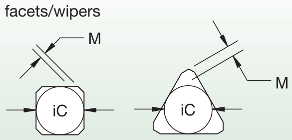
P — Tolerance Class

J — Geometry and Clamping Type

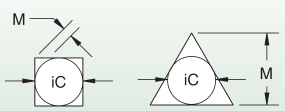
symbol	hole	shape of hole	chipbreaker	shape of insert's section
N	without		without	
R			single-sided	
F			double-sided	
A	with	cylindrical hole	without	
M			single-sided	
G			double-sided	
W	with	partly cylindrical hole, 40–60° countersink	without	
T			single-sided	
Q	with	partly cylindrical hole, 40–60° double countersink	without	
U			double-sided	
B	with	partly cylindrical hole, 70–90° countersink	without	
H			single-sided	
C	with	partly cylindrical hole, 70–90° double countersink	without	
J			double-sided	
X	special design			



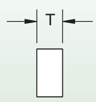
indexable inserts with facets/wipers



indexable inserts with corner radii



insert thickness

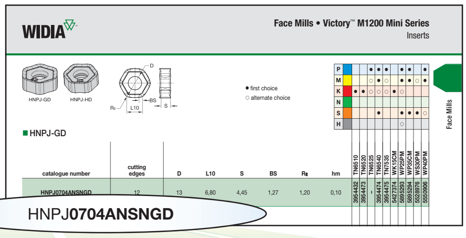


iC	tolerances on "iC" classes J, K, L, M, N (+/–)	tolerances on "iC" class U (+/–)	tolerances on "M" classes M & N (+/–)	tolerances on "M" class U (+/–)
4,76–10,00	0,051	0,076	0,076	0,127
11,11–14,29	0,076	0,127	0,127	0,203
15,00–20,64	0,102	0,178	0,152	0,279
22,00–31,16	0,127	0,254	0,178	0,381
31,75–35,00	0,152	0,254	0,2	0,381

	iC (+/–)	M (+/–)	T (+/–)		iC (+/–)	M (+/–)	T (+/–)
A	0,025	0,005	0,025	**J**	0,05–0,15*	0,005	0,025
B	0,025	0,005	0,013	**K**	0,05–0,15*	0,013	0,025
C	0,025	0,013	0,025	**L**	0,05–0,15*	0,025	0,025
D	0,025	0,013	0,013	**M**	0,05–0,15*	0,08–0,20*	0,013
E	0,025	0,025	0,025	**N**	0,05–0,15*	0,08–0,20*	0,025
F	0,013	0,005	0,025	**P****	0,038	0,038	0,038
G	0,025	0,025	0,013	**U**	0,08–0,25*	0,13–0,30*	0,013
H	0,013	0,013	0,025				

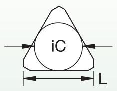
**See table above for tolerances according to insert size and class.*
***WIDIA standard only.*

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



HNPJ**0704ANSNGD**

07
Size (Cutting Edge Length)



inscribed circle "iC" versus cutting edge length "L"
For shapes A, L, and X, see position #1;
use length of leading cutting edge.

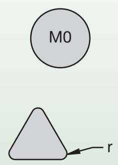
iC	"L" for shapes						
	S	T	R	O	C	H	E
6,00	–	–	06	–	–	–	–
6,35	06	11	06	02	06	03	06
8,00	–	–	08	–	–	–	–
9,52	09	16	09	04	09	05	09
10,00	–	–	10	–	–	–	–
12,00	–	–	12	–	–	–	–
12,70	12	22	12	05	12	07	13
15,88	15	27	15	06	16	09	16
16,00	–	–	16	–	–	–	–
19,05	19	33	19	07	19	11	19
20,00	–	–	20	–	–	–	–
25,00	–	–	25	–	–	–	–
25,40	25	4					

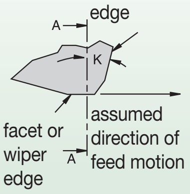
04
Insert Thickness

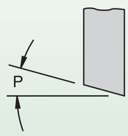
symbol	thickness
T1	1,98
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94

AN
Corner Configuration

radius







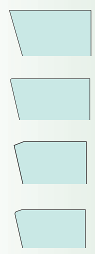
MO	round insert
01	0,1mm
02	0,2mm
04	0,4mm
05	0,5mm
08	0,8mm
10	1,0mm
12	1,2mm
15	1,5mm
16	1,6mm
24	2,4mm
32	3,2mm

If letter is replaced by number(s), refer to table for radius "r."

lead angle K	
A	45º
D	60º
E	75º
P	90º

wiper edge clearance P	
A	3º
B	5º
C	7º
D	15º
E	20º
F	25º
G	30º
N	0º
P	11º

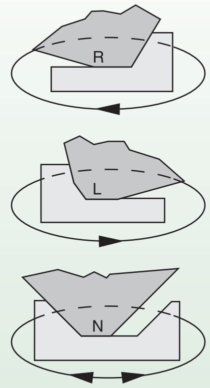
S
Cutting Edge Form



F	sharp
E	honed
T	T-land
S	honed + T-land

N
Insert Hand

direction of cutter rotation



GD
Edge Geometry

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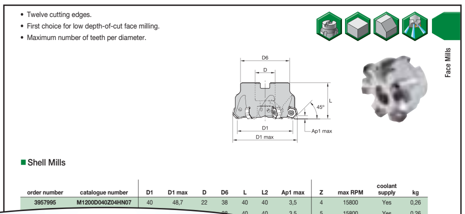
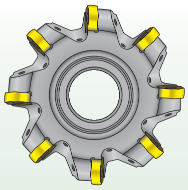


M1200D100Z03C100HN07L800

Indexable Milling Tool Bodies

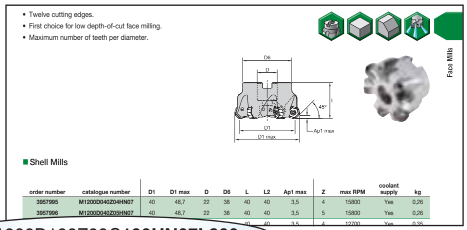
M1200	D	100	Z	03	C
Series	Cutting Diameter		Number of Flutes		Shank Form

Z = Number of effective flutes



C = Cylindrical
W = Weldon®
M = Modular
S = Shell Mill

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



M1200D100Z03C**100HN07L800**

Indexable Milling Tool Bodies

100	H	N	07	L	800
Shank/Pilot Diameter	Insert Shape	Insert Clearance Angle	Insert Size (Cutting Edge Length)	Overall Length of Tool Used for all cylindrical shank and long version Weldon® if required (standard Weldon without)	

Insert Shape

- A 85°
- B 82°
- C 80°
- D 55°
- E 75°
- H 120°
- K 55°
- L 90°
- M 86°
- O 135°
- P 108°
- R
- S 90°
- T 60°
- V 35°
- W 80°
- X Special Design

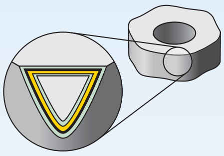
Insert Clearance Angle

- C 7°
- D 15°
- E 20°
- F 25°
- G 30°
- N 0°
- P 11°

Optional uses as required

LH	Left Hand
C	Carbide Shank
HM	Heavy Metal Shank

WIDIA



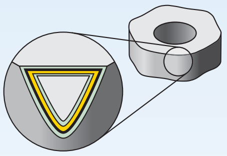
Modern coating technologies provide higher speed capabilities, greater productivity, and longer tool life.

Each insert has a material grid indicating primary and alternate uses for that tool, as well as whether it can be operated dry or with coolant.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

primary use		alternate use	
▼▼▼	Light (finishing)	▽▽▽	Light (finishing)
▼▼	Medium	▽▽	Medium
▼	Heavy (roughing)	▽	Heavy (roughing)

Grade	P	M	K	N	S	H	dry	with coolant
TN2505 HC-H05 • PVD-TiAlN	▽▽▽		▼▼▼			▼▼▼	•	
TN2510 HC-H10 • MT-CVD/CVD-TiN-TiCN-$(ZrO_2\text{-}Al_2O_3\text{-}TiOx)$	▽▽		▼▼			▼▼	•	
TN2525 HC-H20 • PVD-TiAlN	▼▼		▽▽			▼▼	•	
TN6501 HC-N03 • PVD-TiB_2				▼▼▼			•	•
TN6510 HC-K10 • PVD-TiAlN Nanolayer			▼▼				•	
TN6520 HC-K20 • PVD-TiAlN Nanolayer			▼▼				•	•



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P	Steel
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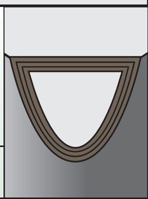
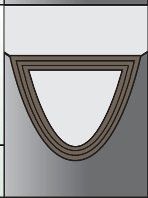
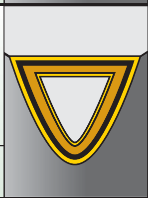
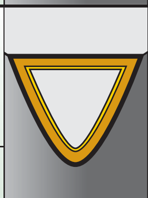
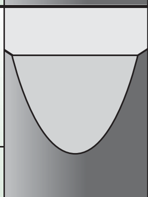
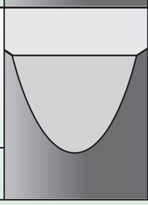
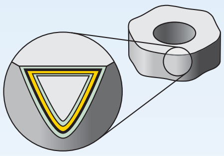
S	High-Temp Alloys
H	Hardened Materials

primary use		alternate use	
▼▼▼	Light (finishing)	▽▽▽	Light (finishing)
▼▼	Medium	▽▽	Medium
▼	Heavy (roughing)	▽	Heavy (roughing)

Grade		P	M	K	N	S	H	dry	with coolant
TN6525 HC-P25 • PVD-TiAlN Nanolayer		▼▼	▽▽	▽▽				•	
TN6540 HC-P40 • PVD-TiAlN Nanolayer		▼	▼	▽		▼▼		•	•
TN7525 HC-P25 • MT-CVD/CVD-TiN-TiCN-Al_2O_3-TiN		▼▼	▽▽					•	
TN7535 HC-P35 • MT-CVD/CVD-TiN-TiCN-Al_2O_3		▼	▽	▽				•	
TTI25 HT-P15 • Cermet		▼▼▼	▽▽▽					•	•
THM HW-K15 • Uncoated				▽	▼	▽		•	•

WIDIA



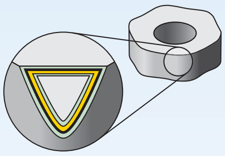
Modern coating technologies provide higher speed capabilities, greater productivity, and longer tool life.

Each insert has a material grid indicating primary and alternate uses for that tool, as well as whether it can be operated dry or with coolant.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

primary use		alternate use	
▼▼▼	Light (finishing)	▽▽▽	Light (finishing)
▼▼	Medium	▽▽	Medium
▼	Heavy (roughing)	▽	Heavy (roughing)

Grade	P	M	K	N	S	H	dry	with coolant
THM-U HF-N05 • Uncoated				▼▼▼			•	•
TTM/TTM08 HW-P25 • Uncoated	▼▼	▽▽	▽▽				•	•
WK15PM PVD-TiAIN Nanolayer			▼▼				•	•
WK15CM™ MT-CVD/TiN-TiCN-Al_2O_3			▼▼				•	
WP20CM MT-CVD/TiN-TiCN-Al_2O_3	▼▼		▽▽					
WP25PM PVD-AlTiN Multilayer	▼▼	▼▼	▽▽		▼▼	▽▽	•	•

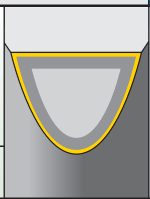
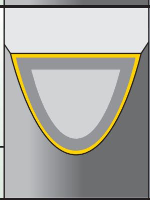
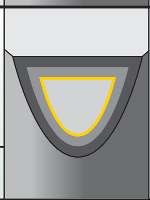
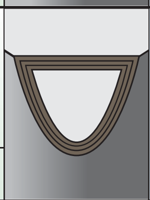
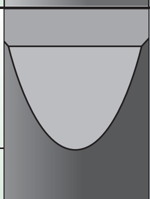
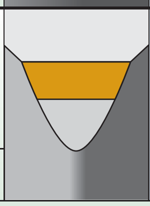


Modern coating technologies provide higher speed capabilities, greater productivity, and longer tool life.

Each insert has a material grid indicating primary and alternate uses for that tool, as well as whether it can be operated dry or with coolant.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

primary use		**alternate use**	
▼▼▼	Light (finishing)	▽▽▽	Light (finishing)
▼▼	Medium	▽▽	Medium
▼	Heavy (roughing)	▽	Heavy (roughing)

Grade		**P**	**M**	**K**	**N**	**S**	**H**	**dry**	**with coolant**
WS30PM™ PVD-AlTiN Multilayer		▽▽	▼▼			▼▼		•	•
WU35PM PVD-AlTiN Multilayer		▼	▼			▼		•	•
WP35CM MT-CVD/TiN-TiCN-Al_2O_3		▼	▽	▼				•	
WP40PM™ PVD TiAlN-AlCrN Multilayer		▼	▼			▽		•	•
WK25YM Silicon Nitride				▼▼				•	
WDN00U™ Ultra-fine grain PCD					▼▼▼ ▼▼ ▼				•

Indexable Milling • Face Mills

One Series Meets Every Face Milling Need •

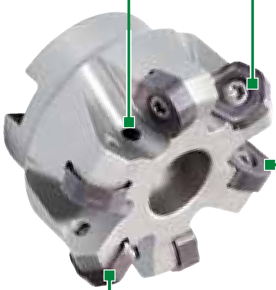
WIDIA™ Victory™ M1200 Mini

For consistent performance, look no further than the WIDIA Victory™ M1200 Mini. This easy-to-use product ensures great tool life, reduced machining time, and maximum productivity.

M1200 Mini

- Low cost per edge and high productivity.
- Reduced cutting forces due to soft cutting action.
- Significantly increased Metal Removal Rates (MRR).
- Victory™ M1200 Mini available in 15°, 45°, and 59° lead.
- WIDIA premium milling grades.
- Excellent tool life in light to heavy machining.
- Shorter machining cycle times.

Best-in-class face milling platform to boost productivity on taper 40 spindle milling machines and driven tools.



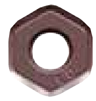
Latest soft cutting edge insert design for all material groups

-FNLDJ

N

Machining Aluminium

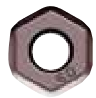
-ENLD



P M K S

Light Machining

-SNGD



P M K S

General Purpose

-SNHD

P M K S

Heavy Machining

Face Mills

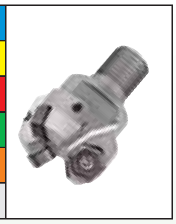
Victory™ M1200 Mini HF 15°

Max depth of cut: 1,7mm

Lead angle: 15°
Indexes per insert: 12
Diameter: 25–80mm

Pages: H5–H11

P M K N S



Victory™ M1200 Mini 45°

Max depth of cut: 3,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 25–120mm

Pages: H12–H19

P M K N S H

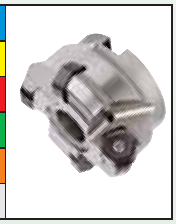
Victory™ M1200 Mini HD 59°

Max depth of cut: 4,7mm

Lead angle: 59°
Indexes per insert: 12
Diameter: 40–125mm

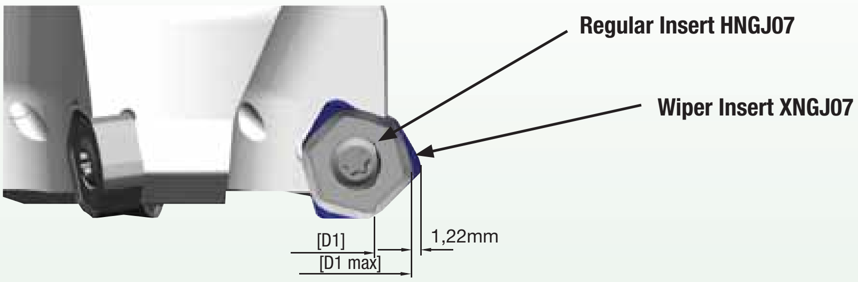
Pages: H20–H23

P M K N S



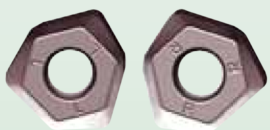
Easy-to-use wiper insert setup to achieve excellent surface floor finish

Wiper insert overlapping vs. regular insert



D1 max wiper = D1 max + 2,44mm

- Wiper inserts only applied with 45° lead angle cutter bodies.
- Easy to use. Regular and wiper inserts are loaded into fixed pockets. No adjustment required.
- Please have D1 max wiper in mind in case of limited working area.
- Use wiper inserts only in combination with periphery ground regular inserts HNGJ07.
- Up to cutting diameter D1=100mm load one wiper insert.
- For cutting diameter D1=125mm and above load two wiper inserts.
- Each wiper insert XNGJ07 can be applied with three right hand R and three left hand L cutting edges.



Victory™ M1200 Mini Series

Victory™ M1200 Mini HF High-Feed 15°

12 True
Cutting
Edges

15° Lead

Insert HNGJ0704
HNPJ0704

Ap1 max = 1,7mm

M1200 Mini HF can be loaded with all M1200 Mini standard inserts, except wiper inserts.

Victory™ M1200 Mini HF High-Feed

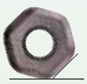
First choice for long reach face milling applications or light fixtures.

Chip thinning effect due to lead angle 15°. Tremendous enlargement of feed rate and MRR.

Up to 40% shorter machining cycle time.

Victory™ M1200 Mini 45°

12 True
Cutting
Edges



45° Lead

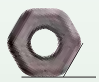
Insert HNGJ0704
HNPJ0704

Ap1 max = 3,5mm

Best-in-class leader in face milling up to Ap1 max = 3,5mm. Excellent choice for near net shape strategies and driven tools.

Victory™ M1200 Mini HD 59°

12 True
Cutting
Edges



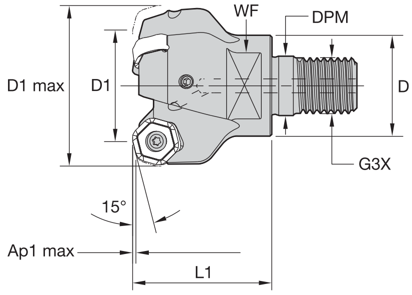
59° Lead

Insert HNGJ0704
HNPJ0704

Ap1 max = 4,7mm

Achieve a higher axial depth-of-cut capability up to Ap1 = 4,7mm with standard M1200 Mini inserts.

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- High-feed capability.



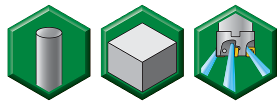
Screw-On End Mills

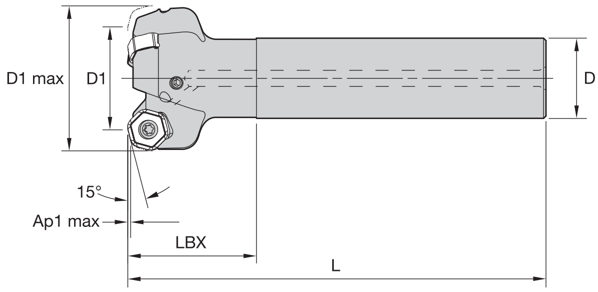
order number	catalogue number	D1	D1 max	D	DPM	G3X	L1	WF	Ap1 max	Z	max RPM	coolant supply	kg
4136874	**M1200HF025Z02M16HN07**	25	39	29	17,0	M16	32	22	1,7	2	20000	Yes	0,2
4136875	**M1200HF025Z03M16HN07**	25	39	29	17,0	M16	32	22	1,7	3	20000	Yes	0,2
4136876	**M1200HF032Z03M16HN07**	32	46	29	17,0	M16	40	22	1,7	3	17600	Yes	0,3
4136877	**M1200HF032Z04M16HN07**	32	46	29	17,0	M16	40	22	1,7	4	17600	Yes	0,3
4136878	**M1200HF040Z04M16HN07**	40	54	29	17,0	M16	40	22	1,7	4	15800	Yes	0,3
4136879	**M1200HF040Z05M16HN07**	40	54	29	17,0	M16	40	22	1,7	5	15800	Yes	0,3

Spare Parts

D1	insert screw	Nm	Torx wrench
25	**12146034500**	3,5	**12148082400**
32	**12146034500**	3,5	**12148082400**
40	**12146034500**	3,5	**12148082400**

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- High-feed capability.

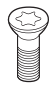


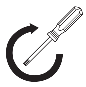


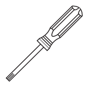
Cylindrical Shanks

order number	catalogue number	D1	D1 max	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4136880	M1200HF025Z02A20HN07L120	25	39,1	20	120	32	1,7	2	20000	Yes	0,33
4136881	M1200HF025Z03A20HN07L120	25	39,1	20	120	32	1,7	3	20000	Yes	0,31
4136882	M1200HF032Z03A25HN07L130	32	46,1	25	130	40	1,7	3	17600	Yes	0,52
4136883	M1200HF032Z04A25HN07L130	32	46,1	25	130	40	1,7	4	17600	Yes	0,53

Spare Parts

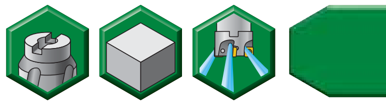


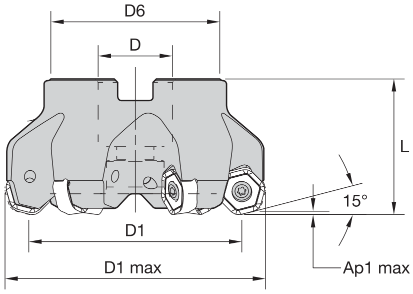




D1	insert screw	Nm	Torx driver
25	12146034500	3,5	12148082400
32	12146034500	3,5	12148082400

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- High-feed capability.

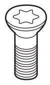
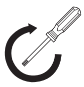
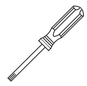
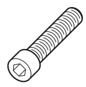




Shell Mills

order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
4136884	**M1200HF040Z05HN07**	40	54,1	22	38	40	1,7	5	15800	Yes	0,29
4136885	**M1200HF050Z05HN07**	50	64,1	22	38	40	1,7	5	12700	Yes	0,40
4136886	**M1200HF063Z06HN07**	63	77,1	22	50	40	1,7	6	10100	Yes	0,67
4136887	**M1200HF080Z08HN07**	80	94,1	27	60	50	1,7	8	7900	Yes	1,26

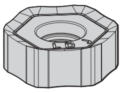
Spare Parts

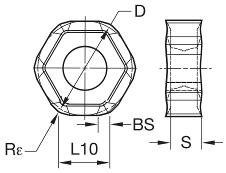
   

D1	insert screw	Nm	Torx driver	socket-head cap screw
40	**12146034500**	3,5	**12148082400**	**12146120500**
50	**12146034500**	3,5	**12148082400**	**12146120500**
63	**12146034500**	3,5	**12148082400**	**12146120500**
80	**12146034500**	3,5	**12148082400**	**12748701000**

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6510	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..GD	WS30PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–


HNGJ-LDJ

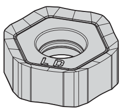


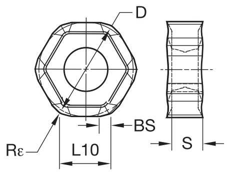
● first choice
○ alternate choice

		TN6501	THM-U
P			
M			
K			
N		●	●
S			
H			

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
HNGJ0704ANFNLDJ	12	13	6,80	4,48	1,60	1,20	0,08	3954414	3954332


HNGJ-LD

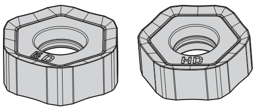


● first choice
○ alternate choice

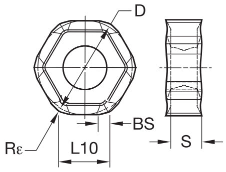
		TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
P				●	●	●		●	●		●
M				○	●	○		●	●	○	●
K		●	●	○	○	○	●	○			
N											
S					●			●	●	●	○
H								○			

HNGJ-LD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNGJ0704ANENLD	12	13	6,80	4,48	1,60	1,20	0,08	3954419	3954420	3954421	3954422	-	-	5895291	5895292	5528975	5550905
HNGJ070432ANENLD	12	13	6,80	4,48	–	3,20	0,08	3954428	-	3954429	3954430	-	-	-	-	-	-



HNPJ-GD HNPJ-HD



● first choice
○ alternate choice

	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
P			●	●	●		●	●		●
M			○	●	○		●	●	○	●
K	●	●	○	○	○	●	○			
N										
S				●			●	●	●	○
H							○			

HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNPJ0704ANSNGD	12	13	6,80	4,45	1,27	1,20	0,10	3954432	3954473	-	3954474	3954475	5427374	5895293	5895294	5528976	5550906

HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNPJ0704ANSNHD	12	13	6,80	4,41	1,25	1,20	0,14	3954477	3954478	-	3954479	3954480	5427375	5895295	5895296	-	5550907
HNPJ070432ANSNHD	12	13	6,80	4,42	—	3,20	0,14	3954481	3954482	-	3954483	3954484	-	-	-	-	5895297

Recommended Starting Speeds [m/min]

Material Group		TN6510			TN6520			TN6525			TN6540			TN7535			WK15CM		
P	1	–	–	–	–	–	–	410	**320**	280	360	**280**	240	545	**475**	445	–	–	–
	2	–	–	–	–	–	–	320	**250**	215	250	**190**	170	335	**305**	275	–	–	–
	3	–	–	–	–	–	–	280	**215**	185	215	**170**	140	305	**275**	245	–	–	–
	4	–	–	–	–	–	–	235	**170**	145	180	**130**	110	230	**210**	190	–	–	–
	5	–	–	–	–	–	–	310	**235**	200	240	**180**	150	310	**275**	250	–	–	–
	6	–	–	–	–	–	–	205	**160**	130	160	**120**	100	190	**160**	130	–	–	–
M	1	–	–	–	–	–	–	190	**120**	80	130	**80**	60	245	**220**	185	–	–	–
	2	–	–	–	–	–	–	120	**80**	50	80	**50**	40	220	**190**	170	–	–	–
	3	–	–	–	–	–	–	125	**80**	55	85	**50**	40	175	**155**	140	–	–	–
K	1	480	**350**	260	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	505	**460**	410
	2	420	**280**	205	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	400	**355**	330
	3	335	**260**	200	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	335	**300**	275
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	50	**35**	30	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	25	**20**	10	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	70	**40**	30	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	60	**30**	25	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WP25PM			WP35CM			WS30PM			WP40PM			TN6501			THM-U		
P	1	395	**340**	325	545	**475**	445	–	–	–	355	**310**	295	–	–	–	–	–	–
	2	330	**290**	240	335	**305**	275	–	–	–	300	**260**	215	–	–	–	–	–	–
	3	305	**260**	210	305	**275**	245	–	–	–	275	**235**	190	–	–	–	–	–	–
	4	270	**220**	180	230	**210**	190	–	–	–	245	**205**	160	–	–	–	–	–	–
	5	220	**205**	180	310	**275**	250	–	–	–	205	**185**	160	–	–	–	–	–	–
	6	200	**150**	120	190	**160**	130	–	–	–	180	**140**	110	–	–	–	–	–	–
M	1	245	**215**	200	245	**220**	185	270	**240**	220	235	**205**	185	–	–	–	–	–	–
	2	220	**190**	155	220	**190**	170	245	**215**	175	210	**180**	150	–	–	–	–	–	–
	3	170	**145**	115	175	**155**	140	185	**160**	125	155	**140**	110	–	–	–	–	–	–
K	1	275	**245**	220	355	**320**	290	–	–	–	–	–	–	–	–	–	–	–	–
	2	215	**190**	180	280	**250**	230	–	–	–	–	–	–	–	–	–	–	–	–
	3	180	**160**	145	235	**210**	190	–	–	–	–	–	–	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	–	–	–	–	–	–	–	–	–	–	–	1640	**980**	800	1640	**980**	800
	3	–	–	–	–	–	–	–	–	–	–	–	–	960	**600**	480	960	**600**	480
S	1	50	**40**	30	–	–	–	55	**50**	35	50	**40**	35	–	–	–	–	–	–
	2	50	**40**	30	–	–	–	55	**50**	35	50	**40**	35	–	–	–	–	–	–
	3	60	**50**	30	–	–	–	65	**55**	35	60	**50**	35	–	–	–	–	–	–
	4	85	**60**	40	80	**60**	40	100	**70**	50	80	**60**	40	–	–	–	–	–	–
H	1	145	**110**	85	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

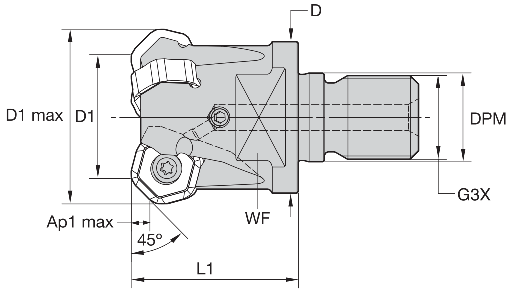
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDJ	0,48	**0,89**	1,81	0,34	**0,64**	1,29	0,26	**0,48**	0,96	0,22	**0,42**	0,83	0,21	**0,38**	0,76	.F..LDJ
.E..LD	0,48	**1,38**	2,85	0,34	**0,99**	2,00	0,26	**0,74**	1,48	0,22	**0,64**	1,28	0,21	**0,59**	1,17	.E..LD
.S..GD	0,92	**2,35**	3,89	0,66	**1,67**	2,70	0,49	**1,23**	1,98	0,43	**1,07**	1,72	0,39	**0,98**	1,57	.S..GD
.S..HD	0,92	**2,35**	3,89	0,66	**1,67**	2,70	0,49	**1,23**	1,98	0,43	**1,07**	1,72	0,39	**0,98**	1,57	.S..HD

NOTE: Use “Light Machining” value as starting feed rate.

Face Mills

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- Maximum number of teeth per diameter.



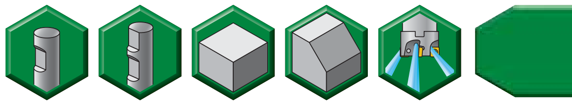
Screw-On End Mills

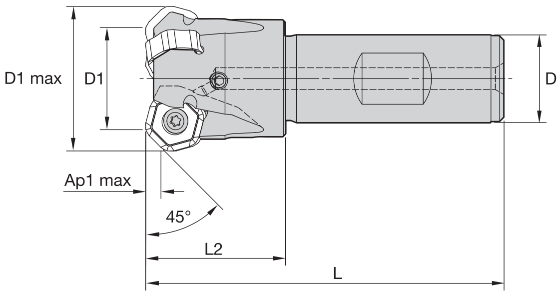
order number	catalogue number	D1	D1 max	D	DPM	G3X	L1	WF	Ap1 max	Z	max RPM	coolant supply	kg
3957839	M1200D025Z02M16HN07	25	33,7	29	17,0	M16	32	22	3,5	2	20000	Yes	0,13
3957840	M1200D025Z03M16HN07	25	33,7	29	17,0	M16	32	22	3,5	3	20000	Yes	0,13
3957841	M1200D032Z03M16HN07	32	40,7	29	17,0	M16	40	22	3,5	3	17600	Yes	0,20
3957842	M1200D032Z04M16HN07	32	40,7	29	17,0	M16	40	22	3,5	4	17600	Yes	0,20
3957963	M1200D040Z04M16HN07	40	48,7	29	17,0	M16	40	22	3,5	4	15800	Yes	0,24
3957964	M1200D040Z05M16HN07	40	48,7	29	17,0	M16	40	22	3,5	5	15800	Yes	0,25

Spare Parts

D1	insert screw	Nm	Torx driver
25	12146034500	3,5	12148082400
32	12146034500	3,5	12148082400
40	12146034500	3,5	12148082400

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- Maximum number of teeth per diameter.

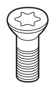


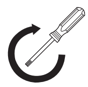


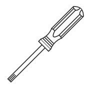
Weldon Shanks

order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
3958011	**M1200D025Z02B20HN07**	25	33,7	20	82	32	3,5	2	20000	Yes	0,22
3958012	**M1200D025Z03B20HN07**	25	33,7	20	82	32	3,5	3	20000	Yes	0,21
3958023	**M1200D032Z03B25HN07**	32	40,7	25	97	40	3,5	3	17600	Yes	0,39
3958024	**M1200D032Z04B25HN07**	32	40,7	25	97	40	3,5	4	17600	Yes	0,40

Spare Parts

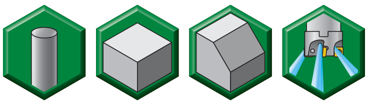


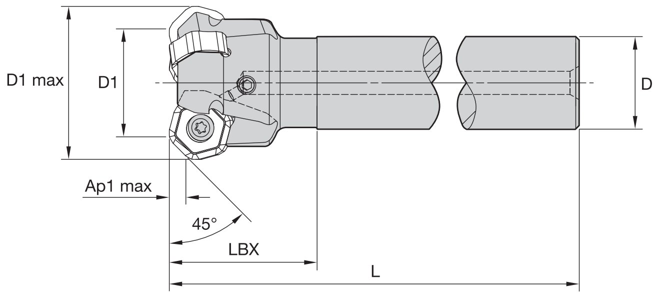




D1	insert screw	Nm	Torx driver
25	**12146034500**	3,5	**12148082400**
32	**12146034500**	3,5	**12148082400**

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- Maximum number of teeth per diameter.





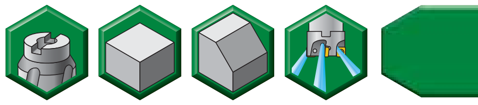
Cylindrical Shanks

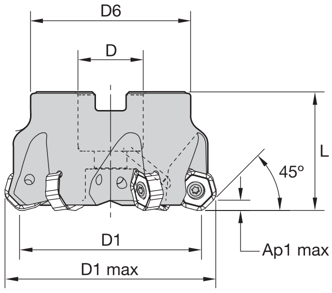
order number	catalogue number	D1	D1 max	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
3958025	**M1200D025Z02A20HN07L120**	25	33,7	20	120	32	3,5	2	20000	Yes	0,29
3958026	**M1200D025Z03A20HN07L120**	25	33,7	20	120	32	3,5	3	20000	Yes	0,28
3958029	**M1200D025Z02A25HN07L200**	25	33,7	25	200	32	3,5	2	20000	Yes	0,72
3958030	**M1200D025Z03A25HN07L200**	25	33,7	25	200	32	3,5	3	20000	Yes	0,71
3958027	**M1200D032Z03A25HN07L130**	32	40,7	25	130	40	3,5	3	17600	Yes	0,49
3958028	**M1200D032Z04A25HN07L130**	32	40,7	25	130	40	3,5	4	17600	Yes	0,50

Spare Parts

D1	insert screw	Nm	Torx driver
25	**12146034500**	3,5	**12148082400**
32	**12146034500**	3,5	**12148082400**

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- Maximum number of teeth per diameter.

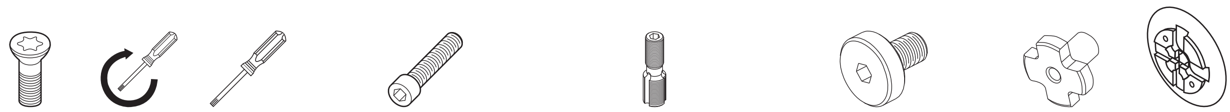




Shell Mills

order number	catalogue number	D1	D1 max	D	D6	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
3957995	M1200D040Z04HN07	40	48,7	22	38	40	40	3,5	4	15800	Yes	0,26
3957996	M1200D040Z05HN07	40	48,7	22	38	40	40	3,5	5	15800	Yes	0,26
3957997	M1200D050Z04HN07	50	58,7	22	38	40	40	3,5	4	12700	Yes	0,35
3957998	M1200D050Z05HN07	50	58,7	22	38	40	40	3,5	5	12700	Yes	0,36
3957999	M1200D050Z06HN07	50	58,7	22	38	40	40	3,5	6	12700	Yes	0,35
3958000	M1200D063Z04HN07	63	71,7	22	50	40	40	3,5	4	10100	Yes	0,58
3958001	M1200D063Z06HN07	63	71,7	22	50	40	40	3,5	6	10100	Yes	0,65
3958002	M1200D063Z08HN07	63	71,7	22	50	40	40	3,5	8	10100	Yes	0,62
3958003	M1200D080Z05HN07	80	88,7	27	60	50	50	3,5	5	7900	Yes	1,11
3958004	M1200D080Z08HN07	80	88,7	27	60	50	50	3,5	8	7900	Yes	1,24
3958005	M1200D080Z10HN07	80	88,7	27	60	50	50	3,5	10	7900	Yes	1,17
3958006	M1200D100Z06HN07	100	108,7	32	80	50	50	3,5	6	6300	Yes	1,71
3958007	M1200D100Z09HN07	100	108,7	32	80	50	50	3,5	9	6300	Yes	1,82
3958008	M1200D100Z12HN07	100	108,7	32	80	50	50	3,5	12	6300	Yes	1,82
4138470	M1200D125Z08HN07	125	133,7	40	90	63	—	3,5	8	5050	Yes	2,84
4138471	M1200D125Z12HN07	125	133,7	40	90	63	—	3,5	12	5050	Yes	2,96
4138472	M1200D125Z16HN07	125	133,7	40	90	63	—	3,5	16	5050	Yes	3,02

Spare Parts

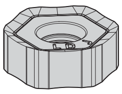


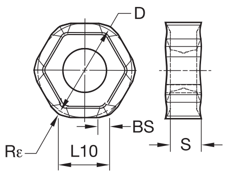
D1	insert screw	Nm	Torx driver	socket-head cap screw	mounting screw with coolant grooves	coolant screw assembly	coolant lock screw	coolant cap
40	12146034500	3,5	12148082400	–	12146109200	–	–	–
50	12146034500	3,5	12148082400	12146120500	–	–	–	–
63	12146034500	3,5	12148082400	12146120500	–	–	–	–
80	12146034500	3,5	12148082400	12748701000	–	–	–	–
100	12146034500	3,5	12148082400	–	–	12146109400	–	–
125	12146034500	3,5	12148082400	–	–	–	12146107000	12146111000

NOTE: Mounting screw with coolant groove, coolant screw assembly, coolant lock screw, and coolant cap must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6510	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..GD	WS30PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–

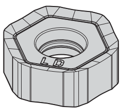

HNGJ-LDJ

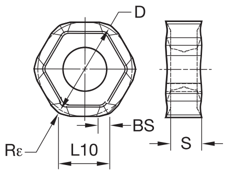


● first choice
○ alternate choice

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
P									
M									
K									
N								●	●
S									
H									
HNGJ0704ANFNLDJ	12	13	6,80	4,48	1,60	1,20	0,08	3954414	3954332

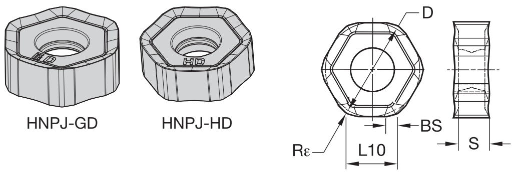

HNGJ-LD



● first choice
○ alternate choice

HNGJ-LD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
P										●	●	●		●	●		●
M										○	●	○		●	●	○	●
K								●	●	○	○	○	●	○			
N																	
S											●			●	●	●	○
H														○			
HNGJ0704ANENLD	12	13	6,80	4,48	1,60	1,20	0,08	3954419	3954420	3954421	3954422	–	–	5895291	5895292	5528975	5550905
HNGJ070432ANENLD	12	13	6,80	4,48	–	3,20	0,08	3954428	–	3954429	3954430	–	–	–	–	–	–



● first choice
○ alternate choice

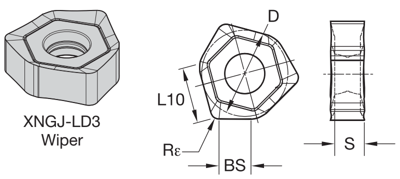
	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
P			●	●	●		●	●		●
M			○	●	○		●	●	○	●
K	●	●	○	○	○	●	○			
N										
S				●			●	●	●	○
H							○			

HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNPJ0704ANSNGD	12	13	6,80	4,45	1,27	1,20	0,10	3954432	3954473	-	3954474	3954475	5427374	5895293	5895294	5528976	5550906

HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNPJ0704ANSNHD	12	13	6,80	4,41	1,25	1,20	0,14	3954477	3954478	-	3954479	3954480	5427375	5895295	5895296	-	5550907
HNPJ070432ANSNHD	12	13	6,80	4,42	—	3,20	0,14	3954481	3954482	-	3954483	3954484	-	-	-	-	5895297



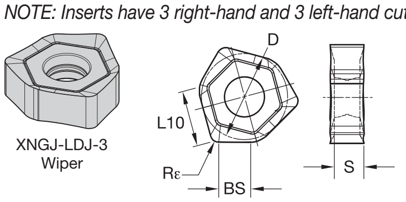
● first choice
○ alternate choice

	TN6501	THM-U
P		
M		
K		
N	●	●
S		
H		

XNGJ-LDJ-3 Wiper

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
XNGJ0704ANFNLDJ3W	3	13	6,78	4,47	6,78	1,30	0,08	3954416	3954433

NOTE: Inserts have 3 right-hand and 3 left-hand cutting edges.



● first choice
○ alternate choice

	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
P			●	●	●		●	●		●
M			○	●	○		●	●	○	●
K	●	●	○	○	○	●	○			
N										
S				●			●	●	●	○
H							○			

XNGJ-LD3 Wiper

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
XNGJ0704ANENLD3W	3	13	6,78	4,47	6,78	1,30	0,08	3954424	3954425	3954426	3954427	-	5427373	5895298	-	-	5895299

NOTE: Inserts have 3 right-hand and 3 left-hand cutting edges.

Recommended Starting Speeds [m/min]

Material Group		TN6510			TN6520			TN6525			TN6540			TN7535			WK15CM		
P	1	–	**–**	–	–	**–**	–	410	**320**	280	360	**280**	240	545	**475**	445	–	**–**	–
	2	–	**–**	–	–	**–**	–	320	**250**	215	250	**190**	170	335	**305**	275	–	**–**	–
	3	–	**–**	–	–	**–**	–	280	**215**	185	215	**170**	140	305	**275**	245	–	**–**	–
	4	–	**–**	–	–	**–**	–	235	**170**	145	180	**130**	110	230	**210**	190	–	**–**	–
	5	–	**–**	–	–	**–**	–	310	**235**	200	240	**180**	150	310	**275**	250	–	**–**	–
	6	–	**–**	–	–	**–**	–	205	**160**	130	160	**120**	100	190	**160**	130	–	**–**	–
M	1	–	**–**	–	–	**–**	–	190	**120**	80	130	**80**	60	245	**220**	185	–	**–**	–
	2	–	**–**	–	–	**–**	–	120	**80**	50	80	**50**	40	220	**190**	170	–	**–**	–
	3	–	**–**	–	–	**–**	–	125	**80**	55	85	**50**	40	175	**155**	140	–	**–**	–
K	1	480	**350**	260	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	505	**460**	410
	2	420	**280**	205	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	400	**355**	330
	3	335	**260**	200	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	335	**300**	275
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WP25PM			WP35CM			WS30PM			WP40PM			TN6501			THM-U		
P	1	395	**340**	325	545	**475**	445	–	–	–	355	**310**	295	–	–	–	–	–	–
	2	330	**290**	240	335	**305**	275	–	–	–	300	**260**	215	–	–	–	–	–	–
	3	305	**260**	210	305	**275**	245	–	–	–	275	**235**	190	–	–	–	–	–	–
	4	270	**220**	180	230	**210**	190	–	–	–	245	**205**	160	–	–	–	–	–	–
	5	220	**205**	180	310	**275**	250	–	–	–	205	**185**	160	–	–	–	–	–	–
	6	200	**150**	120	190	**160**	130	–	–	–	180	**140**	110	–	–	–	–	–	–
M	1	245	**215**	200	245	**220**	185	270	**240**	220	235	**205**	185	–	–	–	–	–	–
	2	220	**190**	155	220	**190**	170	245	**215**	175	210	**180**	150	–	–	–	–	–	–
	3	170	**145**	115	175	**155**	140	185	**160**	125	155	**140**	110	–	–	–	–	–	–
K	1	275	**245**	220	355	**320**	290	–	–	–	–	–	–	–	–	–	–	–	–
	2	215	**190**	180	280	**250**	230	–	–	–	–	–	–	–	–	–	–	–	–
	3	180	**160**	145	235	**210**	190	–	–	–	–	–	–	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	–	–	–	–	–	–	–	–	–	–	–	1640	**980**	800	1640	**980**	800
	3	–	–	–	–	–	–	–	–	–	–	–	–	960	**600**	480	960	**600**	480
S	1	50	**40**	30	–	–	–	55	**50**	35	50	**40**	35	–	–	–	–	–	–
	2	50	**40**	30	–	–	–	55	**50**	35	50	**40**	35	–	–	–	–	–	–
	3	60	**50**	30	–	–	–	65	**55**	35	60	**50**	35	–	–	–	–	–	–
	4	85	**60**	40	80	**60**	40	100	**70**	50	80	**60**	40	–	–	–	–	–	–
H	1	145	**110**	85	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

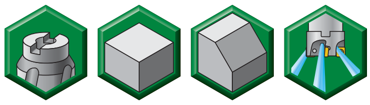
Recommended Starting Feeds [mm]

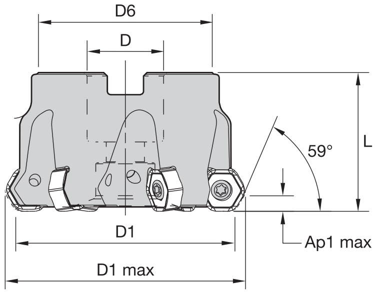
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDJ	0,17	**0,32**	0,65	0,13	**0,23**	0,47	0,09	**0,17**	0,35	0,08	**0,15**	0,31	0,08	**0,14**	0,28	.F..LDJ
.E..LD	0,17	**0,50**	1,00	0,13	**0,36**	0,72	0,09	**0,27**	0,54	0,08	**0,23**	0,47	0,08	**0,21**	0,43	.E..LD
.S..GD	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	.S..GD
.S..HD	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	.S..HD

NOTE: Use "Light Machining" value as starting feed rate.

- Twelve cutting edges.
- Higher axial depth-of-cut capability with 59° lead angle.

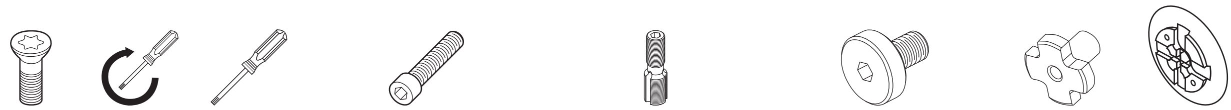




Shell Mills

order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
4136482	M1200HD040Z04HN07	40	46,8	22	38	40	4,7	4	15800	Yes	0,22
4136863	M1200HD040Z05HN07	40	46,8	22	38	40	4,7	5	15800	Yes	0,22
4136864	M1200HD050Z04HN07	50	56,8	22	38	40	4,7	4	12700	Yes	0,34
4136865	M1200HD050Z05HN07	50	56,8	22	38	40	4,7	5	12700	Yes	0,34
4136866	M1200HD063Z04HN07	63	69,8	22	50	40	4,7	4	10100	Yes	0,58
4136867	M1200HD063Z06HN07	63	69,8	22	50	40	4,7	6	10100	Yes	0,60
4136868	M1200HD080Z05HN07	80	86,8	27	60	50	4,7	5	7900	Yes	1,11
4136869	M1200HD080Z08HN07	80	86,8	27	60	50	4,7	8	7900	Yes	1,17
4136870	M1200HD100Z06HN07	100	106,7	32	80	50	4,7	6	6300	Yes	1,74
4136871	M1200HD100Z09HN07	100	106,7	32	80	50	4,7	9	6300	Yes	1,74
4136872	M1200HD125Z08HN07	125	131,7	40	90	63	4,7	8	5050	Yes	2,86
4136873	M1200HD125Z12HN07	125	131,7	40	90	63	4,7	12	5050	Yes	2,90

Spare Parts

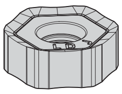


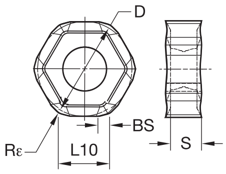
D1	insert screw	Nm	Torx driver	socket-head cap screw	mounting screw with coolant grooves	coolant screw assembly	coolant lock screw	coolant cap
40	12146034500	3,5	12148082400	–	12146109200	–	–	–
50	12146034500	3,5	12148082400	12146120500	–	–	–	–
63	12146034500	3,5	12148082400	12146120500	–	–	–	–
80	12146034500	3,5	12148082400	12748701000	–	–	–	–
100	12146034500	3,5	12148082400	–	–	12146109400	–	–
125	12146034500	3,5	12148082400	–	–	–	12146107000	12146111000

NOTE: Mounting screw with coolant groove, coolant screw assembly, coolant lock screw, and coolant cap must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6510	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..GD	WS30PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–

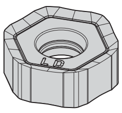

HNGJ-LDJ

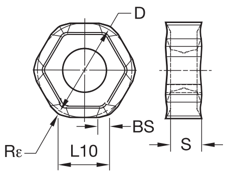


● first choice
○ alternate choice

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
P									
M									
K									
N								●	●
S									
H									
HNGJ0704ANFNLDJ	12	13	6,80	4,48	1,60	1,20	0,08	3954414	3954332

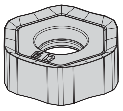

HNGJ-LD

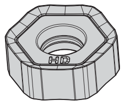


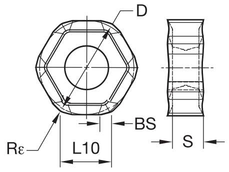
● first choice
○ alternate choice

HNGJ-LD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
P										●	●	●		●	●		●
M										○	●	○		●	●	○	●
K								●	●	○	○	○	●	○			
N																	
S											●			●	●	●	○
H														○			
HNGJ0704ANENLD	12	13	6,80	4,48	1,60	1,20	0,08	3954419	3954420	3954421	3954422	-	-	5895291	5895292	5528975	5550905
HNGJ070432ANENLD	12	13	6,80	4,48	—	3,20	0,08	3954428	-	3954429	3954430	-	-	-	-	-	-


HNPJ-GD


HNPJ-HD



● first choice
○ alternate choice

	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
P			●	●	●		●	●		●
M			○	●	○		●	●	○	●
K	●	●	○	○	○	●	○			
N										
S				●			●	●	●	○
H							○			

■ HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNPJ0704ANSNGD	12	13	6,80	4,45	1,27	1,20	0,10	3954432	3954473	-	3954474	3954475	5427374	5895293	5895294	5528976	5550906

■ HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNPJ0704ANSNHD	12	13	6,80	4,41	1,25	1,20	0,14	3954477	3954478	-	3954479	3954480	5427375	5895295	5895296	-	5550907
HNPJ070432ANSNHD	12	13	6,80	4,42	–	3,20	0,14	3954481	3954482	-	3954483	3954484	-	-	-	-	5895297

Recommended Starting Speeds

■ Recommended Starting Speeds [m/min]

Material Group		TN6510			TN6520			TN6525			TN6540			TN7535			WK15CM		
P	1	–	–	–	–	–	–	410	**320**	280	360	**280**	240	545	**475**	445	–	–	–
	2	–	–	–	–	–	–	320	**250**	215	250	**190**	170	335	**305**	275	–	–	–
	3	–	–	–	–	–	–	280	**215**	185	215	**170**	140	305	**275**	245	–	–	–
	4	–	–	–	–	–	–	235	**170**	145	180	**130**	110	230	**210**	190	–	–	–
	5	–	–	–	–	–	–	310	**235**	200	240	**180**	150	310	**275**	250	–	–	–
	6	–	–	–	–	–	–	205	**160**	130	160	**120**	100	190	**160**	130	–	–	–
M	1	–	–	–	–	–	–	190	**120**	80	130	**80**	60	245	**220**	185	–	–	–
	2	–	–	–	–	–	–	120	**80**	50	80	**50**	40	220	**190**	170	–	–	–
	3	–	–	–	–	–	–	125	**80**	55	85	**50**	40	175	**155**	140	–	–	–
K	1	480	**350**	260	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	505	**460**	410
	2	420	**280**	205	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	400	**355**	330
	3	335	**260**	200	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	335	**300**	275
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	50	**35**	30	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	25	**20**	10	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	70	**40**	30	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	60	**30**	25	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WP25PM			WP35CM			WS30PM			WP40PM			TN6501			THM-U		
P	1	395	**340**	325	545	**475**	445	–	–	–	355	**310**	295	–	–	–	–	–	–
	2	330	**290**	240	335	**305**	275	–	–	–	300	**260**	215	–	–	–	–	–	–
	3	305	**260**	210	305	**275**	245	–	–	–	275	**235**	190	–	–	–	–	–	–
	4	270	**220**	180	230	**210**	190	–	–	–	245	**205**	160	–	–	–	–	–	–
	5	220	**205**	180	310	**275**	250	–	–	–	205	**185**	160	–	–	–	–	–	–
	6	200	**150**	120	190	**160**	130	–	–	–	180	**140**	110	–	–	–	–	–	–
M	1	245	**215**	200	245	**220**	185	270	**240**	220	235	**205**	185	–	–	–	–	–	–
	2	220	**190**	155	220	**190**	170	245	**215**	175	210	**180**	150	–	–	–	–	–	–
	3	170	**145**	115	175	**155**	140	185	**160**	125	155	**140**	110	–	–	–	–	–	–
K	1	275	**245**	220	355	**320**	290	–	–	–	–	–	–	–	–	–	–	–	–
	2	215	**190**	180	280	**250**	230	–	–	–	–	–	–	–	–	–	–	–	–
	3	180	**160**	145	235	**210**	190	–	–	–	–	–	–	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	–	–	–	–	–	–	–	–	–	–	–	1640	**980**	800	1640	**980**	800
	3	–	–	–	–	–	–	–	–	–	–	–	–	960	**600**	480	960	**600**	480
S	1	50	**40**	30	–	–	–	55	**50**	35	50	**40**	35	–	–	–	–	–	–
	2	50	**40**	30	–	–	–	55	**50**	35	50	**40**	35	–	–	–	–	–	–
	3	60	**50**	30	–	–	–	65	**55**	35	60	**50**	35	–	–	–	–	–	–
	4	85	**60**	40	80	**60**	40	100	**70**	50	80	**60**	40	–	–	–	–	–	–
H	1	145	**110**	85	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

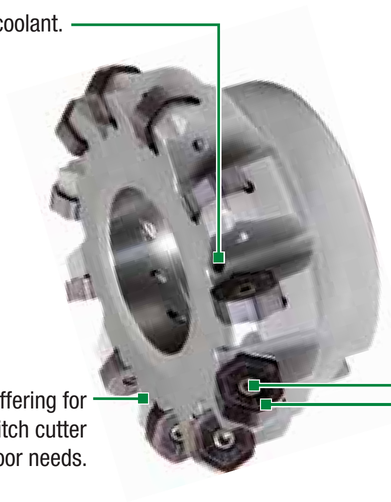
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
.F..LDJ	0,14	**0,26**	0,53	0,10	**0,19**	0,38	0,08	**0,14**	0,29	0,07	**0,12**	0,25	0,06	**0,11**	0,23	.F..LDJ
.E..LD	0,14	**0,41**	0,82	0,10	**0,29**	0,59	0,08	**0,22**	0,44	0,07	**0,19**	0,38	0,06	**0,18**	0,35	.E..LD
.S..GD	0,27	**0,68**	1,10	0,20	**0,49**	0,79	0,15	**0,37**	0,59	0,13	**0,32**	0,51	0,12	**0,29**	0,47	.S..GD
.S..HD	0,27	**0,68**	1,10	0,20	**0,49**	0,79	0,15	**0,37**	0,59	0,13	**0,32**	0,51	0,12	**0,29**	0,47	.S..HD

NOTE: Use "Light Machining" value as starting feed rate.

M1200

- Low cost per edge; high productivity.
- 14.5–59° lead angles.
- One series meets every face milling need.
- Available in WIDIA premium milling grades.
- Better tool life in light to heavy machining.

Best-in-class face milling platform to boost productivity on taper 50 spindle milling machines.



Face Mills

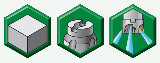
Victory™ M1200 HF 14.5°

Max depth of cut: 2,2mm

Lead angle: 14.5°
Indexes per insert: 12
Diameter: 50–160mm

Pages: H26–H29

P M K N S



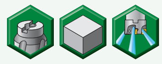
Victory™ M1200 45°

Max depth of cut: 4,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 40–315mm

Pages: H30–H37

P M K N S H



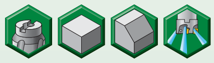
Victory™ M1200 HD 59°

Max depth of cut: 6mm

Lead angle: 59°
Indexes per insert: 12
Diameter: 50–160mm

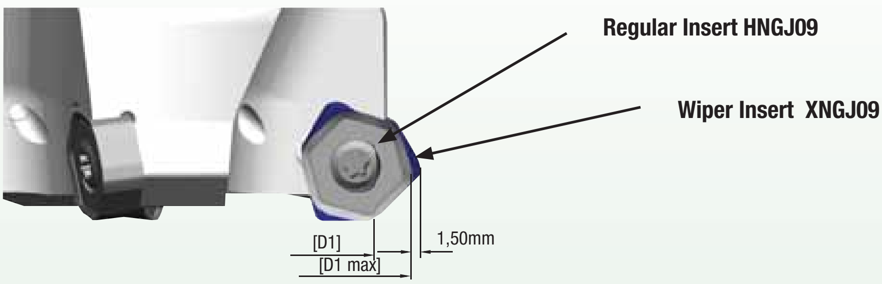
Pages: H38–H41

P M K N S



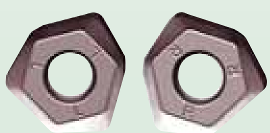
Easy-to-use wiper insert setup to achieve excellent surface floor finish

Wiper insert overlapping vs. regular insert

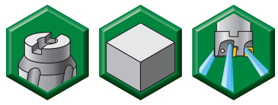


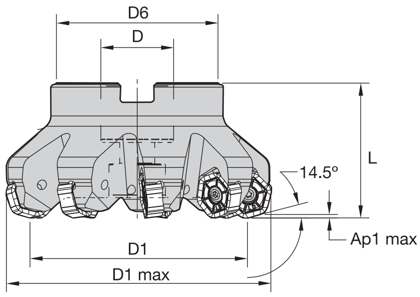
D1 max Wiper = D1 max + 3,00mm

- Wiper inserts only applied with 45° lead angle cutter bodies.
- Easy to use. Regular and wiper inserts are loaded into fixed pockets. No adjustment required.
- Please have D1 max wiper in mind in case of limited working area.
- Use wiper inserts only in combination with periphery ground regular inserts HNGJ09.
- Up to cutting diameter D1=100mm load one wiper insert.
- For cutting diameter D1=125mm and above load two wiper inserts.
- Each wiper insert XNGJ09 can be applied with three right hand R and three left hand L cutting edges.



- Twelve cutting edges.
- High feed rates for rough face milling.
- Use standard M1200 inserts.
- Do not load wiper inserts.

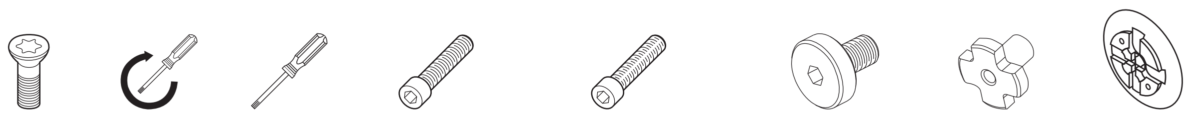




Shell Mills

order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
3750370	M1200HF050Z04HN09	50	67,9	22	38	40	2,2	4	11400	Yes	0,65
3750372	M1200HF063Z05HN09	63	80,9	22	50	40	2,2	5	8950	Yes	0,65
3750434	M1200HF080Z06HN09	80	97,9	27	60	50	2,2	6	7300	Yes	1,24
3750435	M1200HF100Z08HN09	100	117,9	32	80	50	2,2	8	5900	Yes	1,89
3750436	M1200HF125Z09HN09	125	142,9	40	90	63	2,2	9	4800	Yes	3,23
3957969	M1200HF160Z12HN09	160	177,9	40	110	63	2,2	12	3900	Yes	5,14

Spare Parts

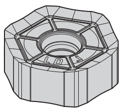


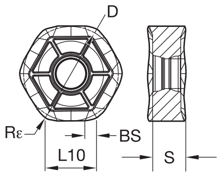
D1	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw assembly	coolant lock screw	coolant cap
50	12146034500	3,5	12148082400	12146120500	12146101000	–	–	–
63	12146034500	3,5	12148082400	12146120500	12146101000	–	–	–
80	12146034500	3,5	12148082400	12748701000	12146101800	–	–	–
100	12146034500	3,5	12148082400	–	–	12146109400	–	–
125	12146034500	3,5	12148082400	–	–	–	12146107000	12146111000
160	12146034500	3,5	12148082400	–	–	–	12146107000	12146111100

NOTE: Socket-head cap screw with coolant groove, coolant lock screw assembly, coolant lock screw, and coolant cap must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6520	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–

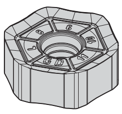

HNGJ-LDJ

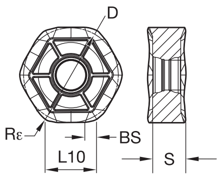


● first choice
○ alternate choice

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
P									
M									
K									
N								●	●
S									
H									
HNGJ0905ANFNLDJ	12	16	8,58	5,56	1,80	1,20	0,02	3865373	3606383


HNPJ-GD

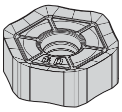


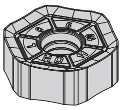
● first choice
○ alternate choice

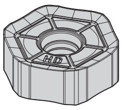
HNPJ-GD

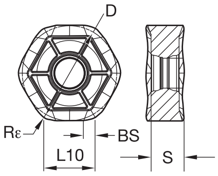
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P									●	●	●		●		●	●
M									○	●	○		●	○	●	●
K								●	○	○	○	●	○			
N																
S										●			●	●	●	○
H													○			
HNPJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3761185	–	3761187	3761188	5427372	5895374	–	5895375	5550908

Face Mills


HNGJ-GD


HNPJ-HD


HNGJ-HD



● first choice
○ alternate choice

		TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P			●	●	●		●		●	●
M			○	●	○		●	○	●	●
K		●	○	○	○	●	○			
N										
S				●			●	●	●	○
H							○			

HNGJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3119541	3614650	3037596	3093721	5427370	–	5528974	5895349	5895350

HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNPJ090543ANSNHD	12	16	8,50	5,44	–	4,34	0,13	3670866	–	3670865	–	–	5895378	–	5895379	5895380
HNPJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,18	3670864	–	3670842	–	5427371	5895376	–	5895377	5550909

HNGJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ090543ANSNHD	12	16	8,50	5,44	–	4,35	0,20	3564083	3564084	3564085	–	–	–	–	–	–
HNGJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,17	3563900	3563901	3563902	–	–	5895371	–	5895372	5895373

Recommended Starting Speeds [m/min]

Material Group		TN6520			TN6525			TN6540			TN7535			WK15CM			WP25PM		
P	1	–	**–**	–	410	**320**	280	360	**280**	240	545	**475**	445	–	**–**	–	395	**340**	325
	2	–	**–**	–	320	**250**	215	250	**190**	170	335	**305**	275	–	**–**	–	330	**290**	240
	3	–	**–**	–	280	**215**	185	215	**170**	140	305	**275**	245	–	**–**	–	305	**260**	210
	4	–	**–**	–	235	**170**	145	180	**130**	110	230	**210**	190	–	**–**	–	270	**220**	180
	5	–	**–**	–	310	**235**	200	240	**180**	150	310	**275**	250	–	**–**	–	220	**205**	180
	6	–	**–**	–	205	**160**	130	160	**120**	100	190	**160**	130	–	**–**	–	200	**150**	120
M	1	–	**–**	–	190	**120**	80	130	**80**	60	245	**220**	185	–	**–**	–	245	**215**	200
	2	–	**–**	–	120	**80**	50	80	**50**	40	220	**190**	170	–	**–**	–	220	**190**	155
	3	–	**–**	–	125	**80**	55	85	**50**	40	175	**155**	140	–	**–**	–	170	**145**	115
K	1	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	505	**460**	410	275	**245**	220
	2	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	400	**355**	330	215	**190**	180
	3	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	335	**300**	275	180	**160**	145
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–	50	**40**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–	50	**40**	30
	3	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–	60	**50**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–	85	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	145	**110**	85
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

Material Group		WS30PM			WP35CM			WP40PM			TN6501			THM-U		
P	1	–	**–**	–	545	**475**	445	355	**310**	295	–	**–**	–	–	**–**	–
	2	–	**–**	–	335	**305**	275	300	**260**	215	–	**–**	–	–	**–**	–
	3	–	**–**	–	305	**275**	245	275	**235**	190	–	**–**	–	–	**–**	–
	4	–	**–**	–	230	**210**	190	245	**205**	160	–	**–**	–	–	**–**	–
	5	–	**–**	–	310	**275**	250	205	**185**	160	–	**–**	–	–	**–**	–
	6	–	**–**	–	190	**160**	130	180	**140**	110	–	**–**	–	–	**–**	–
M	1	270	**240**	220	245	**220**	185	235	**205**	185	–	**–**	–	–	**–**	–
	2	245	**215**	175	220	**190**	170	210	**180**	150	–	**–**	–	–	**–**	–
	3	185	**160**	125	175	**155**	140	155	**140**	110	–	**–**	–	–	**–**	–
K	1	–	**–**	–	355	**320**	290	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	280	**250**	230	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	235	**210**	190	–	**–**	–	–	**–**	–	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	**–**	–	–	**–**	–	–	**–**	–	1640	**980**	800	1640	**980**	800
	3	–	**–**	–	–	**–**	–	–	**–**	–	960	**600**	480	960	**600**	480
S	1	55	**50**	35	–	**–**	–	50	**40**	35	–	**–**	–	–	**–**	–
	2	55	**50**	35	–	**–**	–	50	**40**	35	–	**–**	–	–	**–**	–
	3	65	**55**	35	–	**–**	–	60	**50**	35	–	**–**	–	–	**–**	–
	4	100	**70**	50	80	**60**	40	80	**60**	40	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

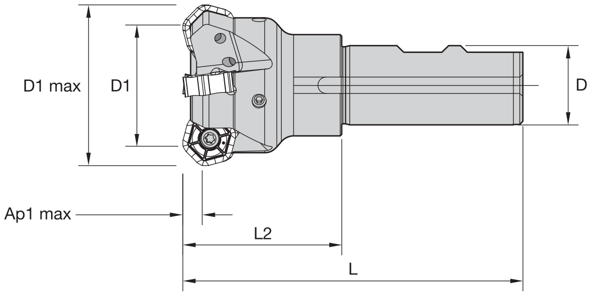
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDJ	0,45	**0,90**	1,84	0,33	**0,65**	1,31	0,25	**0,48**	0,97	0,21	**0,42**	0,84	0,20	**0,39**	0,77	.F..LDJ
.E..LD	0,45	**1,36**	2,81	0,33	**0,98**	1,97	0,25	**0,73**	1,46	0,21	**0,63**	1,27	0,20	**0,58**	1,16	.E..LD
.S..GD	0,72	**2,35**	3,89	0,52	**1,67**	2,70	0,39	**1,23**	1,98	0,34	**1,07**	1,72	0,31	**0,98**	1,57	.S..GD
.S..HD	0,92	**2,35**	3,89	0,66	**1,67**	2,70	0,49	**1,23**	1,98	0,43	**1,07**	1,72	0,39	**0,98**	1,57	.S..HD

NOTE: Use "Light Machining" value as starting feed rate.

Face Mills

- Twelve cutting edges.
- First choice for general face milling.
- Low cutting forces for maximum productivity.



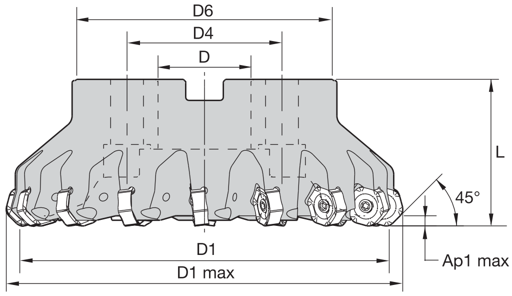
Weldon Shanks

order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
3325311	**M1200D040Z04B25HN09**	40	51,0	25	107	50	4,5	4	15800	Yes	0,52
3325310	**M1200D040Z03B25HN09**	40	51,0	25	107	50	4,5	3	15800	Yes	0,53

Spare Parts

D1	insert screw	Nm	Torx driver
40	**12146034500**	3,5	**12148082400**

- Twelve cutting edges.
- First choice for general face milling.
- Low cutting forces for maximum productivity.



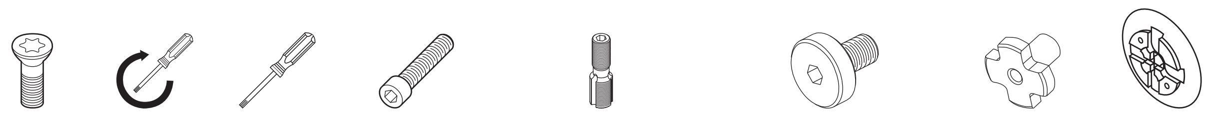
Shell Mills

order number	catalogue number	D1	D1 max	D	D4	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
3957970	M1200D040Z03HN09	40	51,0	22	—	39	40	4,4	3	15800	Yes	0,26
3957971	M1200D040Z04HN09	40	51,0	22	—	39	40	4,4	4	15800	Yes	0,25
3325312	M1200D050Z04HN09	50	61,0	22	—	38	40	4,5	4	12700	Yes	0,32
3325693	M1200D050Z05HN09	50	61,0	22	—	38	40	4,5	5	12700	Yes	0,33
3650535	M1200D063Z04HN09	63	74,0	22	—	50	40	4,5	4	10100	Yes	0,59
3093594	M1200D063Z06HN09	63	74,0	22	—	50	40	4,5	6	10100	Yes	0,56
3025376	M1200D063Z07HN09	63	74,0	22	—	50	40	4,5	7	10100	Yes	0,57
3650536	M1200D080Z05HN09	80	91,0	27	—	60	50	4,5	5	7900	Yes	1,12
3081507	M1200D080Z06HN09	80	91,0	27	—	60	50	4,5	6	7900	Yes	1,07
3025377	M1200D080Z09HN09	80	91,0	27	—	60	50	4,5	9	7900	Yes	1,11
3650537	M1200D100Z06HN09	100	111,0	32	—	80	50	4,5	6	6300	Yes	1,73
3325694	M1200D100Z08HN09	100	111,0	32	—	80	50	4,5	8	6300	Yes	1,68
3025378	M1200D100Z11HN09	100	111,0	32	—	80	50	4,5	11	6300	Yes	1,73
3650538	M1200D125Z08HN09	125	135,9	40	—	90	63	4,5	8	5050	Yes	2,84
3081508	M1200D125Z10HN09	125	135,9	40	—	90	63	4,5	10	5050	Yes	2,77
3093593	M1200D125Z14HN09	125	136,0	40	—	90	63	4,5	14	5050	Yes	2,86
3066118	M1200D160Z12HN09	160	171,0	40	66,7	110	63	4,5	12	3900	Yes	4,56
3066119	M1200D160Z16HN09	160	171,0	40	66,7	110	63	4,5	16	3900	Yes	4,70
3957972	M1200D200Z16HN09	200	211,0	60	101,6	130	63	4,5	16	3180	Yes	6,43
3957993	M1200D250Z20HN09	250	261,0	60	101,6	130	63	4,5	20	2550	Yes	9,93
3957994	M1200D315Z24HN09	315	326,0	60	101,6	230	80	4,5	24	2020	Yes	22,90

(continued)

(Shell Mills — continued)

Spare Parts

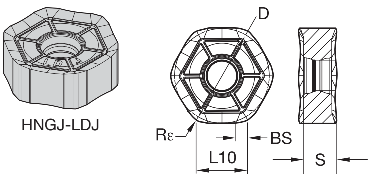


D1	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant screw assembly	coolant lock screw	coolant cap
40	**12146034500**	3,5	**12148082400**	–	**12146109200**	–	–	–
50	**12146034500**	3,5	**12148082400**	–	–	–	–	–
63	**12146034500**	3,5	**12148082400**	–	–	–	–	–
80	**12146034500**	3,5	**12148082400**	**12748701000**	–	–	–	–
100	**12146034500**	3,5	**12148082400**	–	–	**12146109400**	–	–
125	**12146034500**	3,5	**12148082400**	–	–	–	**12146107000**	**12146111000**
160	**12146034500**	3,5	**12148082400**	–	–	–	**12146107000**	**12146111100**
200	**12146034500**	3,5	**12148082400**	–	–	–	–	**12146111200**
250	**12146034500**	3,5	**12148082400**	–	–	–	–	**12146111300**
315	**12146034500**	3,5	**12148082400**	–	–	–	–	**12146111400**

NOTE: Socket-head cap screw with coolant groove, coolant screw assembly, coolant lock screw, and coolant cap must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6520	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–

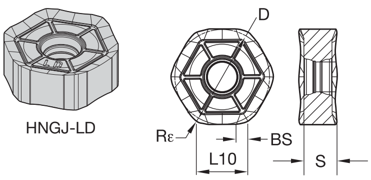


● first choice
○ alternate choice

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
HNGJ0905ANFNLDJ	12	16	8,58	5,56	1,80	1,20	0,02	3865373	3606383

	TN6501	THM-U
P		
M		
K		
N	●	●
S		
H		

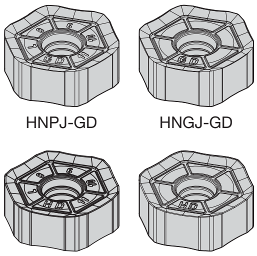


● first choice
○ alternate choice

HNGJ-LD

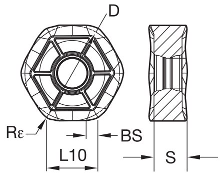
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ0905ANENLD	12	16	8,58	5,56	1,80	1,20	0,05	3093559	3330950	3030034	3030017	–	5895346	5528973	5895347	5895348

	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P		●	●	●		●		●	●
M		○	●	○		●	○	●	●
K	●	○	○	○	●	○			
N									
S			●			●	●	●	○
H						○			



HNPJ-GD HNGJ-GD

HNPJ-HD HNGJ-HD



● first choice
○ alternate choice

		TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P			●	●	●		●		●	●
M			○	●	○		●	○	●	●
K		●	○	○	○	●	○			
N										
S				●			●	●	●	○
H							○			

HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNPJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3761185	–	3761187	3761188	5427372	5895374	–	5895375	5550908

HNGJ-GD

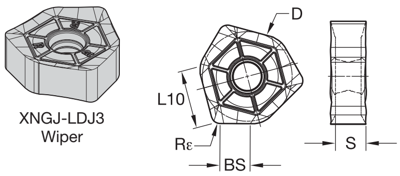
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3119541	3614650	3037596	3093721	5427370	–	5528974	5895349	5895350

HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNPJ090543ANSNHD	12	16	8,50	5,44	—	4,34	0,13	3670866	–	3670865	–	–	5895378	–	5895379	5895380
HNPJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,18	3670864	–	3670842	–	5427371	5895376	–	5895377	5550909

HNGJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ090543ANSNHD	12	16	8,50	5,44	—	4,35	0,20	3564083	3564084	3564085	–	–	–	–	–	–
HNGJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,17	3563900	3563901	3563902	–	–	5895371	–	5895372	5895373

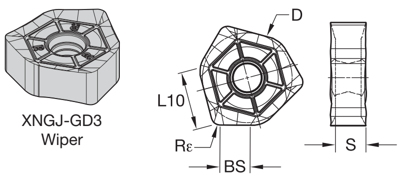


● first choice
○ alternate choice

XNGJ-LDJ3 Wiper

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
P									
M									
K									
N								●	●
S									
H									
XNGJ0905ANFNLDJ3W	3	16	9,60	5,51	6,00	1,60	0,02	3865375	3865358

NOTE: Inserts have 3 right-hand and 3 left-hand cutting edges.

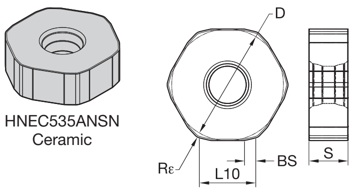


● first choice
○ alternate choice

XNGJ-GD3 Wiper

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P									●	●	●		●		●	●
M									○	●	○		●	○	●	●
K								●	○	○	○	●	○			
N																
S										●			●	●	●	○
H													○			
XNGJ0905ANSNGD3W	3	16	9,60	5,51	6,00	1,60	0,09	3524707	3523620	3066479	–	5622622	5895381	–	–	5895382

NOTE: Inserts have 3 right-hand and 3 left-hand cutting edges.



● first choice
○ alternate choice

HNEC535ANSN Ceramic

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	WK25YM
P								
M								
K								●
N								
S								
H								
HNEC0905ANSN	12	16	9,17	5,56	1,95	1,20	0,19	5910033

Recommended Starting Speeds [m/min]

Material Group		TN6520			TN6525			TN6540			TN7535			WK15CM			WP25PM		
P	1	–	**–**	–	410	**320**	280	360	**280**	240	545	**475**	445	–	**–**	–	395	**340**	325
	2	–	**–**	–	320	**250**	215	250	**190**	170	335	**305**	275	–	**–**	–	330	**290**	240
	3	–	**–**	–	280	**215**	185	215	**170**	140	305	**275**	245	–	**–**	–	305	**260**	210
	4	–	**–**	–	235	**170**	145	180	**130**	110	230	**210**	190	–	**–**	–	270	**220**	180
	5	–	**–**	–	310	**235**	200	240	**180**	150	310	**275**	250	–	**–**	–	220	**205**	180
	6	–	**–**	–	205	**160**	130	160	**120**	100	190	**160**	130	–	**–**	–	200	**150**	120
M	1	–	**–**	–	190	**120**	80	130	**80**	60	245	**220**	185	–	**–**	–	245	**215**	200
	2	–	**–**	–	120	**80**	50	80	**50**	40	220	**190**	170	–	**–**	–	220	**190**	155
	3	–	**–**	–	125	**80**	55	85	**50**	40	175	**155**	140	–	**–**	–	170	**145**	115
K	1	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	505	**460**	410	275	**245**	220
	2	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	400	**355**	330	215	**190**	180
	3	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	335	**300**	275	180	**160**	145
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–	50	**40**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–	50	**40**	30
	3	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–	60	**50**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–	85	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	145	**110**	85
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WS30PM			WP35CM			WP40PM			WK25YM			TN6501			THM-U		
P	1	–	–	–	545	**475**	445	355	**310**	295	–	–	–	–	–	–	–	–	–
	2	–	–	–	335	**305**	275	300	**260**	215	–	–	–	–	–	–	–	–	–
	3	–	–	–	305	**275**	245	275	**235**	190	–	–	–	–	–	–	–	–	–
	4	–	–	–	230	**210**	190	245	**205**	160	–	–	–	–	–	–	–	–	–
	5	–	–	–	310	**275**	250	205	**185**	160	–	–	–	–	–	–	–	–	–
	6	–	–	–	190	**160**	130	180	**140**	110	–	–	–	–	–	–	–	–	–
M	1	270	**240**	220	245	**220**	185	235	**205**	185	–	–	–	–	–	–	–	–	–
	2	245	**215**	175	220	**190**	170	210	**180**	150	–	–	–	–	–	–	–	–	–
	3	185	**160**	125	175	**155**	140	155	**140**	110	–	–	–	–	–	–	–	–	–
K	1	–	–	–	355	**320**	290	–	–	–	965	**880**	780	–	–	–	–	–	–
	2	–	–	–	280	**250**	230	–	–	–	765	**685**	635	–	–	–	–	–	–
	3	–	–	–	235	**210**	190	–	–	–	645	**570**	525	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	–	–	–	–	–	–	–	–	–	–	–	1640	**980**	800	1640	**980**	800
	3	–	–	–	–	–	–	–	–	–	–	–	–	960	**600**	480	960	**600**	480
S	1	55	**50**	35	–	–	–	50	**40**	35	–	–	–	–	–	–	–	–	–
	2	55	**50**	35	–	–	–	50	**40**	35	–	–	–	–	–	–	–	–	–
	3	65	**55**	35	–	–	–	60	**50**	35	–	–	–	–	–	–	–	–	–
	4	100	**70**	50	80	**60**	40	80	**60**	40	–	–	–	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

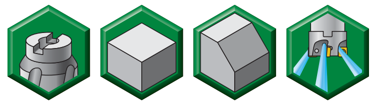
Recommended Starting Feeds [mm]

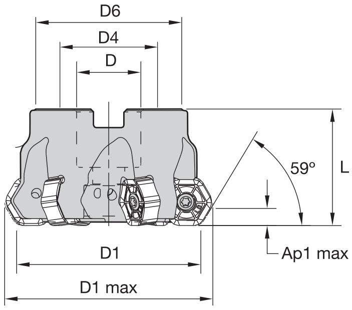
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDJ	0,17	**0,33**	0,66	0,12	**0,24**	0,47	0,09	**0,18**	0,35	0,08	**0,15**	0,31	0,07	**0,14**	0,28	.F..LDJ
.E..LD	0,17	**0,49**	0,99	0,12	**0,35**	0,71	0,09	**0,27**	0,53	0,08	**0,23**	0,46	0,07	**0,21**	0,42	.E..LD
.S..GD	0,26	**0,84**	1,35	0,19	**0,60**	0,97	0,14	**0,45**	0,72	0,12	**0,39**	0,63	0,11	**0,36**	0,57	.S..GD
.S..HD	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	.S..HD
.S..Ceramic	0,17	**0,33**	0,49	0,12	**0,24**	0,35	0,09	**0,18**	0,27	0,08	**0,15**	0,23	0,07	**0,14**	0,21	.S..Ceramic

NOTE: Use "Light Machining" value as starting feed rate.

- Twelve cutting edges.
- Higher Ap1 max with standard insert.

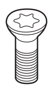
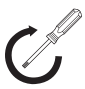
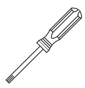
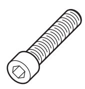
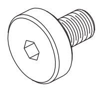
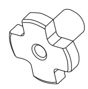
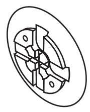




Shell Mills

order number	catalogue number	D1	D1 max	D	D4	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
4152113	**M1200HD050Z04HN09**	50	58,6	22	—	38	40	6,0	4	12700	Yes	0,29
4152114	**M1200HD050Z05HN09**	50	58,6	22	—	38	40	6,0	5	12700	Yes	0,28
4152115	**M1200HD063Z04HN09**	63	71,5	22	—	50	40	6,0	4	10100	Yes	0,54
4152116	**M1200HD063Z06HN09**	63	71,5	22	—	50	40	6,0	6	10100	Yes	0,55
4152117	**M1200HD080Z05HN09**	80	88,5	27	—	60	50	6,0	5	7900	Yes	1,05
4152118	**M1200HD080Z08HN09**	80	88,5	27	—	60	50	6,0	8	7900	Yes	1,10
4152119	**M1200HD100Z06HN09**	100	108,5	32	—	80	50	6,0	6	6300	Yes	1,61
4152120	**M1200HD100Z08HN09**	100	108,5	32	—	80	50	6,0	8	6300	Yes	1,63
4152121	**M1200HD125Z08HN09**	125	133,5	40	—	90	63	6,0	8	5050	Yes	2,88
4152122	**M1200HD125Z10HN09**	125	133,5	40	—	90	63	6,0	10	5050	Yes	2,85
4152123	**M1200HD160Z09HN09**	160	168,5	40	66,7	110	63	6,0	9	3900	Yes	4,62
4152124	**M1200HD160Z12HN09**	160	168,5	40	66,7	110	63	6,0	12	3900	Yes	4,75

Spare Parts

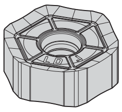
      

D1	insert screw	Nm	Torx driver	socket-head cap screw	coolant screw assembly	coolant lock screw	coolant cap
50	**12146034500**	3,5	**12148082400**	**12146120500**	–	–	–
63	**12146034500**	3,5	**12148082400**	**12146120500**	–	–	–
80	**12146034500**	3,5	**12148082400**	**12748701000**	–	–	–
100	**12146034500**	3,5	**12148082400**	–	**12146109400**	–	–
125	**12146034500**	3,5	**12148082400**	–	–	**12146107000**	**12146111000**
160	**12146034500**	3,5	**12148082400**	–	–	**12146107000**	**12146111100**

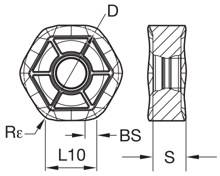
NOTE: Coolant screw assembly, coolant lock screw, and coolant cap must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6520	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–



HNGJ-LDJ

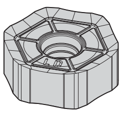


● first choice
○ alternate choice

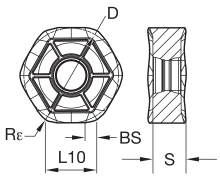
HNGJ-LDJ

	TN6501	THM-U
P		
M		
K		
N	●	●
S		
H		

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
HNGJ0905ANFNLDJ	12	16	8,58	5,56	1,80	1,20	0,02	3865373	3606383



HNGJ-LD

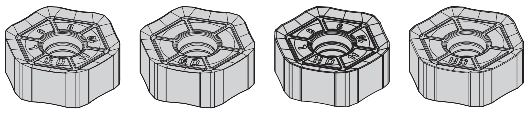


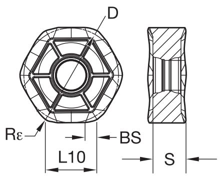
● first choice
○ alternate choice

HNGJ-LD

	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
P		●	●	●	●			●	●
M		○	●	○	●		○	●	●
K	●	○	○	○	○	●			
N									
S			●		●		●	●	○
H					○				

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNGJ0905ANENLD	12	16	8,58	5,56	1,80	1,20	0,05	3093559	3330950	3030034	3030017	5895346	–	5528973	5895347	5895348





● first choice
○ alternate choice

		TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
P			●	●	●	●			●	●
M			○	●	○	●		○	●	●
K		●	○	○	○	○	●			
N										
S				●		●		●	●	○
H						○				

■ HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNPJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3761185	–	3761187	3761188	5895374	5427372	–	5895375	5550908

■ HNGJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNGJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3119541	3614650	3037596	3093721	–	5427370	5528974	5895349	5895350

■ HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNPJ090543ANSNHD	12	16	8,50	5,44	—	4,34	0,13	3670866	–	3670865	–	5895378	–	–	5895379	5895380
HNPJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,18	3670864	–	3670842	–	5895376	5427371	–	5895377	5550909

■ HNGJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNGJ090543ANSNHD	12	16	8,50	5,44	—	4,35	0,20	3564083	3564084	3564085	–	–	–	–	–	–
HNGJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,17	3563900	3563901	3563902	–	5895371	–	–	5895372	5895373

Recommended Starting Speeds [m/min]

Material Group		TN6501			TN6520			TN6525			TN6540			TN7535			WP25PM		
P	1	–	–	–	–	–	–	410	**320**	280	360	**280**	240	545	**475**	445	1295	**1120**	1060
	2	–	–	–	–	–	–	320	**250**	215	250	**190**	170	335	**305**	275	1080	**940**	785
	3	–	–	–	–	–	–	280	**215**	185	215	**170**	140	305	**275**	245	1000	**845**	690
	4	–	–	–	–	–	–	235	**170**	145	180	**130**	110	230	**210**	190	890	**725**	590
	5	–	–	–	–	–	–	310	**235**	200	240	**180**	150	310	**275**	250	725	**670**	590
	6	–	–	–	–	–	–	205	**160**	130	160	**120**	100	190	**160**	130	650	**490**	395
M	1	–	–	–	–	–	–	190	**120**	80	130	**80**	60	245	**220**	185	805	**710**	650
	2	–	–	–	–	–	–	120	**80**	50	80	**50**	40	220	**190**	170	725	**630**	510
	3	–	–	–	–	–	–	125	**80**	55	85	**50**	40	175	**155**	140	550	**475**	370
K	1	–	–	–	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	905	**805**	725
	2	–	–	–	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	710	**630**	590
	3	–	–	–	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	590	**535**	475
N	1	2400	**1440**	1200	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	1640	**980**	800	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	960	**600**	480	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	50	**35**	30	–	–	–	155	**140**	95
	2	–	–	–	–	–	–	–	–	–	25	**20**	10	–	–	–	155	**140**	95
	3	–	–	–	–	–	–	–	–	–	70	**40**	30	–	–	–	200	**155**	95
	4	–	–	–	–	–	–	–	–	–	60	**30**	25	–	–	–	275	**200**	140
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	475	**355**	275
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Material Group		WK15CM			WS30PM			WP35CM			WP40PM			TN6501			THM-U		
P	1	–	–	–	–	–	–	545	**475**	445	355	**310**	295	–	–	–	–	–	–
	2	–	–	–	–	–	–	335	**305**	275	300	**260**	215	–	–	–	–	–	–
	3	–	–	–	–	–	–	305	**275**	245	275	**235**	190	–	–	–	–	–	–
	4	–	–	–	–	–	–	230	**210**	190	245	**205**	160	–	–	–	–	–	–
	5	–	–	–	–	–	–	310	**275**	250	205	**185**	160	–	–	–	–	–	–
	6	–	–	–	–	–	–	190	**160**	130	180	**140**	110	–	–	–	–	–	–
M	1	–	–	–	270	**240**	220	245	**220**	185	235	**205**	185	–	–	–	–	–	–
	2	–	–	–	245	**215**	175	220	**190**	170	210	**180**	150	–	–	–	–	–	–
	3	–	–	–	185	**160**	125	175	**155**	140	155	**140**	110	–	–	–	–	–	–
K	1	505	**460**	410	–	–	–	355	**320**	290	–	–	–	–	–	–	–	–	–
	2	400	**355**	330	–	–	–	280	**250**	230	–	–	–	–	–	–	–	–	–
	3	335	**300**	275	–	–	–	235	**210**	190	–	–	–	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	–	–	–	–	–	–	–	–	–	–	–	1640	**980**	800	1640	**980**	800
	3	–	–	–	–	–	–	–	–	–	–	–	–	960	**600**	480	960	**600**	480
S	1	–	–	–	55	**50**	35	–	–	–	50	**40**	35	–	–	–	–	–	–
	2	–	–	–	55	**50**	35	–	–	–	50	**40**	35	–	–	–	–	–	–
	3	–	–	–	65	**55**	35	–	–	–	60	**50**	35	–	–	–	–	–	–
	4	–	–	–	100	**70**	50	80	**60**	40	80	**60**	40	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)														Insert Geometry
	5%			10%			20%			30%			40–100%		
.F..LDJ	0,13	**0,27**	0,54	0,10	**0,19**	0,39	0,07	**0,14**	0,29	0,06	**0,13**	0,25	0,06	**0,12**	0,23	.F..LDJ
.E..LD	0,13	**0,40**	0,81	0,10	**0,29**	0,58	0,07	**0,22**	0,43	0,06	**0,19**	0,38	0,06	**0,17**	0,35	.E..LD
.S..GD	0,21	**0,68**	1,10	0,15	**0,49**	0,79	0,12	**0,37**	0,59	0,10	**0,32**	0,51	0,09	**0,29**	0,47	.S..GD
.S..HD	0,27	**0,68**	1,10	0,20	**0,49**	0,79	0,15	**0,37**	0,59	0,13	**0,32**	0,51	0,12	**0,29**	0,47	.S..HD

NOTE: Use "Light Machining" value as starting feed rate.

When Low Cutting Forces Are Required •
M640 Series

M640

The M640 platform is the first choice when high productivity, superior finish operations, and soft cutting performance are a priority. With six effective cutting edges and a streamlined body design, this easy-to-use tool is ideal, even for low-power machines.

- Highly positive rake angle means extremely low cutting forces.
- Available in geometries and grades for all applications.
- Easy-to-use for fast, accurate indexing.

All pockets are machined into preheated material for excellent runout and pocket strength.

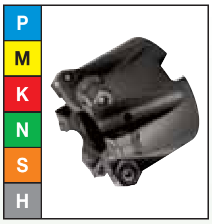
Face Mills

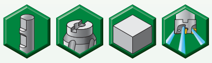
M640

Max depth of cut: 4,8mm

Lead angle: 58°
Indexes per insert: 6
Diameter: 32–125mm

Pages: H44–H49





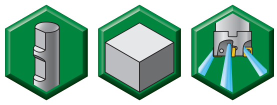
Insert Offering

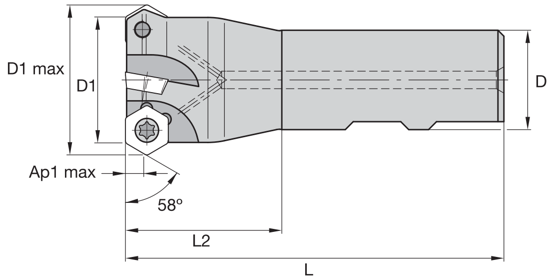
Low cutting force wiper inserts: Special wiper design for very soft cutting in finishing operations with high productivity.

Six effective cutting edges.

Highly positive rake:
- Extremely low cutting forces.
- For low-power machines, driven units, and light fixtures.
- Chipbreaker and grades for all applications.
- Through tool coolant up to 80mm diameter.

- Six cutting edges.
- Highly positive rake for low-power machines or light fixtures.
- Geometries and grades for all applications.

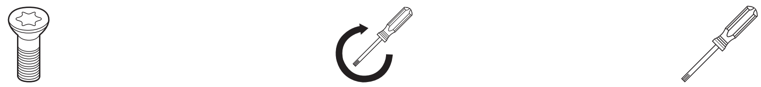




Weldon Shanks

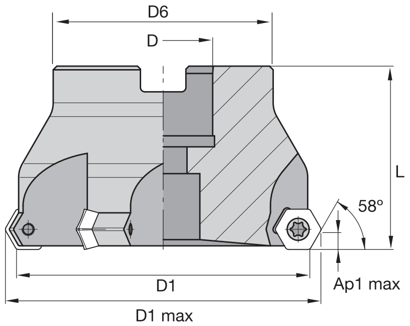
order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
2263165	**12395405200**	32	38,4	32	100	40	4,8	4	29500	Yes	0,35

Spare Parts



D1	insert screw	Nm	Torx driver
32	**12148038800**	4,0	**12148000600**

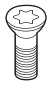
- Six cutting edges.
- Highly positive rake for low-power machines or light fixtures.
- Geometries and grades for all applications.

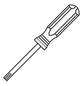


Shell Mills

order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2263132	**12395410200**	50	56,4	22	47	40	4,8	4	19000	Yes	0,40
2263154	**12395410400**	63	69,4	22	50	40	4,8	5	15000	Yes	0,55
2263156	**12395410600**	80	86,4	27	60	50	4,8	6	11500	Yes	1,05
2263158	**12395410800**	100	106,4	32	78	50	4,8	7	9500	No	1,50
2263159	**12395415800**	100	106,4	32	78	50	4,8	10	9500	No	1,65
2263160	**12395411000**	125	131,4	40	89	63	4,8	8	7500	No	2,90

Spare Parts

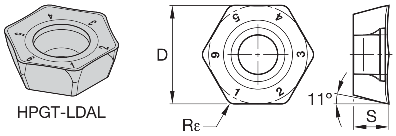




D1	insert screw	Nm	Torx driver
50	**12148038800**	4,0	**12148000600**
63	**12148038800**	4,0	**12148000600**
80	**12148038800**	4,0	**12148000600**
100	**12148038800**	4,0	**12148000600**
125	**12148038800**	4,0	**12148000600**

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.E..LD	WP40PM	**.E..GD**	**WP40PM**	.E..GD	WP40PM
P3–P4	.E..LD	WP25PM	**.E..GD**	**WP35CM**	.E..GD	WP35CM
P5–P6	.E..LD	WP25PM	**.E..GD**	**WP35CM**	.E..GD	WP35CM
M1–M2	.E..LD	WP25PM	**.E..GD**	**WP25PM**	.E..GD	WP25PM
M3	.E..LD	WP40PM	**.E..GD**	**WP35CM**	.E..GD	WP35CM
K1–K2	.E..LD	TN6510	**.E..GD**	**WK15CM**	.E..GD	WK15CM
K3	.E..LD	TN6520	**.E..GD**	**WP35CM**	.E..GD	WP35CM
N1–N2	.F..LDAL	TN6501	**.F..LDAL**	**TN6501**	.F..LDAL	TN6501
N3	.F..LDAL	TN6501	**.F..LDAL**	**TN6501**	.F..LDAL	TN6501
S1–S2	.E..LD	WP25PM	**.E..GD**	**WP25PM**	.E..GD	WP25PM
S3	.E..GD	WS30PM	**.E..GD**	**WS30PM**	.E..GD	WP40PM
S4	.E..GD	WS30PM	**.E..GD**	**WS30PM**	.E..GD	WP40PM
H1	.E..LD	TN2510	**.E..GD**	**TN2510**	–	–



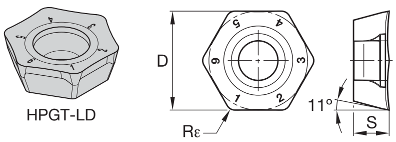
HPGT-LDAL

● first choice
○ alternate choice

HPGT-LDAL

catalogue number	cutting edges	D	S	Rε	hm	TN6501	THM-U	THM
P								
M								
K								○
N						●	●	●
S								○
H								
HPGT06T3DZFRLDAL	6	11	4,00	0,90	0,08	2957548	2288107	2288106

NOTE: Ap1 max = 3,2mm with this geometry.



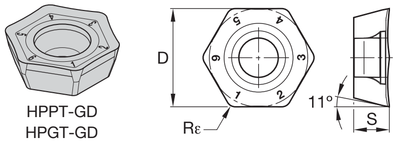
HPGT-LD

● first choice
○ alternate choice

HPGT-LD

catalogue number	cutting edges	D	S	Rε	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P						○			●	●	●	●		●		●	●
M									○	●	○	○		●	○	●	●
K						●	●	●	○	○		○	●	○			
N																	
S										●				●	●	●	○
H						●								○			
HPGT06T3DZERLD	6	11	3,99	0,98	0,08	2288072	–	2957585	2957547	2957587	2288070	–	–	5895784	–	–	5895785

NOTE: Ap1 max = 3mm with this geometry.



● first choice
○ alternate choice

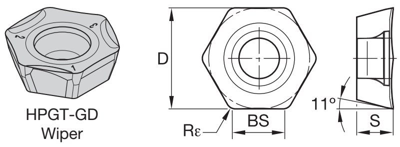
		TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P		○			●	●	●	●		●		●	●
M					○	●	○	○		●	○	●	●
K		●	●	●	○	○		○	●	○			
N													
S						●				●	●	●	○
H		●								○			

HPPT-GD

catalogue number	cutting edges	D	S	Rε	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HPPT06T3DZENGD	6	11	3,97	0,98	0,10	–	–	2957583	2957586	2957552	2271760	2271759	–	5895788	–	5895790	5895789

HPGT-GD

catalogue number	cutting edges	D	S	Rε	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HPGT06T3DZENGD	6	11	3,97	0,98	0,10	2288069	2957589	–	2957588	2957546	2288067	2288066	5427387	5895782	5528978	–	5895783



● first choice
○ alternate choice

		TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P		○			●	●	●	●		●		●	●
M					○	●	○	○		●	○	●	●
K		●	●	●	○	○		○	●	○			
N													
S						●				●	●	●	○
H		●								○			

HPGT-GD Wiper

catalogue number	cutting edges	D	S	BS	Rε	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HPGT06T3DZERGD3W	3	11	4,00	2,88	0,98	0,10	–	2957549	–	2957584	–	2288103	–	5427388	5895786	–	–	5895787

Face Mills

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6510			TN6520			TN6525			TN6540			TN7525		
P	1	660	**580**	540	–	–	–	–	–	–	410	**320**	280	360	**280**	240	410	**310**	280
	2	410	**370**	330	–	–	–	–	–	–	320	**250**	215	250	**190**	170	310	**250**	215
	3	370	**330**	305	–	–	–	–	–	–	280	**215**	185	215	**170**	140	280	**215**	185
	4	275	**260**	230	–	–	–	–	–	–	235	**170**	145	180	**130**	110	235	**170**	145
	5	330	**300**	275	–	–	–	–	–	–	310	**235**	200	240	**180**	150	310	**235**	200
	6	230	**205**	175	–	–	–	–	–	–	205	**160**	130	160	**120**	100	205	**160**	130
M	1	270	**240**	210	–	–	–	–	–	–	190	**120**	80	130	**80**	60	245	**220**	185
	2	245	**210**	190	–	–	–	–	–	–	120	**80**	50	80	**50**	40	220	**190**	170
	3	190	**175**	150	–	–	–	–	–	–	125	**80**	55	85	**50**	40	175	**155**	140
K	1	420	**360**	300	480	**350**	260	450	**320**	230	275	**245**	220	220	**205**	180	380	**280**	240
	2	360	**300**	250	420	**280**	205	390	**250**	190	215	**190**	180	175	**155**	140	325	**240**	200
	3	300	**250**	200	335	**260**	200	300	**230**	160	180	**160**	145	155	**145**	125	240	**200**	170
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	–	–	–	50	**35**	30	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	25	**20**	10	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	70	**40**	30	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	60	**30**	25	–	–	–
H	1	145	**110**	70	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	145	**110**	70	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	115	**80**	45	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Material Group		TN7535			WK15CM			WP25PM			WS30PM			WP35CM			WP40PM		
P	1	545	**475**	445	–	–	–	395	**340**	325	–	–	–	545	**475**	445	355	**310**	295
	2	335	**305**	275	–	–	–	330	**290**	240	–	–	–	335	**305**	275	300	**260**	215
	3	305	**275**	245	–	–	–	305	**260**	210	–	–	–	305	**275**	245	275	**235**	190
	4	230	**210**	190	–	–	–	270	**220**	180	–	–	–	230	**210**	190	245	**205**	160
	5	310	**275**	250	–	–	–	220	**205**	180	–	–	–	310	**275**	250	205	**185**	160
	6	190	**160**	130	–	–	–	200	**150**	120	–	–	–	190	**160**	130	180	**140**	110
M	1	245	**220**	185	–	–	–	245	**215**	200	270	**240**	220	245	**220**	185	235	**205**	185
	2	220	**190**	170	–	–	–	220	**190**	155	245	**215**	175	220	**190**	170	210	**180**	150
	3	175	**155**	140	–	–	–	170	**145**	115	185	**160**	125	175	**155**	140	155	**140**	110
K	1	355	**320**	290	505	**460**	410	275	**245**	220	–	–	–	355	**320**	290	–	–	–
	2	280	**250**	230	400	**355**	330	215	**190**	180	–	–	–	280	**250**	230	–	–	–
	3	235	**210**	190	335	**300**	275	180	**160**	145	–	–	–	235	**210**	190	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	50	**40**	30	55	**50**	35	–	–	–	50	**40**	35
	2	–	–	–	–	–	–	50	**40**	30	55	**50**	35	–	–	–	50	**40**	35
	3	–	–	–	–	–	–	60	**50**	30	65	**55**	35	–	–	–	60	**50**	35
	4	–	–	–	–	–	–	85	**60**	40	100	**70**	50	80	**60**	40	80	**60**	40
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		TN6501			THM-U			THM		
P	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–
	5	–	**–**	–	–	**–**	–	–	**–**	–
	6	–	**–**	–	–	**–**	–	–	**–**	–
M	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
K	1	–	**–**	–	230	**205**	180	145	**110**	90
	2	–	**–**	–	–	**–**	–	150	**120**	85
	3	–	**–**	–	–	**–**	–	155	**115**	70
N	1	2400	**1440**	1200	2400	**1440**	1200	1080	**720**	600
	2	1640	**980**	800	1640	**980**	800	820	**560**	460
	3	960	**600**	480	960	**600**	480	540	**335**	240
S	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDAL	0,13	**0,34**	0,47	0,10	**0,25**	0,34	0,07	**0,18**	0,25	0,06	**0,16**	0,22	0,06	**0,15**	0,20	.F..LDAL
.E..LD	0,13	**0,34**	0,47	0,10	**0,25**	0,34	0,07	**0,18**	0,25	0,06	**0,16**	0,22	0,06	**0,15**	0,20	.E..LD
.E..GD	0,13	**0,48**	0,54	0,10	**0,35**	0,39	0,07	**0,26**	0,29	0,06	**0,23**	0,25	0,06	**0,21**	0,23	.E..GD

NOTE: Use "Light Machining" value as starting feed rate.

The Ideal Heavy-Duty Face Milling Platform •
M660 Series

M660

The M660 Series heavy-duty face milling platform, with its strong tool body design and perfect axial and radial runout, is the ultimate high-performance booster in the heavy machining of steel and cast iron.

- Three tailor-made chipbreakers with large chip gash ensures excellent chip evacuation.
- Easy, safe, and stable clamping ensures accurate indexing.
- Thick inserts for reliability and high MRR capability.

Face Mills

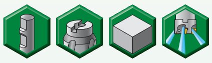
M660 SN1205..

Max depth of cut: 6,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 20–160mm

Pages: H52–H57

P
M
K
N
S
H



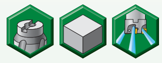
M660 SN1505..

Max depth of cut: 8,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 100mm

Pages: H58–H60

P
M
K



Insert Offering

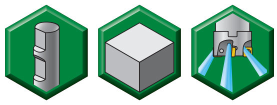
Three tailor-made chipbreakers (-20, -21, -31) for all heavy-duty applications in steel and cast iron.

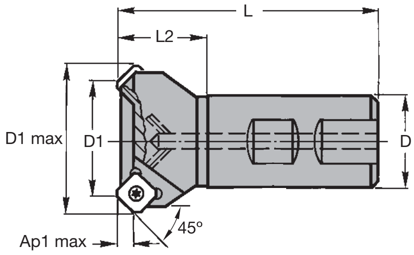
Thick inserts for reliability and high MRR capability.

Integrated wiper facet: Good surface finish in heavy roughing applications.

Positive rake angle:
- Soft cutting action.
- Less spindle power requirement.
- Less chipping on workpiece in cast iron.
- Less burs on workpiece in steel.
- High feed rate capability.

- Four cutting edges.
- Strong tool body design.
- Excellent chip evacuation.

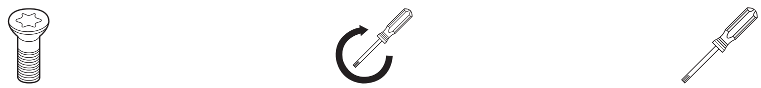




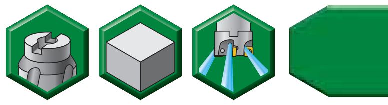
Weldon Shanks

order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
2002367	**12396202200**	20	33,8	25	86	30	6,4	2	17000	Yes	0,30
2002370	**12396202600**	25	38,7	25	91	35	6,4	2	15000	Yes	0,35

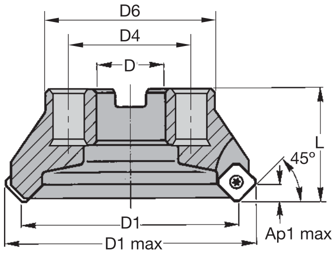
Spare Parts



D1	insert screw	Nm	Torx driver
20	**12148007200**	3,5	**12148007500**
25	**12148007200**	3,5	**12148007500**



- Four cutting edges.
- Strong tool body design.
- Excellent chip evacuation.

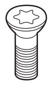


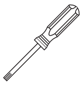
Face Mills

Shell Mills

order number	catalogue number	D1	D1 max	D	D4	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2003541	**12396203800**	50	63,5	22	–	50	40	6,4	4	12500	Yes	0,45
2003558	**12396204200**	63	76,5	22	–	50	40	6,4	5	11000	Yes	0,60
2003575	**12396204600**	80	94,3	27	–	60	50	6,4	6	9900	Yes	1,15
2003582	**12396205000**	100	113,4	32	–	78	50	6,4	7	8900	No	1,60
2003679	**12396205400**	125	138,3	40	–	89	63	6,4	8	7900	No	2,80
2003780	**12396205800**	160	173,3	40	66,7	90	63	6,4	10	7000	No	4,10

Spare Parts





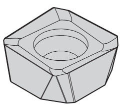
D1	insert screw	Nm	Torx driver
50	**12148007200**	3,5	**12148007500**
63	**12148007200**	3,5	**12148007500**
80	**12148007200**	3,5	**12148007500**
100	**12148007200**	3,5	**12148007500**
125	**12148007200**	3,5	**12148007500**
160	**12148007200**	3,5	**12148007500**

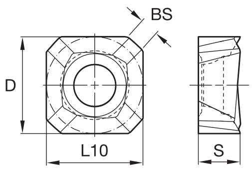
Face Mills

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	…20	TN6540	**…31**	**WP40PM**	…31	WP40PM
P3–P4	…20	TN7535	**…31**	**WP35CM**	…31	WP35CM
P5–P6	…20	TN7535	**…31**	**WP35CM**	…31	WP35CM
M1–M2	…20	TN6540	**…31**	**WP25PM**	…31	WP25PM
M3	…20	TN7535	**…31**	**WP35CM**	…31	WP35CM
K1–K2	…21	WK15CM	**…31**	**WK15CM**	…31	WK15CM
K3	…21	WK15CM	**…31**	**WP35CM**	…31	WP35CM
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	…20	TN6540	**…31**	**WP25PM**	…31	WP25PM
S3	–	–	–	–	–	–
S4	…20	TN6540	**…31**	**WP40PM**	…31	WP40PM
H1	–	–	–	–	–	–

Inserts • SN1205..


SNKT-20
SNKT-21



● first choice
○ alternate choice

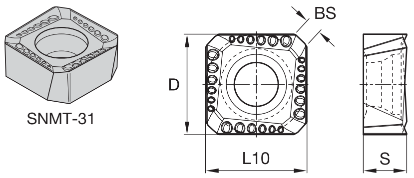
	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
P	●	●	●		●	●	
M	●	○	○		●	○	
K	○		○	●			○
N							●
S	●				○		○
H							

SNKT-20

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
SNKT1205AZER20	4	12,70	12,70	5,51	2,00	0,10	2964201	2022370	2020691	-	-	2022371	-

SNKT-21

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
SNKT1205AZR21	4	12,70	12,70	5,56	1,54	0,15	-	2022373	-	5427383	-	2022374	2022375

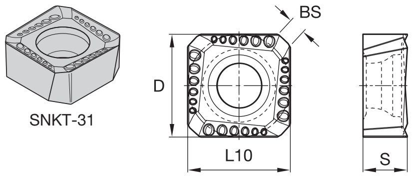


● first choice
○ alternate choice

		TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	TTI25	THM
P		●	●	●	●		●	●	●	●	
M		○	●	○	○		●	●	●	○	
K		○	○		○	●	○				○
N							●				●
S			●					●	○		○
H							○				

SNMT-31

catalogue number	cutting edges	D	L10	S	BS	hm	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	TTI25	THM
SNMT1205AZR31	4	12,70	12,70	5,56	1,54	0,16	2964206	2964204	2020673	2020663	5427382	5895536	5895537	5551088	-	-

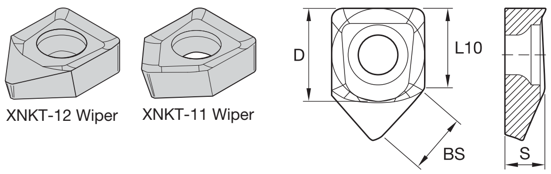


● first choice
○ alternate choice

		TN6525	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
P		●	●	●	●		●	●	
M		○	●	○	○		●	○	
K		○	○		○	●			○
N									●
S			●				○		○
H									

SNKT-31

catalogue number	cutting edges	D	L10	S	BS	hm	TN6525	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
SNKT1205AZR31	4	12,70	12,70	5,56	1,54	0,16	2964208	2964205	2020683	2020677	5427384	-	-	-



● first choice
○ alternate choice

		TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
P		●	●	●		●	●	
M		●	○	○		●	○	
K		○		○	●			○
N								●
S		●				○		○
H								

XNKT-12 Wiper

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
XNKT1205AZTR12	1	12,70	12,70	5,15	8,00	0,04	-	2015264	-	-	-	2015266	-

XNKT-11 Wiper

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
XNKT1205AZER11	1	12,70	12,70	5,15	8,00	0,04	-	2015242	-	5427381	-	2015244	2015246

WIDIA

Face Mills

Recommended Starting Speeds [m/min]

Material Group		TN6525			TN6540			TN7525			TN7535		
P	1	410	**320**	280	360	**280**	240	410	**310**	280	545	**475**	445
	2	320	**250**	215	250	**190**	170	310	**250**	215	335	**305**	275
	3	280	**215**	185	215	**170**	140	280	**215**	185	305	**275**	245
	4	235	**170**	145	180	**130**	110	235	**170**	145	230	**210**	190
	5	310	**235**	200	240	**180**	150	310	**235**	200	310	**275**	250
	6	205	**160**	130	160	**120**	100	205	**160**	130	190	**160**	130
M	1	190	**120**	80	130	**80**	60	245	**220**	185	245	**220**	185
	2	120	**80**	50	80	**50**	40	220	**190**	170	220	**190**	170
	3	125	**80**	55	85	**50**	40	175	**155**	140	175	**155**	140
K	1	275	**245**	220	220	**205**	180	380	**280**	240	355	**320**	290
	2	215	**190**	180	175	**155**	140	325	**240**	200	280	**250**	230
	3	180	**160**	145	155	**145**	125	240	**200**	170	235	**210**	190
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–
	2	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–
	3	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–
	4	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WK15CM			WP40PM			TTI25			THM		
P	1	–	**–**	–	355	**310**	295	430	**360**	300	–	**–**	–
	2	–	**–**	–	300	**260**	215	310	**250**	215	–	**–**	–
	3	–	**–**	–	275	**235**	190	310	**250**	215	–	**–**	–
	4	–	**–**	–	245	**205**	160	265	**215**	180	–	**–**	–
	5	–	**–**	–	205	**185**	160	320	**235**	200	–	**–**	–
	6	–	**–**	–	180	**140**	110	145	**110**	90	–	**–**	–
M	1	–	**–**	–	235	**205**	185	480	**310**	215	–	**–**	–
	2	–	**–**	–	210	**180**	150	325	**205**	145	–	**–**	–
	3	–	**–**	–	155	**140**	110	320	**210**	145	–	**–**	–
K	1	505	**460**	410	–	**–**	–	220	**185**	155	145	**110**	90
	2	400	**355**	330	–	**–**	–	180	**145**	125	150	**120**	85
	3	335	**300**	275	–	**–**	–	145	**125**	100	155	**115**	70
N	1	–	**–**	–	–	**–**	–	–	**–**	–	1080	**720**	600
	2	–	**–**	–	–	**–**	–	–	**–**	–	820	**560**	460
	3	–	**–**	–	–	**–**	–	–	**–**	–	540	**335**	240
S	1	–	**–**	–	50	**40**	35	–	**–**	–	–	**–**	–
	2	–	**–**	–	50	**40**	35	–	**–**	–	–	**–**	–
	3	–	**–**	–	60	**50**	35	–	**–**	–	–	**–**	–
	4	–	**–**	–	80	**60**	40	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

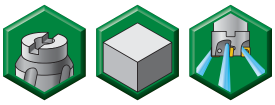
Recommended Starting Feeds [mm]

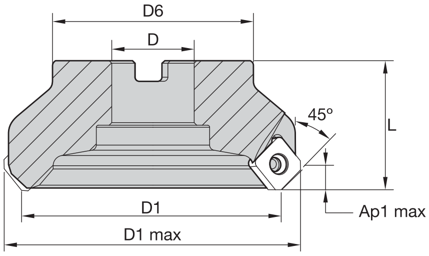
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)														Insert Geometry
	5%			10%			20%			30%			40–100%		
...20	0,17	**0,66**	1,19	0,12	**0,47**	0,86	0,09	**0,35**	0,64	0,08	**0,31**	0,56	0,07	**0,28**	0,51	...20
...21	0,24	**0,74**	1,25	0,18	**0,53**	0,89	0,13	**0,40**	0,66	0,12	**0,35**	0,58	0,11	**0,32**	0,53	...21
...31	0,26	**0,76**	1,28	0,19	**0,55**	0,91	0,14	**0,41**	0,68	0,12	**0,36**	0,59	0,11	**0,33**	0,54	...31

NOTE: Use "Light Machining" value as starting feed rate.

- Four cutting edges.
- Strong tool body design.
- Thick inserts for reliability.

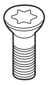


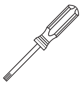


Shell Mills

order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2003593	**12396215000**	100	116,9	32	78	50	8,0	7	8900	No	1,60

Spare Parts



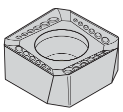
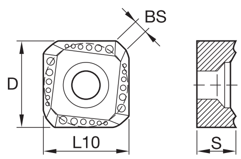


D1	insert screw	Nm	Torx driver
100	**12148007200**	3,5	**12148007500**

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	...31	WP40PM	**...31**	**WP40PM**	...31	WP40PM
P3–P4	...31	WP25PM	**...31**	**WP35CM**	...31	WP35CM
P5–P6	...31	WP25PM	**...31**	**WP35CM**	...31	WP35CM
M1–M2	...31	WP25PM	**...31**	**WP25PM**	...31	WP25PM
M3	...31	WP35CM	**...31**	**WP35CM**	...31	WP35CM
K1–K2	...31	WK15CM	**...31**	**WK15CM**	...31	WK15CM
K3	...31	WK15CM	**...31**	**WK35CM**	...31	WK15CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	...31	WP25PM	**...31**	**WP25PM**	...31	WP25PM
S3	–	–	**–**	**–**	–	–
S4	...31	WP40PM	**...31**	**WP40PM**	...31	WP40PM
H1	–	–	**–**	**–**	–	–

Inserts • SN1505..

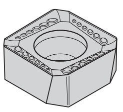

SNMT-31


● first choice
○ alternate choice

	TN7525	TN7535	WK15CM
P	●	●	
M	○	○	
K		○	●
N			
S			
H			

SNMT-31

catalogue number	cutting edges	D	L10	S	BS	hm	TN7525	TN7535	WK15CM
SNMT1505AZR31	4	16	15,88	5,56	2,00	0,16	2020701	2020695	5427386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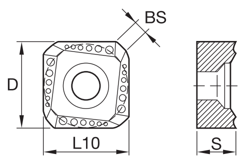


● first choice
○ alternate choice

	TN7525	TN7535	WK15CM	WP25PM	WP35CM	WP40PM
P	●	●		●	●	●
M	○	○		●	●	●
K		○	●	○		
N				●		
S					●	○
H				○		

SNKT-31

catalogue number	cutting edges	D	L10	S	BS	hm	TN7525	TN7535	WK15CM	WP25PM	WP35CM	WP40PM
SNKT1505AZR31	4	16	15,88	5,56	2,00	0,16	2020711	2020705	5427385	5895538	5895539	5895540

Recommended Starting Speeds [m/min]

Material Group		TN6525			TN7525			TN7535			WK15CM			WP25PM			WP35CM			WP40PM		
P	1	410	**320**	280	410	**310**	280	545	**475**	445	–	**–**	–	395	**340**	325	545	**475**	445	355	**310**	295
	2	320	**250**	215	310	**250**	215	335	**305**	275	–	**–**	–	330	**290**	240	335	**305**	275	300	**260**	215
	3	280	**215**	185	280	**215**	185	305	**275**	245	–	**–**	–	305	**260**	210	305	**275**	245	275	**235**	190
	4	235	**170**	145	235	**170**	145	230	**210**	190	–	**–**	–	270	**220**	180	230	**210**	190	245	**205**	160
	5	310	**235**	200	310	**235**	200	310	**275**	250	–	**–**	–	220	**205**	180	310	**275**	250	205	**185**	160
	6	205	**160**	130	205	**160**	130	190	**160**	130	–	**–**	–	200	**150**	120	190	**160**	130	180	**140**	110
M	1	190	**120**	80	245	**220**	185	245	**220**	185	–	**–**	–	245	**215**	200	245	**220**	185	235	**205**	185
	2	120	**80**	50	220	**190**	170	220	**190**	170	–	**–**	–	220	**190**	155	220	**190**	170	210	**180**	150
	3	125	**80**	55	175	**155**	140	175	**155**	140	–	**–**	–	170	**145**	115	175	**155**	140	155	**140**	110
K	1	275	**245**	220	380	**280**	240	355	**320**	290	505	**460**	410	275	**245**	220	355	**320**	290	–	**–**	–
	2	215	**190**	180	325	**240**	200	280	**250**	230	400	**355**	330	215	**190**	180	280	**250**	230	–	**–**	–
	3	180	**160**	145	240	**200**	170	235	**210**	190	335	**300**	275	180	**160**	145	235	**210**	190	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	50	**40**	30	–	**–**	–	50	**40**	35
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	50	**40**	30	–	**–**	–	50	**40**	35
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	60	**50**	30	–	**–**	–	60	**50**	35
	4	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	85	**60**	40	80	**60**	40	80	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)														Insert Geometry
	5%			10%			20%			30%			40–100%		
...21	0,24	**0,74**	1,25	0,18	**0,53**	0,89	0,13	**0,40**	0,66	0,12	**0,35**	0,58	0,11	**0,32**	0,53	...21
...31	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	...31

NOTE: Use "Light Machining" value as starting feed rate.

NOVO KNOWS SEARCH

Searching for a tool by using the outdated method of a catalogue has been replaced with the Advise and Select functions from NOVO™ — saving you time and money.

ADVISE

Uses a rules-based approach to provide cutting tool recommendations:

- Define Machining Feature (face milling, slotting, blind hole, etc.)
- Apply Constraint Requirements (geometric, material, tolerance, etc.)
- Set Machining Sequence (single or multi-step operations, rough then finish, etc.)
- Receive Ranked Results

SELECT

A method of selecting cutting tools from a tree structure via a hierarchy or parametric search:

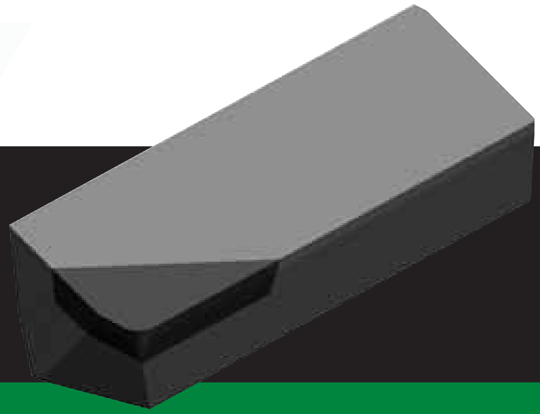
- If you know which product you are looking for, a quick search can be performed by just the catalogue number or product description.
- Smart filters significantly reduce the amount of potential tooling solutions.
- After the tool is selected, NOVO also provides cutting and adaptive item options that fit with your solution.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. **widia.com/novo**

Indexable Milling •
SuperFeed™

The new SuperFeed face mills and end mills are the first choice platform for machining aluminium in the transportation and general engineering industries.

SuperFeed



Our unique insert design delivers exceptional stability and performance. Reduced complexity with exceptional finishing capabilities make SuperFeed the go-to platform in aluminium and non-ferrous face and end milling applications.

- Durable cutter body protection.
- Five PCD cartridge options for increased flexibility.
- User-friendly axial adjustment 0,3–0,8mm.
- Reduce overall tooling costs with reconditioning options.

Features	Benefits
• Anodised aluminium cutter bodies.	• Durable and lightweight.
• Easy axial adjustment range 0,3–0,8mm.	• Simple and very user-friendly.
• DovLok™ PCD cartridge design.	• Proven in demanding automotive applications.
• Fine pitch cutters.	• Shorter cycle times, higher MRR and productivity.

Face Mills

SuperFeed™

Max depth of cut: 6,35mm
(can be less depending
on the cartridge)

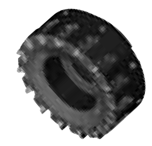
Lead angle: 90°

Indexes per insert:
1 edge per PCD cartridge

Diameter: Standard Platform
63–200mm

Pages: H64–H68

N



PCD

Insert Offering

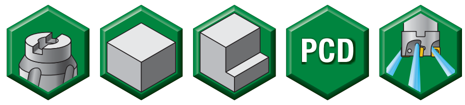
SDR/EDR

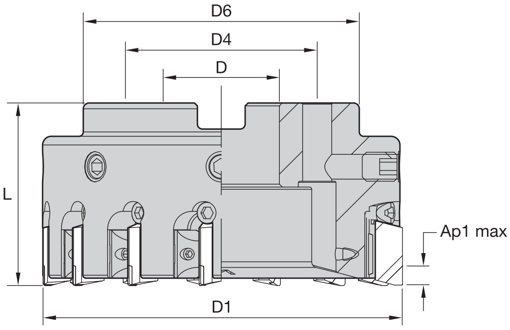
Corner Radii:
SDR — 0,8mm and 2,36mm
EDR — 0,8mm

Axial DOC:
SDR — 6,35mm max
EDR — 6,35mm max

WIDIA™ Grade WDN00U™:
- Ultra fine grain PCD.
- Long tool life, consistent results, excellent surface qualities.

- Through coolant capability.
- +/- 3 micron axial adjustment range.
- Balanced design.
- Easy setup in a simple system design.
- Modified standards available.



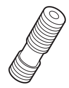
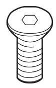
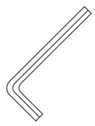
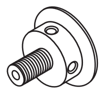
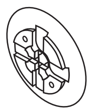


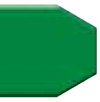
Face Mills • Metric

order number	catalogue number	D1	D	D4	D6	L	Ap1 max	Z	Z ADJ	kg	max RPM
5363208	**SF06306RH**	63	22	–	60	40	6	6	6	0,45	20000
5363209	**SF08008RH**	80	27	–	77	50	6	8	8	0,63	20000
5363220	**SF10012RH**	100	32	–	97	50	6	12	12	1,13	17320
5363221	**SF12515RH**	125	40	–	122	63	6	15	15	2,30	15500
5363222	**SF16018RH**	160	40	–	157	63	6	18	18	3,20	14150
5363223	**SF20024RH**	200	60	102	197	63	6	24	24	4,21	12240

NOTE: Z = Number of cartridges.
Z ADJ = Number of adjustable cartridges.

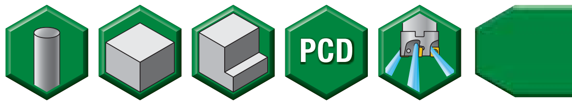
Spare Parts

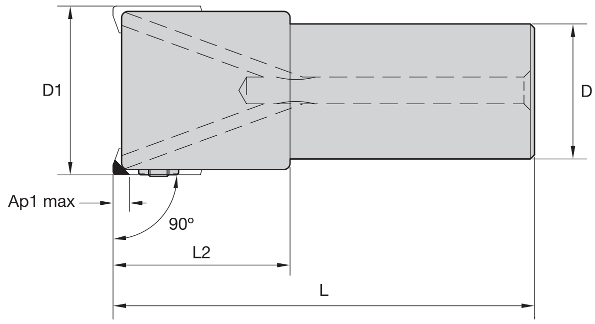


D1	wedge screw	wrench size wedge screw	adjusting screw	wrench size-adjusting screw	coolant cap	coolant shower plate	wedge
63	**LS103**	3 mm	**SWSM515**	4 mm	**SALS063**	–	**HDWM5EU4DD**
80	**LS103**	3 mm	**SWSM515**	4 mm	**SALS080**	–	**HDWM5EU4DD**
100	**LS103**	3 mm	**SWSM515**	4 mm	**SALS100**	–	**HDWM5EU4DD**
125	**LS103**	3 mm	**SWSM515**	4 mm	**SALS125**	–	**HDWM5EU4DD**
160	**LS103**	3 mm	**SWSM515**	4 mm	**SALS160**	–	**HDWM5EU4DD**
200	**LS103**	3 mm	**SWSM515**	4 mm	–	**SSP8**	**HDWM5EU4DD**

NOTE: Coolant cap or coolant shower plate must be ordered separately.



- Through coolant capability.
- +/- 3 micron axial adjustment range.
- Easy setup in a simple system design.
- Modified standards available.

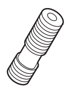
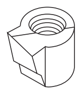
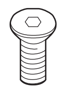
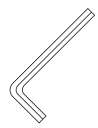


End Mills • Metric

order number	catalogue number	D1	D	L2	L	Ap1 max	Z	Z ADJ	kg	max RPM
5363252	**WSSEM02502RH**	25	20	40	100	6,4	2	2	0,22	35800
5363253	**WSSEM03203RH**	32	32	42	100	6,4	3	3	0,54	31600
5363254	**WSSEM04004RH**	40	32	42	100	6,4	4	4	0,49	28300
5363255	**WSSEM05005RH**	50	32	42	100	6,4	5	5	0,79	25300

NOTE: Z = Number of cartridges.
Z ADJ = Number of adjustable cartridges.

Spare Parts

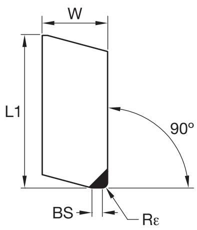





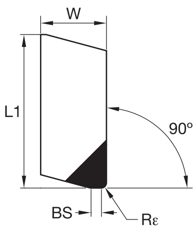
D1	wedge screw	wrench size wedge screw	wedge	adjusting screw	wrench size-adjusting screw
25	**DSM550**	3 mm	**HDWM5S**	**SWSM5155**	4 mm
32	**DSM550**	3 mm	**HDWM5S**	**SWSM5155**	4 mm
40	**DSM550**	3 mm	**HDWM5S**	**SWSM5155**	4 mm
50	**DSM550**	3 mm	**HDWM5S**	**SWSM5155**	4 mm

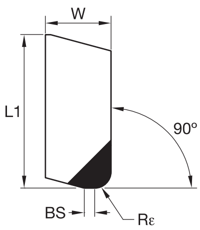
NOTE: For setting procedure, see page H68.

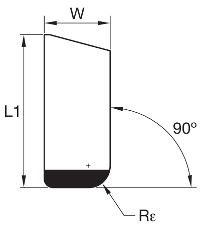
Insert Selection Guide

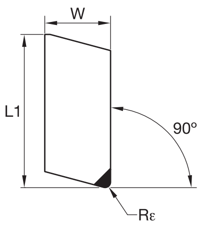
Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	–	–	–	–	–	–
P3–P4	–	–	–	–	–	–
P5–P6	–	–	–	–	–	–
M1–M2	–	–	–	–	–	–
M3	–	–	–	–	–	–
K1–K2	–	–	–	–	–	–
K3	–	–	–	–	–	–
N1–N2	SDR.../EDR...	WDN00U	**SDR.../EDR...**	**WDN00U**	SDR.../EDR...	WDN00U
N3	SDR.../EDR...	WDN00U	**SDR.../EDR...**	**WDN00U**	SDR.../EDR...	WDN00U
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	–	–	–	–	–	–











● first choice
○ alternate choice

	WDN00U
P	
M	
K	
N	●
S	
H	

PCD Inserts • Face Mills • SDR

catalogue number	cutting edges	L1	BS	W	Rε	hm	WDN00U
SDR100031E0NW	1	22,23	–	9,53	0,79	0,02	5358450
SDR100031E0W4	1	22,23	1,52	9,53	0,79	0,02	5358407
SDR100031E1W4	1	22,23	1,52	9,53	0,79	0,02	5358408
SDR100093E1W4	1	22,23	1,52	9,53	2,36	0,02	5358409
SDR102	1	22,22	–	9,52	3,17	0,02	5358451

PCD Inserts • End Mills • EDR

catalogue number	cutting edges	L1	BS	W	Rε	hm	WDN00U
EDR100031E1W4	1	22,23	1,52	6,36	0,79	0,02	5358452

NOTE: hm = Average chip thickness; BS = Wiper facet length; E0 = 2,5 ap1 max; E1 = 6,3 ap1 max.

Recommended Starting Speeds [m/min]

Material Group		WDN00U		
P	1	–	**–**	–
	2	–	**–**	–
	3	–	**–**	–
	4	–	**–**	–
	5	–	**–**	–
	6	–	**–**	–
M	1	–	**–**	–
	2	–	**–**	–
	3	–	**–**	–
K	1	–	**–**	–
	2	–	**–**	–
	3	–	**–**	–
N	1–2	910	**1980**	4880
	3	460	**610**	760
S	1	–	**–**	–
	2	–	**–**	–
	3	–	**–**	–
	4	–	**–**	–
H	1	–	**–**	–

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

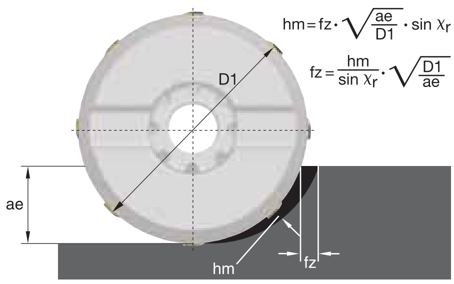
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	10%			20%			30%			40%			50–100%			
SDR…	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	0,05	**0,10**	0,20	SDR…
EDR…	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	0,05	**0,10**	0,20	EDR…

*NOTE: First choice starting feed (fz) is in **bold** type.*
Use corresponding speed (vc).
fz and vc are valid for ae ≥0,4 D1.
For smaller ae, fz and vc should be multiplied by the factor given below:

ae/D1 =	0,2	0,3	0,4
fz-Factor	1,5	1,3	1,0
vc-Factor	1,3	1,2	1,1

$$hm = fz \cdot \sqrt{\frac{ae}{D1}} \cdot \sin \chi_r$$

$$fz = \frac{hm}{\sin \chi_r} \cdot \sqrt{\frac{D1}{ae}}$$



General

- Non-contact gages are preferred.
- Contact gages can be used with the following precautions:
  - Indicator must be flat and parallel to the base.
  - Always approach the PCD cartridge from the relief angle under the PCD segment.
  - Do NOT let the indicator drop on the PCD segment.
- Remove all worn PCD cartridges.
- Clean the pockets of the cutter completely.

Face Mills

- Apply a small amount of lubricant to the following areas:
  - Pocket area where the wedge slides.
  - Threads of the cartridge locking screw.
  - Threads of the axial adjustment screw.
- Install cartridges applying light torque to the wedge assembly locking screw.
- Turn axial adjustment screw until the cartridge is 0,01–0,015mm below the final set height.
- Tighten the wedge assembly locking screw to 4 Nm.
- Turn the axial adjustment screw moving the PCD cartridge 0,005mm to the final set height position.
- Set all cartridges as above.

End Mills

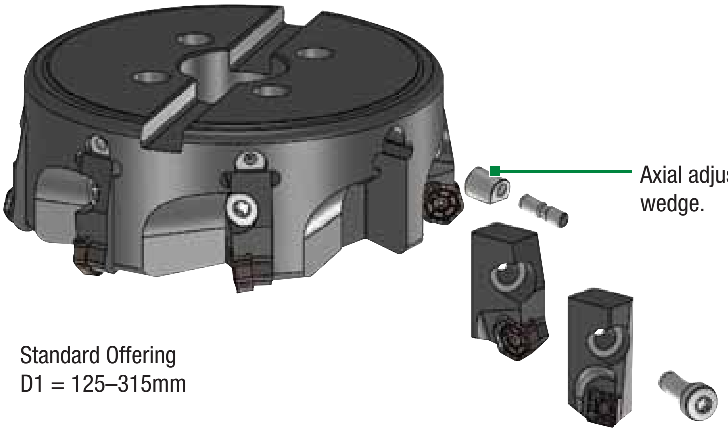
- Apply a small amount of lubricant to the following areas:
  - Threads of the cartridge locking screw.
  - Threads of the axial adjustment screw.
- Install cartridges applying light torque to the locking screws.
- Turn axial adjustment screw until the cartridge is 0,01–0,015mm below the final set height.
- Tighten the locking screw (left-hand threads) to 8 Nm leaving 0,005mm below the final set height.
- Turn the axial adjustment screw moving the PCD cartridge 0,005mm to the final set height position.
- Set all cartridges as above.

M4000

Cartridges with different insert styles and lead angles can be easily changed.

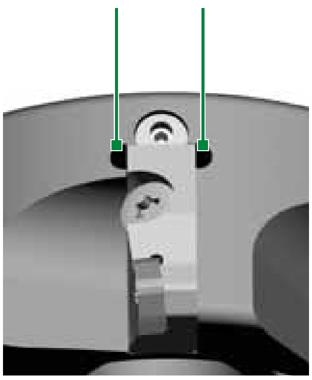
- Roughing and finishing solution with a single tool.
- Adjustable pockets and cartridge stop feature.
- Easily change cartridges with different insert styles and lead angles.
- Best-in-class flexibility lowers cost per tool.
- Easy runout adjustment.
- Perfect floor surface for finishing operations.

Roughing and Finishing with a Single Tool



Standard Offering
D1 = 125–315mm

Quick cartridge stop — ready to go in a minute with no adjustment for roughing.



Face Mills

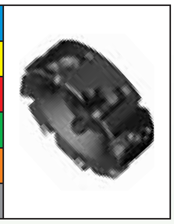
M4000
Cartridge Milling System

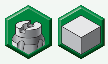
All front line insert styles available.

Diameter: 125–315mm

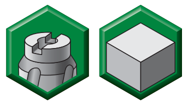
Pages: H72–H74

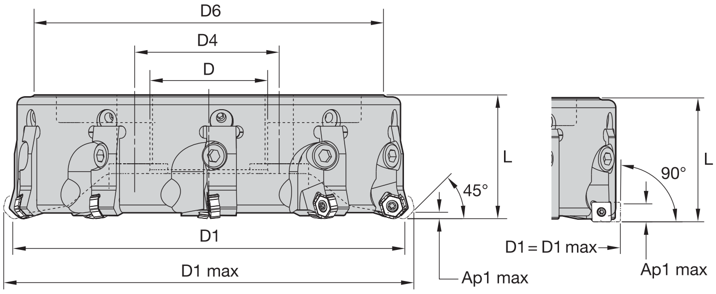
P
M
K
N
S
H





- Roughing and finishing with a single tool.
- Quick cartridge stop feature.
- Easy runout adjustment.
- Easy change of cartridges with different insert styles and lead angles.

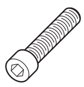


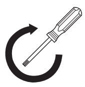


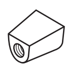
Cartridge Milling System

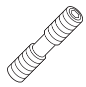
order number	catalogue number	D1	D	D4	D6	L	number of cartridges	kg
4136343	**M4000D125Z06ADJ**	125	40	—	108	68,0	6	3,34
4136344	**M4000D125Z08ADJ**	125	40	—	108	68,0	8	3,51
4136345	**M4000D160Z08ADJ**	160	40	66,7	137	63,0	8	5,19
4136346	**M4000D160Z12ADJ**	160	40	66,7	137	63,0	12	5,20
4136347	**M4000D200Z10ADJ**	200	60	101,6	178	63,0	10	8,02
4136348	**M4000D200Z14ADJ**	200	60	101,6	178	80,0	14	12,57
4136349	**M4000D250Z12ADJ**	250	60	101,6	228	63,0	12	13,53
4136350	**M4000D250Z18ADJ**	250	60	101,6	228	63,0	18	13,90
4136351	**M4000D315Z16ADJ**	315	60	101,6	293	80,0	16	25,08
4136352	**M4000D315Z22ADJ**	315	60	101,6	293	80,0	22	25,42

Spare Parts







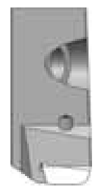
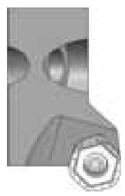
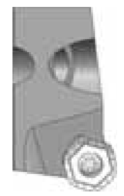
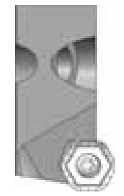
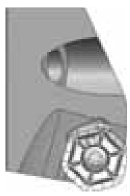
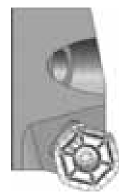
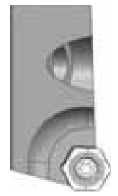


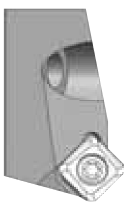
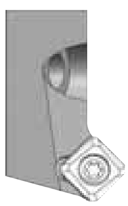
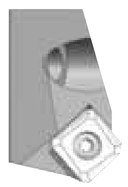
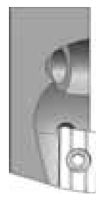
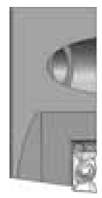
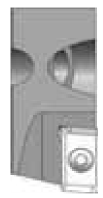
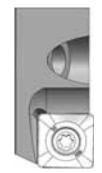
D1	cartridge screw	Nm	wedge	adjusting screw
125	**MS1294**	20,0	**12748308500**	**12748600900**
160	**MS1294**	20,0	**12748308500**	**12748600900**
200	**MS1294**	20,0	**12748308500**	**12748600900**
250	**MS1294**	20,0	**12748308500**	**12748600900**
315	**MS1294**	20,0	**12748308500**	**12748600900**

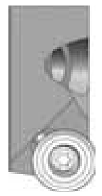
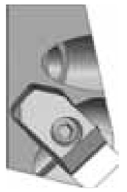
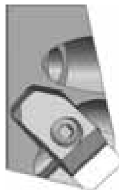
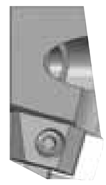
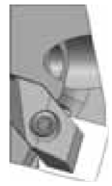
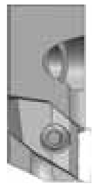
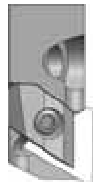
Cartridge

order number	catalogue number	insert style	master platform *	Ap max
4159022	**M4000CA-AD1505**	AD.T1505	CIP	14,0
4159020	**M4000CA-AP1003**	AP.T1003	CIP	10,2
4159021	**M4000CA-AP1604**	AP.T1604	CIP	16,2
3968124	**M4000CA-HN07**	HN.J0704/XNGJ0704	M1200 Mini	3,5
4159018	**M4000CA-HN07HD**	HN.J0704	M1200 Mini	4,7
4159017	**M4000CA-HN07HF**	HN.J0704	M1200 Mini	1,0
3126691	**M4000CA-HN09**	HN.J0905/XNGJ0905	M1200	4,4
4159019	**M4000CA-HN09HD**	HN.J0905	M1200	6,0
3954792	**M4000CA-HN09HF**	HN.J0905	M1200	2,2
2511344	**M4000CA-HP06**	HP.T06T3	M640	4,8
2006361	**M4000CA-MDHX10**	MDHX1004	M76	1,0
2006346	**M4000CA-RC1606**	RC.T1606	M100	8,0
2067492	**M4000CA-SD1204**	SDM.1204	M690	11,7
2006359	**M4000CA-SD1506**	SDM.1506	M690	14,9
2006374	**M4000CA-SE1203**	SE.N1203/SE.R1203	M68	6,0
2033495	**M4000CA-SE1204**	SE.N1204/SE.R1204	M68	6,0
2006377	**M4000CA-SE1504**	SE.N1504/SE.R1504	M68	8,0
2006348	**M4000CA-SN12**	SN.T1205/XNKT1205	M660	6,4
2006360	**M4000CA-SN15**	SN.T1505	M660	8,0
2006362	**M4000CA-SP12**	121358680	M40Wiper	9,0
2006373	**M4000CA-SP1203**	SP.N1203/SP.R1203	M40	9,0
2006376	**M4000CA-SP1504**	SP.N1504	M40	12,0
2033496	**M4000CA-TP1603**	TP.N1603/TP.R1603	M40	12,0
2006379	**M4000CA-TP2204**	TP.N2204/TP.R2204	M40	18,0
2006347	**M4000CA-XP16**	XP.T1604	M680	14,0

** For all details regarding insert offering and cutting conditions, please refer to the master platforms.*

	 M4000CA-MDHX10CA	 M4000CA-HN07HF	 M4000CA-HN07	 M4000CA-HN07HD	 M4000CA-HN09HF	 M4000CA-HN09	 M4000CA-HN09HD	 M4000CA-HP06
	order number	order number	order number	order number	order number	order number	order number	order number
	2006361	4159017	3968124	4159018	3954792	3126691	4159019	2511344
D1	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max
125	125	139	134	132	143	136	133	131,4
160	160	174	169	167	178	171	168	166,4
200	200	214	209	207	218	211	208	206,4
250	250	264	259	257	268	261	258	256,4
315	315	329	324	322	333	326	323	321,4

	 M4000CA-SN12	 M4000CA-SN12RC	 M4000CA-SN15	 M4000CA-XP16	 M4000CA-AP1003	 M4000CA-AD1505	 M4000CA-AP1604	 M4000CA-SD1204	 M4000CA-SD1506
	order number	order number	order number	order number	order number	order number	order number	order number	order number
	2006348	2006357	2006360	2006347	4159020	4159022	4159021	2067492	2006359
D1	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max
125	139,3	139,3	143	125	125	125	125	125	125
160	174,3	174,3	178	160	160	160	160	160	160
200	214,3	214,3	218	200	200	200	200	200	200
250	264,3	264,3	268	250	250	250	250	250	250
315	329,3	329,3	333	315	315	315	315	315	315

	 M4000CA-RC1606	 M4000CA-SE1203	 M4000CA-SE1204	 M4000CA-SE1504	 M4000CA-SP1203	 M4000CA-SP12 Wiper	 M4000CA-SP1504	 M4000CA-TP1603	 M4000CA-TP2204
	order number	order number	order number	order number	order number	order number	order number	order number	order number
	2006346	2006374	2033495	2006377	2006373	2006362	2006376	2033496	2006379
D1	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max
125	125	139	139	143	130,6	132,2	132,2	125	125
160	160	174	174	178	165,6	167,2	167,2	160	160
200	200	214	214	218	205,6	207,2	207,2	200	200
250	250	264	264	268	255,6	257,2	257,2	250	250
315	315	329	329	333	320,6	322,2	322,2	315	315

Indexable Milling • Chamfer Mills

M25™ Series Chamfer Mills

M25

M25 Series Chamfer Mills are the ideal tool of choice for milling all steel, stainless steel, and cast iron materials. With clearance for back-chamfer operations, the M25 Series will help streamline your most challenging milling operations.

- Strong tool design for optimum insert support.
- 45˚ lead angle for most chamfering applications.

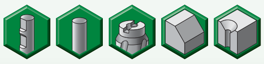
Chamfer Mills

M25™ SD0903..

Max depth of cut: 6,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 25–40mm

Pages: I4–I6, I8, I10

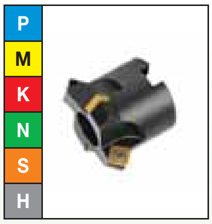


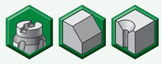
M25 SP1204..

Max depth of cut: 8,3mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 50–63mm

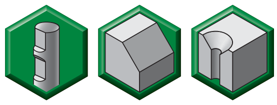
Pages: I7, I9–I10

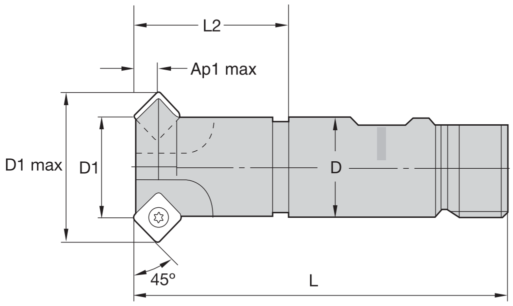




Chamfer Mills

• Chamfer milling in steel, stainless steel, and cast iron.

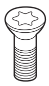
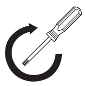
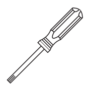




Weldon Shanks

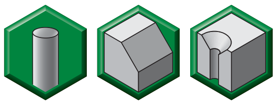
order number	catalogue number	D	D1	D1 max	L	L2	Ap1 max	Z	insert 1	coolant supply	kg
2022628	**12292510400**	16	16	28,8	75	27	6,4	2	SD..0903..	No	0,10
2022629	**12292510800**	25	25	37,8	96	40	6,4	2	SD..0903..	No	0,30
2022630	**12292511000**	32	32	44,8	100	40	6,4	3	SD..0903..	No	0,50

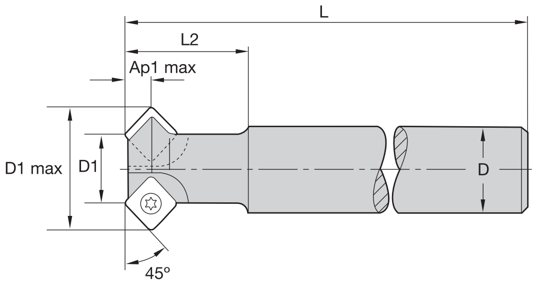
Spare Parts

insert screw	Nm	Torx wrench
12148095100	3,0	**12148000600**

- Chamfer milling in steel, stainless steel, and cast Iron.





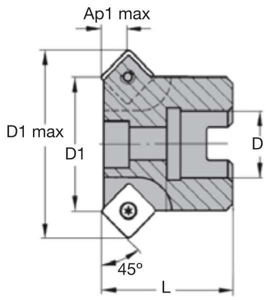
Cylindrical Shanks

order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	insert 1	coolant supply	kg
2022634	**12292550400**	16	28,8	16	200	27	6,4	2	SD..0903..	No	0,40
2022635	**12292550800**	25	37,8	25	200	40	6,4	2	SD..0903..	No	0,70
2022636	**12292551000**	32	44,8	32	200	40	6,4	3	SD..0903..	No	1,20

Spare Parts

insert screw	Nm	Torx driver
12148095100	3,0	**12148000600**

- Chamfer milling in steel, stainless steel, and cast iron.



Shell Mills

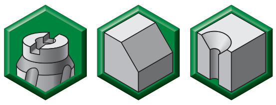
order number	catalogue number	D1	D1 max	D	L	Ap1 max	Z	insert 1	coolant supply	kg
2022631	**12292511200**	40	52,3	22	40	6,1	4	SD..0903..	No	0,80

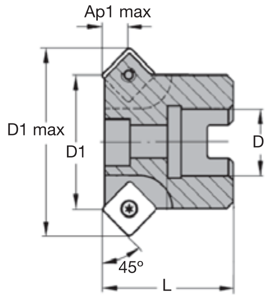
NOTE: Standard milling cutters will accept insert nose radii up to 2mm without modification.

Spare Parts

insert screw	Nm	Torx driver
12148095100	3,0	**12148000600**

- Chamfer milling in steel, stainless steel, and cast Iron.

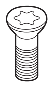


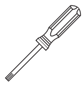


Shell Mills

order number	catalogue number	D1	D1 max	D	L	Ap1 max	Z	insert 1	coolant supply	kg
2022632	**12292511400**	50	66,7	22	40	8,3	4	SP..1204..	No	0,90
2022633	**12292511600**	63	79,7	22	40	8,3	5	SP..1204..	No	1,10

Spare Parts



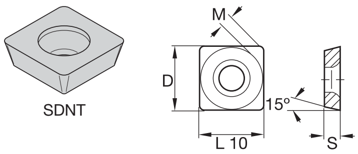


insert screw	Nm	Torx driver
12148007200	4,0	**12148007500**

Chamfer Mills

Insert Selection Guide for Insert Style SD09

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	. ..	TN7525	**. ..**	**TN7525**	. ..	TN7525
P3–P4	. ..	TN7525	**. ..**	**TN7535**	. ..	TN7535
P5–P6	. ..	TN7525	**. ..**	**TN7535**	. ..	TN7535
M1–M2	. ..	TN7525	**. ..**	**TN7525**	. ..	TN7525
M3	. ..	TN7535	**. ..**	**TN7535**	. ..	TN7535
K1–K2	–	–	–	–	–	–
K3	. ..	TN7535	**. ..**	**TN7535**	. ..	TN7535
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	. ..	TN2510	–	–	–	–

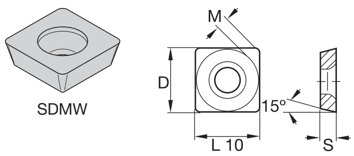


● first choice
○ alternate choice

	TN2510	TN7525	TN7535
P	○	●	●
M		○	○
K	●		○
N			
S			
H	●		

SDNT

catalogue number	cutting edges	D	L10	M	S	hm	TN2510	TN7525	TN7535
SDNT090308	4	9,53	9,53	1,64	3,18	0,10	-	2030200	2030198
SDNT090308T	4	9,53	9,53	1,64	3,18	0,10	2028336	-	-



● first choice
○ alternate choice

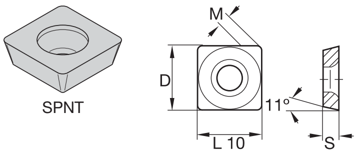
	TN7525	THM
P	●	
M	○	
K		○
N		●
S		○
H		

SDMW

catalogue number	cutting edges	D	L10	M	S	hm	TN7525	THM
SDMW090308	4	9,53	9,53	1,64	3,18	0,10	2105263	2028332

Insert Selection Guide for Insert Style SP12

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	. ..	TN7525	**. ..**	**TN7525**	. ..	TN7525
P3–P4	. ..	TN7525	**. ..**	**TN7535**	. ..	TN7535
P5–P6	. ..	TN7525	**. ..**	**TN7535**	. ..	TN7535
M1–M2	. ..	TN7525	**. ..**	**TN7525**	. ..	TN7525
M3	. ..	TN7535	**. ..**	**TN7535**	. ..	TN7535
K1–K2	. ..	WK15CM	**. ..**	**WK15CM**	. ..	WK15CM
K3	. ..	TN7535	**. ..**	**WK15CM**	. ..	WK15CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**–**	**–**	–	–
S3	–	–	**–**	**–**	–	–
S4	–	–	**–**	**–**	–	–
H1	–	–	**–**	**–**	–	–

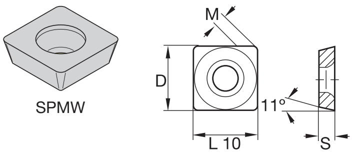


● first choice
○ alternate choice

	TN7525	TN7535
P	●	●
M	○	○
K		○
N		
S		
H		

SPNT

catalogue number	cutting edges	D	L10	M	S	hm	TN7525	TN7535
SPNT120408	4	12,70	12,70	2,30	4,76	0,10	2029794	2029792



● first choice
○ alternate choice

	THM	WK15CM
P		
M		
K	○	●
N	●	
S	○	
H		

SPMW

catalogue number	cutting edges	D	L10	M	S	hm	THM	WK15CM
SPMW120408	4	12,70	12,70	2,30	4,76	0,14	2014066	5427380

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN7525			TN7535			WK15CM			THM		
P	1	660	**580**	540	410	**310**	280	545	**475**	445	–	–	–	–	–	–
	2	410	**370**	330	310	**250**	215	335	**305**	275	–	–	–	–	–	–
	3	370	**330**	305	280	**215**	185	305	**275**	245	–	–	–	–	–	–
	4	275	**260**	230	235	**170**	145	230	**210**	190	–	–	–	–	–	–
	5	330	**300**	275	310	**235**	200	310	**275**	250	–	–	–	–	–	–
	6	230	**205**	175	205	**160**	130	190	**160**	130	–	–	–	–	–	–
M	1	270	**240**	210	245	**220**	185	245	**220**	185	–	–	–	–	–	–
	2	245	**210**	190	220	**190**	170	220	**190**	170	–	–	–	–	–	–
	3	190	**175**	150	175	**155**	140	175	**155**	140	–	–	–	–	–	–
K	1	420	**360**	300	380	**280**	240	355	**320**	290	505	**460**	410	145	**110**	90
	2	360	**300**	250	325	**240**	200	280	**250**	230	400	**355**	330	150	**120**	85
	3	300	**250**	200	240	**200**	170	235	**210**	190	335	**300**	275	155	**115**	70
N	1	–	–	–	–	–	–	–	–	–	–	–	–	1080	**720**	600
	2	–	–	–	–	–	–	–	–	–	–	–	–	820	**560**	460
	3	–	–	–	–	–	–	–	–	–	–	–	–	540	**335**	240
S	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
H	1	145	**110**	70	–	–	–	–	–	–	–	–	–	–	–	–
	2	145	**110**	70	–	–	–	–	–	–	–	–	–	–	–	–
	3	115	**80**	45	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz)			Insert Geometry
SD09	0,10	**0,15**	0,30	SD09
SP12	0,10	**0,15**	0,35	SP12

NOTE: Use "Light Machining" value as starting feed rate.

Reconditioning Services

Anyone can regrind our tools – but only we can recondition them

WIDIA™ Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

To use WIDIA™ tool reconditioning services, contact your authorised WIDIA distributor to get started.

Global Reconditioning Network

WIDIA™

To locate a Reconditioning Center near you, visit **widia.com/services.**


WIDIA

Indexable Milling • 90° Shoulder Mills

VSM11

Victory™ Shoulder Mill 11™ is a high-performance, versatile, robust, 90° square shoulder milling platform. VSM11 is designed for versatility, low horsepower consumption, and easy cutting action. Cutters can be used for profiling, face milling, slotting, ramping, helical interpolation, circular interpolation, and other milling applications. Inserts are specially designed with innovative geometries and features like variable rake angles, negative T-land, small hone, and the latest Victory grades enhancing tool performance and versatility.

Take advantage of the high-performance, advanced carbide substrates, coatings, and surface treatment technologies of the available 6 Victory grades, 5 geometries, and broad range of cutter body product portfolio. This platform works with multiple material types and applications.

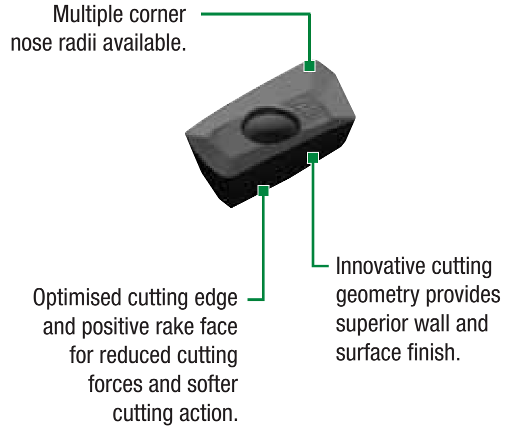
- State-of-the-art step down capability.
- Screw-on, end mill, and shell mill cutters with effective internal coolant supply.

Features

- Insert geometries and grades for all workpiece materials.
- Insert corner radius from 0,4–3,1mm (.016–.122").

Benefits

- Achieve 90° wall finish.
- Longer tool life.
- Latest WIDIA Victory milling grades for all workpiece materials.
- Soft cutting action, reduced cycle times, and low horsepower consumption.
- Stability and reliability.



90° Shoulder Mills

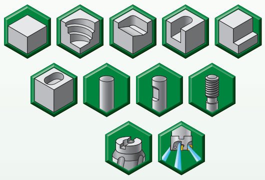
VSM11™

Max depth of cut: 11,7mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 16–125mm

Pages: J4–J16

P M K N S H



Insert Offering

XDCT-ML

P M S H

Light to medium machining.
First choice for stainless steel
and titanium.
Periphery ground.

XDPT-MM

P M K S H

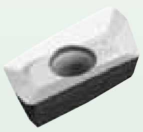
Medium to heavy machining.
First choice for general purpose.
Precision pressed to size.

XDPT-MH

P M K S

First choice for heavy-duty machining.
Steel and cast iron materials.
Precision pressed to size.

XDCT-ALP



N

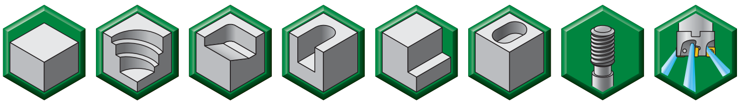
Roughing and finishing
of aluminium alloys.
High precision.
Periphery ground.

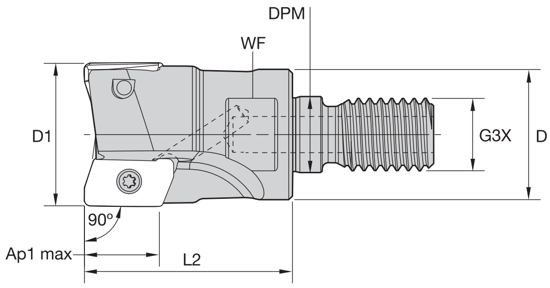
XDCW-PCD

N

Roughing and finishing
of aluminium alloys.
Abrasive non-ferrous materials.
High precision.
Periphery ground.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.

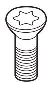
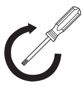
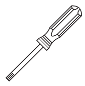




Screw-On End Mills

order number	catalogue number	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5417011	**VSM11D016Z02M08XD11**	16	13	8,5	M8	25	10	11,5	2	10.0°	Yes	41400	0,02
5417013	**VSM11D020Z03M10XD11**	20	18	10,5	M10	28	15	11,6	3	7.8°	Yes	35100	0,05
5417015	**VSM11D025Z04M12XD11**	25	21	12,5	M12	32	17	11,5	4	5.3°	Yes	30200	0,08
5417017	**VSM11D032Z04M16XD11**	32	29	17,0	M16	40	24	11,4	4	3.6°	Yes	25800	0,18
5417019	**VSM11D040Z06M16XD11**	40	29	17,0	M16	40	24	11,4	6	2.6°	Yes	22600	0,24

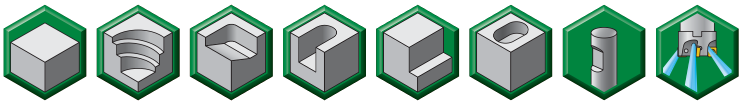
Spare Parts

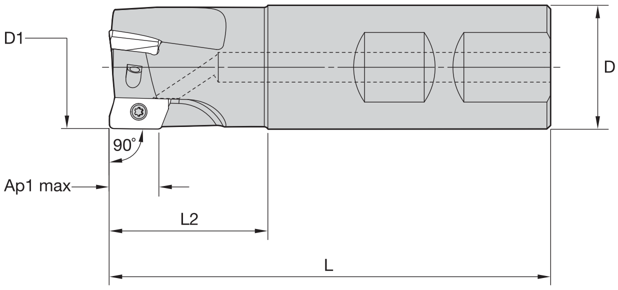




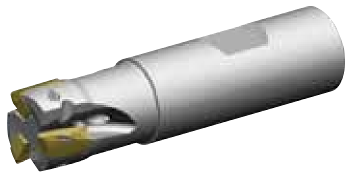
insert screw	Nm	wrench
192.432	1,0	**170.028**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.



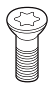


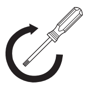


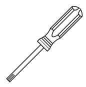
■ Weldon Shanks

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5416454	**VSM11D012Z01B16XD11**	12	16	70	21	11,7	1	3.7°	Yes	53100	0,08
5416455	**VSM11D016Z02B16XD11**	16	16	70	21	11,5	2	10.0°	Yes	41400	0,09
5416457	**VSM11D020Z02B20XD11**	20	20	81	30	11,6	2	7.8°	Yes	35100	0,15
5416458	**VSM11D020Z03B20XD11**	20	20	81	30	11,6	3	7.8°	Yes	35100	0,16
5416459	**VSM11D025Z03B25XD11**	25	25	88	31	11,5	3	5.3°	Yes	30200	0,27
5416480	**VSM11D025Z04B25XD11**	25	25	88	31	11,5	4	5.3°	Yes	30200	0,28
5416481	**VSM11D030Z04B25XD11**	30	25	88	31	11,5	4	3.2°	Yes	26900	0,30
5416482	**VSM11D032Z04B32XD11**	32	32	100	39	11,4	4	3.6°	Yes	25800	0,51
5416483	**VSM11D032Z05B32XD11**	32	32	100	39	11,4	5	3.6°	Yes	25800	0,52

■ Spare Parts







insert screw	Nm	wrench
192.432	1,0	**170.028**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

- True 90° capability.
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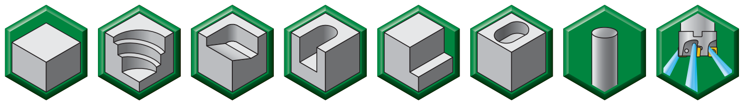
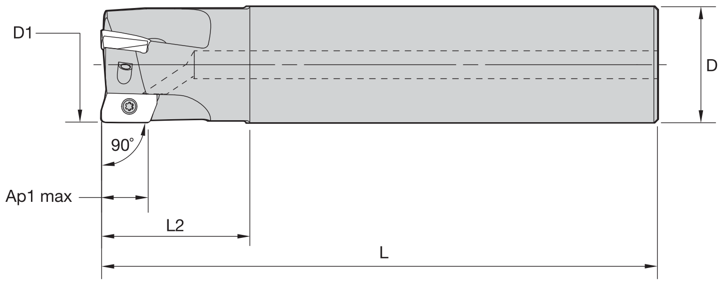
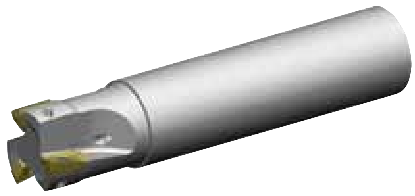
- Effective internal coolant feature, precisely reaching the cutting edge.



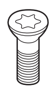


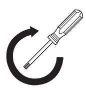


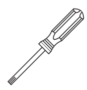
Cylindrical End Mills

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5416632	**VSM11D012Z01A16XD11L100**	12	16	100	25	11,7	1	3.7°	Yes	53100	0,13
5416633	**VSM11D016Z02A16XD11L100**	16	16	100	31	11,5	2	10.0°	Yes	41400	0,12
5416634	**VSM11D020Z02A20XD11L110**	20	20	110	31	11,6	2	7.8°	Yes	35100	0,22
5416635	**VSM11D020Z03A20XD11L110**	20	20	110	31	11,6	3	7.8°	Yes	35100	0,23
5416636	**VSM11D025Z03A25XD11L120**	25	25	120	33	11,5	3	5.3°	Yes	30200	0,39
5416637	**VSM11D025Z04A25XD11L120**	25	25	120	33	11,5	4	5.3°	Yes	30200	0,40
5416638	**VSM11D032Z03A32XD11L130**	32	32	130	41	11,4	3	3.6°	Yes	25800	0,70
5416639	**VSM11D032Z05A32XD11L130**	32	32	130	41	11,4	5	3.6°	Yes	25800	0,71

Spare Parts







insert screw	Nm	wrench
192.432	1,0	**170.028**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
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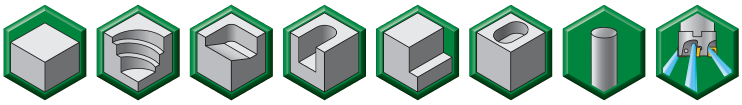
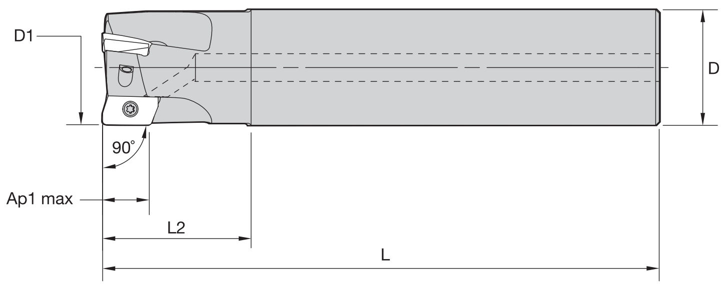
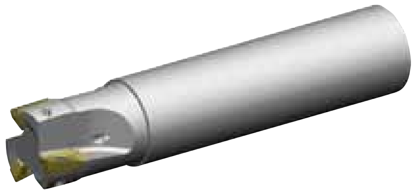


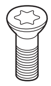


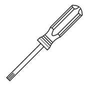


Cylindrical End Mills • Long Shanks

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5416700	VSM11D016Z02A16XD11L170	16	16	170	25	11,5	2	10.0°	Yes	41400	0,23
5416701	VSM11D018Z02A16XD11L170	18	16	170	25	11,6	2	9.7°	Yes	37900	0,23
5416702	VSM11D020Z02A20XD11L170	20	20	170	41	11,6	2	7.8°	Yes	35100	0,35
5416703	VSM11D020Z03A20XD11L170	20	20	170	41	11,6	3	7.8°	Yes	35100	0,36
5416704	VSM11D022Z03A20XD11L170	22	20	170	30	11,5	3	6.6°	Yes	32900	0,37
5416705	VSM11D025Z03A25XD11L210	25	25	210	50	11,5	3	5.3°	Yes	30200	0,70
5416706	VSM11D025Z04A25XD11L210	25	25	210	50	11,5	4	5.3°	Yes	30200	0,72
5416707	VSM11D032Z03A32XD11L250	32	32	250	65	11,4	3	3.6°	Yes	25800	1,39

Spare Parts



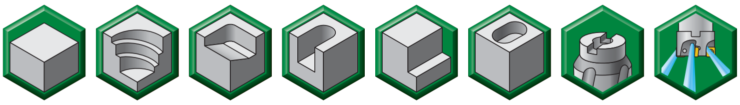


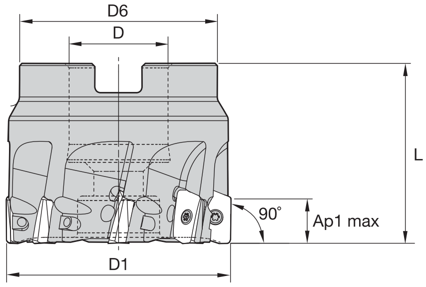
insert screw	Nm	wrench
192.432	1,0	170.028

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

Shoulder Mills

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.

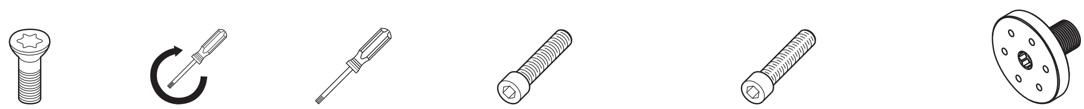




Shell Mills

order number	catalogue number	D1	D	D6	L	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5416316	**VSM11D040Z04S016XD11**	40	16	37	40	11,4	4	2.6°	Yes	22600	0,22
5416317	**VSM11D040Z06S016XD11**	40	16	37	40	11,4	6	2.6°	Yes	22600	0,22
5416318	**VSM11D050Z05S022XD11**	50	22	44	40	11,3	5	1.9°	Yes	19900	0,33
5416319	**VSM11D050Z08S022XD11**	50	22	44	40	11,3	8	1.9°	Yes	19900	0,33
5416340	**VSM11D063Z06S022XD11**	63	22	44	40	11,3	6	1.5°	Yes	17500	0,50
5416341	**VSM11D063Z09S022XD11**	63	22	44	40	11,3	9	1.5°	Yes	17500	0,52
5416342	**VSM11D080Z08S027XD11**	80	27	60	50	11,3	8	1.1°	Yes	15300	1,14
5416345	**VSM11D100Z09S032XD11**	100	32	80	50	11,3	9	0.9°	Yes	13600	1,79
5416347	**VSM11D125Z011S040XD11**	125	40	80	63	11,3	11	0.7°	Yes	12100	3,01

Spare Parts



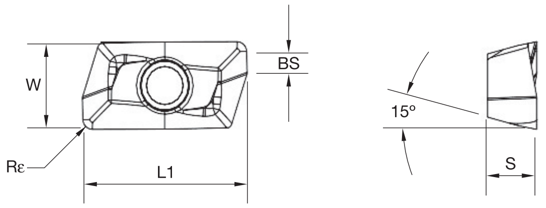
D1	insert screw	Nm	wrench	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw assembly
40,0	**192.432**	1,0	**170.028**	**MS1294**	**MS1294CG**	–
50,0	**192.432**	1,0	**170.028**	**12146120500**	**MS1234CG**	–
63,0	**192.432**	1,0	**170.028**	**12146120500**	**MS1234CG**	–
80,0	**192.432**	1,0	**170.028**	**125.230**	**MS2038CG**	–
100,0	**192.432**	1,0	**170.028**	–	–	**MS2195C**
125,0	**192.432**	1,0	**170.028**	–	–	**MS2187C**

NOTE: Socket-head cap screw and coolant lock screw assembly must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.E..ML	WP40PM	**.E..MM**	**WP40PM**	.S..MH	WP40PM
P3–P4	.E..ML	WP35CM	**.E..MM**	**WP35CM**	.S..MH	WP35CM
P5–P6	.E..MM	WP25PM	**.S..MH**	**WP35CM**	.S..MH	WP35CM
M1–M2	.E..ML	WU35PM	**.E..MM**	**WU35PM**	.S..MH	WU35PM
M3	.E..ML	WU35PM	**.E..MM**	**WU35PM**	.S..MH	WU35PM
K1–K2	.E..ML	WK15CM	**.E..MM**	**WK15CM**	.S..MH	WK15CM
K3	.E..ML	WP25PM	**.E..MM**	**WP25PM**	.S..MH	WP25PM
N1–N2	.F..ALP	WN25PM	**.F..ALP**	**WN25PM**	.E..ML	WP25PM
N3	.F..ALP	WN25PM	**.F..ALP**	**WN25PM**	.E..ML	WP25PM
S1–S2	.E..ML	WP25PM	**.E..MM**	**WU35PM**	.S..MH	WU35PM
S3	.E..ML	WP25PM	**.E..MM**	**WU35PM**	.S..MH	WU35PM
S4	.E..MM	WU35PM	**.S..MH**	**WU35PM**	–	–
H1	.E..MM	WP25PM	**.E..MM**	**WP25PM**	–	–


XDCT-ML



- -ML is a light- to medium-machining geometry and is the first choice for stainless steel and titanium materials.

● first choice
○ alternate choice

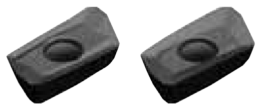
WIDIA VICTORY

	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
P				○	●	●		●
M				●	○	●		●
K		●		○	○			
N	●		●					
S				●		○	●	●
H								

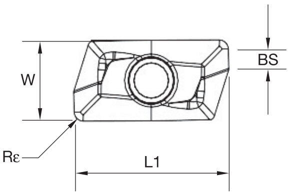
XDCT-ML

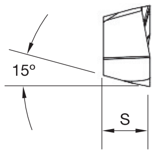
catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
XDCT110404PDERML	2	13,43	2,09	4,00	6,90	0,40	0,04	–	–	–	5536671	5536670	5642230	–	–
XDCT110408PDERML	2	13,44	1,69	4,00	6,90	0,80	0,04	–	5415549	–	5415548	5415547	5545065	5517826	5415546

Shoulder Mills



XDPT-MM XDPT-MH





- -MM is a medium- to heavy-machining geometry and is the first choice for general purpose and universal applications.

● first choice
○ alternate choice

WIDIA VICTORY

		WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
P					○	●	●		●
M					●	○	●		●
K			●		○	○			
N		●		●					
S					●		○	●	●
H									

■ XDPT-MM

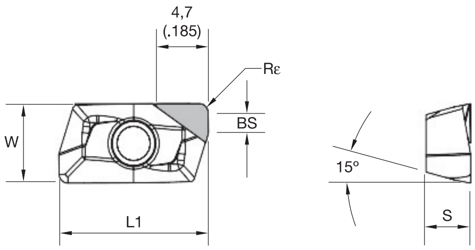
catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
XDPT110404PDSRMM	2	13,43	2,06	4,00	6,90	0,40	0,06	-	5415428	-	5642237	5415450	5642231	-	-
XDPT110408PDSRMM	2	13,44	1,68	4,00	6,90	0,79	0,06	-	5415315	-	5415319	5415318	5545063	5519921	5415317
XDPT110412PDSRMM	2	13,44	1,29	4,00	6,90	1,20	0,06	-	5415310	-	5415314	5415313	5642232	-	5415312
XDPT110416PDSRMM	2	13,51	0,85	4,13	6,95	1,60	0,06	-	5415250	-	5415254	5415253	5642233	-	-
XDPT110420PDSRMM	2	13,51	0,45	4,13	6,95	2,00	0,06	-	-	-	5980399	5980400	5980398	-	-
XDPT110424PDSRMM	2	13,37	—	4,01	6,94	2,40	0,06	-	-	-	5901355	-	5901354	-	-
XDPT110431PDSRMM	2	12,91	—	4,00	6,89	3,10	0,06	-	5415422	-	5415426	5415425	5642234	5517827	-

- -MH is a heavy-duty machining geometry and is the first choice for steel and cast iron materials.

■ XDPT-MH

catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
XDPT110408PDSRMH	2	13,44	1,68	4,00	6,90	0,79	0,13	-	5415255	-	-	5415257	5545064	-	5415256
XDPT110412PDSRMH	2	13,44	1,29	4,00	6,90	1,20	0,13	-	5415360	-	-	5415362	5642235	-	-
XDPT110416PDSRMH	2	13,44	0,90	4,00	6,90	1,59	0,13	-	5415364	-	-	5415366	5642236	-	-


XDCW-PCD



- -PCD is the first choice for roughing and finishing of abrasive non-ferrous materials and aluminium alloys.

WIDIA VICTORY

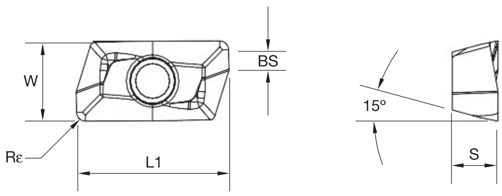
● first choice
○ alternate choice

		WDN10U
P		
M		
K		
N		●
S		
H		

■ XDCW-PCD

catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WDN10U
XDCW110404PDFRPCD	1	13,43	2,10	4,00	6,90	0,40	0,02	5415420
XDCW110408PDFRPCD	1	13,44	1,70	4,00	6,90	0,80	0,02	5415421


XDCT-ALP



- -ALP is the first choice for roughing and finishing of aluminium alloys.

WIDIA VICTORY

● first choice
○ alternate choice

		WN10HM	WN25PM
P			
M			
K			
N		●	●
S			
H			

■ XDCT-ALP

catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WN10HM	WN25PM
XDCT110404PDFRALP	2	13,43	2,09	4,00	6,90	0,40	0,02	5933940	5417054
XDCT110408PDFRALP	2	13,44	1,69	4,00	6,90	0,80	0,02	5936171	5417053
XDCT110412PDFRALP	2	13,44	1,29	4,00	6,90	1,20	–	6055634	6055635
XDCT110416PDFRALP	2	13,44	0,88	4,00	6,89	1,60	–	6055598	6055599
XDCT110424PDFRALP	2	13,44	0,16	4,00	6,88	2,40	–	6055600	6055631
XDCT110432PDFRALP	2	12,86	–	4,00	6,89	3,20	–	6055632	6055633

Shoulder Mills

Recommended Starting Speeds [m/min]

Material Group		WP25PM			WU35PM			WP40PM			WK15CM		
P	1	330	**285**	270	260	**230**	215	300	**260**	250	–	**–**	–
	2	275	**240**	200	220	**190**	160	250	**220**	180	–	**–**	–
	3	255	**215**	175	200	**170**	140	230	**200**	160	–	**–**	–
	4	225	**185**	150	180	**150**	120	210	**170**	140	–	**–**	–
	5	185	**170**	150	150	**135**	120	170	**160**	140	–	**–**	–
	6	165	**125**	100	130	**100**	80	150	**120**	90	–	**–**	–
M	1	205	**180**	165	170	**150**	135	200	**170**	160	–	**–**	–
	2	185	**160**	130	155	**130**	110	180	**150**	130	–	**–**	–
	3	140	**120**	95	115	**100**	80	130	**120**	90	–	**–**	–
K	1	230	**205**	185	–	**–**	–	–	**–**	–	420	**385**	340
	2	180	**160**	150	–	**–**	–	–	**–**	–	335	**295**	275
	3	150	**135**	120	–	**–**	–	–	**–**	–	280	**250**	230
N	1–2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	40	**35**	25	35	**30**	25	40	**40**	30	–	**–**	–
	2	40	**35**	25	35	**30**	25	40	**40**	30	–	**–**	–
	3	50	**40**	25	45	**35**	25	50	**40**	30	–	**–**	–
	4	70	**50**	35	60	**45**	30	70	**50**	40	–	**–**	–
H	1	120	**90**	70	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WS30PM			WP35CM			WN25PM			WDN10U		
P	1	–	**–**	–	455	**395**	370	–	**–**	–	–	**–**	–
	2	–	**–**	–	280	**255**	230	–	**–**	–	–	**–**	–
	3	–	**–**	–	255	**230**	205	–	**–**	–	–	**–**	–
	4	–	**–**	–	190	**175**	160	–	**–**	–	–	**–**	–
	5	–	**–**	–	260	**230**	210	–	**–**	–	–	**–**	–
	6	–	**–**	–	160	**135**	110	–	**–**	–	–	**–**	–
M	1	225	**200**	185	205	**185**	155	–	**–**	–	–	**–**	–
	2	205	**180**	145	185	**160**	140	–	**–**	–	–	**–**	–
	3	155	**135**	105	145	**130**	115	–	**–**	–	–	**–**	–
K	1	–	**–**	–	295	**265**	240	–	**–**	–	–	**–**	–
	2	–	**–**	–	235	**210**	190	–	**–**	–	–	**–**	–
	3	–	**–**	–	195	**175**	160	–	**–**	–	–	**–**	–
N	1–2	–	**–**	–	–	**–**	–	1075	**945**	875	2755	**2450**	2255
	3	–	**–**	–	–	**–**	–	945	**875**	760	2285	**1670**	1355
S	1	45	**40**	30	–	**–**	–	–	**–**	–	–	**–**	–
	2	45	**40**	30	–	**–**	–	–	**–**	–	–	**–**	–
	3	55	**45**	30	–	**–**	–	–	**–**	–	–	**–**	–
	4	85	**60**	40	66	**50**	33	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

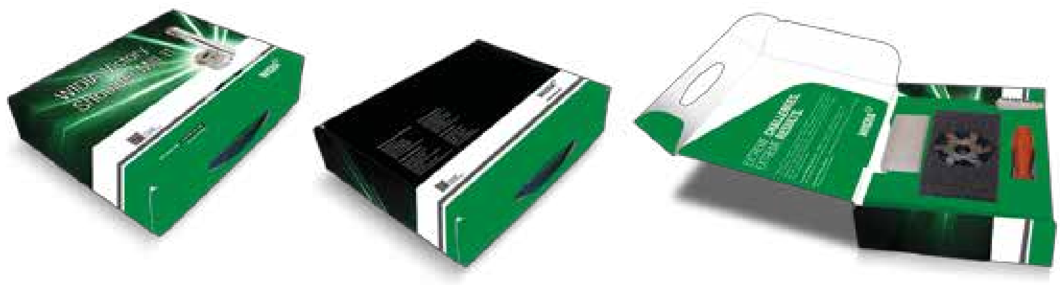
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	10%			20%			30%			40%			50–100%			
.F..-PCD	0,08	**0,17**	0,23	0,06	**0,13**	0,18	0,06	**0,11**	0,15	0,05	**0,10**	0,14	0,05	**0,10**	0,14	.F..-PCD
.F..ALP	0,08	**0,10**	0,16	0,06	**0,07**	0,12	0,06	**0,06**	0,10	0,05	**0,06**	0,10	0,05	**0,06**	0,10	.F..ALP
.E..ML	0,09	**0,18**	0,30	0,07	**0,14**	0,23	0,06	**0,12**	0,20	0,05	**0,11**	0,19	0,05	**0,11**	0,18	.E..ML
.S..MM	0,17	**0,20**	0,34	0,13	**0,15**	0,25	0,11	**0,13**	0,22	0,10	**0,12**	0,21	0,10	**0,12**	0,20	.S..MM
.S..MH	0,17	**0,25**	0,40	0,13	**0,19**	0,30	0,11	**0,17**	0,26	0,10	**0,15**	0,24	0,10	**0,15**	0,24	.S..MH

NOTE: Use “Light Machining” values as starting feed rate.

Achieve True 90° Shoulder Milling with the New High-Performance WIDIA™ VSM11™ Starter Kits.

Victory™ Shoulder Mill 11™ Starter Kits

Order one of our starter kits and test the performance of our new VSM11 platform. The kits are set up to serve the majority of shoulder milling applications, delivered with a cutter body and the latest WIDIA Victory™ grades. Detailed order information can be found in the table below.

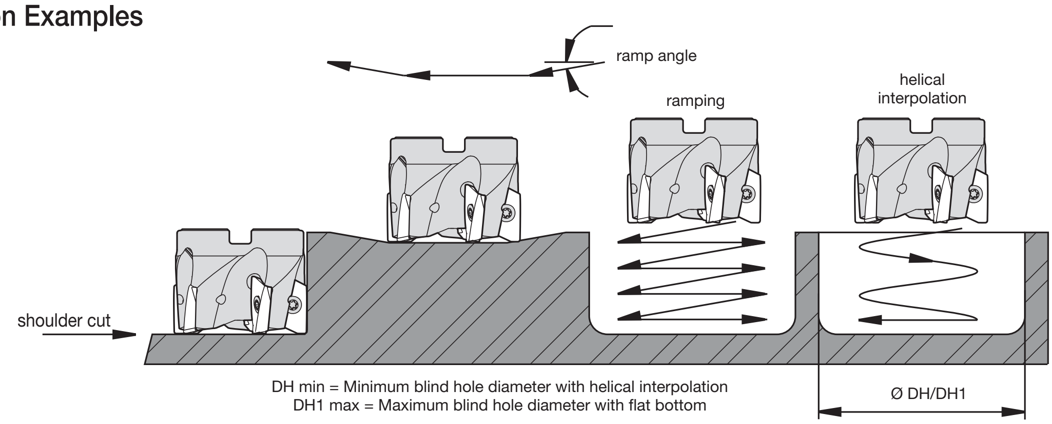


VSM11 Starter Kits • Metric

					content				
order number	catalogue number	diameter D1 (mm)	cutter body type	material group	cutter	qty	inserts	grade	Z (pocket seats)
5527101	VSM11KITWD016Z02WP40PM	16	Weldon	P	VSM11D016Z02B16XD11	10	XDPT110408PDSRMM	WP40PM	2
5527102	VSM11KITWD020Z03WP40PM	20	Weldon	P	VSM11D020Z03B20XD11	10	XDPT110408PDSRMM	WP40PM	3
5527106	VSM11KITSD050Z05WP40PM	50	Shell	P	VSM11D050Z05S022XD11	10	XDPT110408PDSRMM	WP40PM	5
5719051	VSM11KITSD040Z06WP40PM	40	Shell	P	VSM11D040Z06S016XD11	10	XDPT110408PDSRMM	WP40PM	6
5719052	VSM11KITCD016Z02WP40PM	16	Cylindrical	P	VSM11D016Z02A16XD11L100	10	XDPT110408PDSRMM	WP40PM	2
5719053	VSM11KITCD020Z03WP40PM	20	Cylindrical	P	VSM11D020Z03A20XD11L110	10	XDPT110408PDSRMM	WP40PM	3
5719054	VSM11KITCD025Z04WP40PM	25	Cylindrical	P	VSM11D025Z04A25XD11L120	10	XDPT110408PDSRMM	WP40PM	4
5719055	VSM11KITCD032Z03WP40PM	32	Cylindrical	P	VSM11D032Z03A32XD11L130	10	XDPT110408PDSRMM	WP40PM	3
5886219	VSM11KITCD025Z03L120WP40PM	25	Cylindrical	P	VSM11D025Z03A25XD11L120	10	XDPT110408PDSRMM	WP40PM	3
5886220*	VSM11KITCD025Z03L210WP40PM	25	Cylindrical	P	VSM11D025Z03A25XD11L210	10	XDPT110408PDSRMM	WP40PM	3
5886251*	VSM11KITCD032Z03L250WP40PM	32	Cylindrical	P	VSM11D032Z03A32XD11L250	10	XDPT110408PDSRMM	WP40PM	3

Starter Kit to be delivered in regular WIDIA™ corrugated box.

Application Examples



order number	catalogue number	number of inserts	max RPM	max ramp angle to steel body interference	max flat-bottom hole diameter (DH1 max)	min hole diameter (DH min)
5417011	VSM11D016Z02M08XD11	2	41400	10.00°	32,00	19,00
5417013	VSM11D020Z03M10XD11	3	35100	7.80°	40,00	27,00
5417015	VSM11D025Z04M12XD11	4	30200	5.30°	50,00	37,00
5417017	VSM11D032Z04M16XD11	4	25800	3.60°	64,00	51,00
5417019	VSM11D040Z06M16XD11	6	22600	2.60°	80,00	67,00
5416454	VSM11D012Z01B16XD11	1	53100	3.70°	24,00	11,00
5416455	VSM11D016Z02B16XD11	2	41400	10.00°	32,00	19,00
5416457	VSM11D020Z02B20XD11	2	35100	7.80°	40,00	27,00
5416458	VSM11D020Z03B20XD11	3	35100	7.80°	40,00	27,00
5416459	VSM11D025Z03B25XD11	3	30200	5.30°	50,00	37,00
5416480	VSM11D025Z04B25XD11	4	30200	5.30°	50,00	37,00
5416481	VSM11D030Z04B25XD11	4	26900	3.20°	60,00	47,00
5416482	VSM11D032Z04B32XD11	4	25800	3.60°	64,00	51,00
5416483	VSM11D032Z05B32XD11	5	25800	3.60°	64,00	51,00
5416632	VSM11D012Z01A16XD11L100	1	53100	4.00°	24,00	11,00
5416633	VSM11D016Z02A16XD11L100	2	41400	10.00°	32,00	19,00
5416634	VSM11D020Z02A20XD11L110	2	35100	8.00°	40,00	27,00
5416635	VSM11D020Z03A20XD11L110	3	35100	8.00°	40,00	27,00
5416637	VSM11D025Z04A25XD11L120	4	30200	5.00°	50,00	37,00
5416636	VSM11D025Z03A25XD11L120	3	30200	5.00°	50,00	37,00
5416638	VSM11D032Z03A32XD11L130	3	25800	4.00°	64,00	51,00
5416639	VSM11D032Z05A32XD11L130	5	25800	4.00°	64,00	51,00
5416700	VSM11D016Z02A16XD11L170	2	41400	10.00°	32,00	19,00
5416701	VSM11D018Z02A16XD11L170	2	37900	10.00°	36,00	23,00
5416703	VSM11D020Z03A20XD11L170	3	35100	8.00°	40,00	27,00
5416702	VSM11D020Z02A20XD11L170	2	35100	8.00°	40,00	27,00
5416704	VSM11D022Z03A20XD11L170	3	32900	7.00°	44,00	31,00
5416705	VSM11D025Z03A25XD11L210	3	30200	5.00°	50,00	37,00
5416706	VSM11D025Z04A25XD11L210	4	30200	5.00°	50,00	37,00
5416707	VSM11D032Z03A32XD11L250	3	25800	4.00°	64,00	51,00
5416316	VSM11D040Z04S016XD11	4	22600	3.00°	80,00	67,00
5416317	VSM11D040Z06S016XD11	6	22600	3.00°	80,00	67,00
5416318	VSM11D050Z05S022XD11	5	19900	2.00°	100,00	87,00
5416319	VSM11D050Z08S022XD11	8	19900	2.00°	100,00	87,00
5416340	VSM11D063Z06S022XD11	6	17500	2.00°	126,00	113,00
5416341	VSM11D063Z09S022XD11	9	17500	2.00°	126,00	113,00
5416342	VSM11D080Z08S027XD11	8	15300	1.00°	160,00	147,00
5416345	VSM11D100Z09S032XD11	9	13600	0.90°	200,00	187,00
5416347	VSM11D125Z011S040XD11	11	12100	0.70°	250,00	237,00

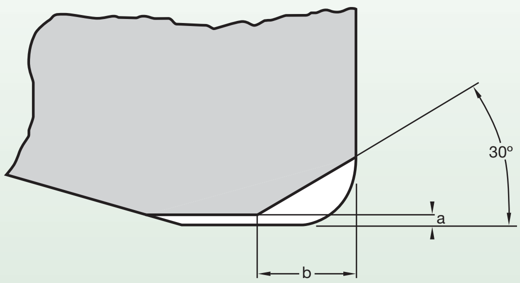
NOTE: For DH1 max, subtract the insert corner radius from the max hole diameter.

Shoulder Mills

WIDIA

Shoulder Mills

Modification Instructions for Use of Larger Radii Inserts (Shoulder Mills and Helical Mills)



insert corner radius	material to remove a	material to remove b
3,1mm	0,2mm	1,8mm

VSM17

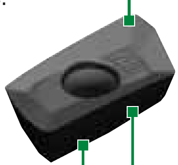
WIDIA Victory Shoulder Mill 17 is a high-performance, versatile, robust, 90° square shoulder milling platform. VSM17 is designed for versatility, low horsepower consumption, and easy cutting action. Cutters can be used for shoulder milling, profiling, face milling, slotting, ramping, helical interpolation, and circular interpolation milling applications. Inserts are specially designed with innovative geometries and features like variable rake angles, negative T-land, small hone, and the latest Victory grades enhancing tool performance and versatility.

Take advantage of the high-performance, advanced carbide substrates, coatings, and surface treatment technologies of the available 7 Victory grades, 4 geometries, and a broad-range cutter body product portfolio. This platform works with multiple material types and applications.

- Up to 16,33mm (.65") depth-of-cut capabilities.
- State-of-the-art step down capability.
- Screw-on, end mill, and shell mill cutters with effective internal coolant supply.

Features

- Insert geometries and grades for all workpiece materials.
- Insert corner radius from 0,4–4mm (.015–.157").
- Max axial depth of cut 16,3mm (0.65").



Benefits

- Achieve true 90° wall finish.
- High performance and longer tool life.
- Latest WIDIA Victory milling grades for all workpiece materials.
- High positive geometry, soft cutting action, reduced cycle times, and low horsepower consumption.
- Stability and reliability.

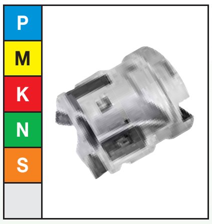
90° Shoulder Mills

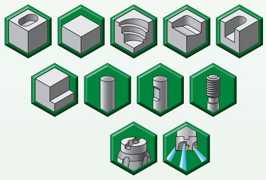
VSM17™

Max depth of cut: 16,33mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 25–160mm

Pages: J20–J29





Insert Offering

XDPT-MM

P	M	K		S	H

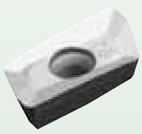
Medium to heavy machining.
First choice for general purpose.
Precision pressed to size.

XDPT-MH

P	M	K		S	

First choice for heavy-duty machining.
Steel and cast iron materials.
Precision pressed to size.

XDCT-ALP



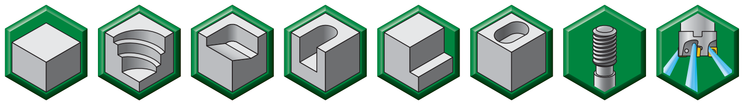
			N		

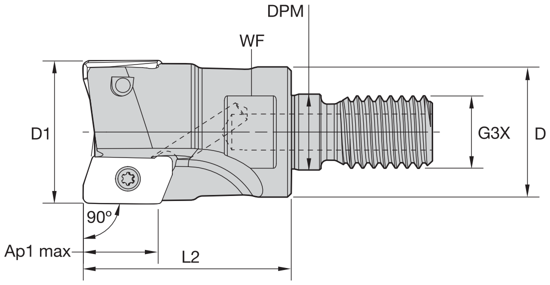
Roughing and finishing
of aluminium alloys.
High precision.
Periphery ground.

XDCT-ML

P	M			S	H

Light to medium machining.
First choice for stainless steel
and titanium.
Periphery ground.

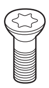


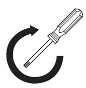


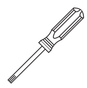
Screw-On End Mills

order number	catalogue number	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5988091	**VSM17D025Z02M12XD17**	25	21	12,5	M12	35	17	16,3	2	8.8	Yes	41800	0,08
5988092	**VSM17D032Z03M16XD17**	32	29	17,0	M16	40	24	16,3	3	5.7	Yes	34700	0,17
5988132	**VSM17D32Z02M016XD17**	32	29	17,0	M16	40	24	16,3	2	5.7	Yes	34700	0,18
5988093	**VSM17D040Z04M16XD17**	40	29	17,0	M16	40	24	16,2	4	4.0	Yes	29800	0,20
5988131	**VSM17D40Z03M016XD17**	40	29	17,0	M16	40	24	16,2	3	4.0	Yes	29800	0,20

Spare Parts

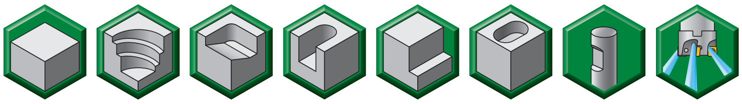


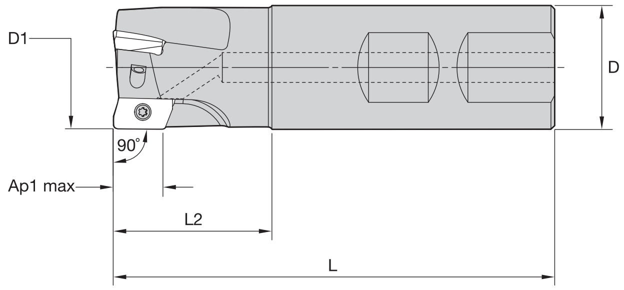




insert screw	Nm	wrench
191.725	3,5	**170.025**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

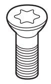
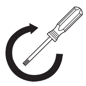
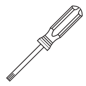




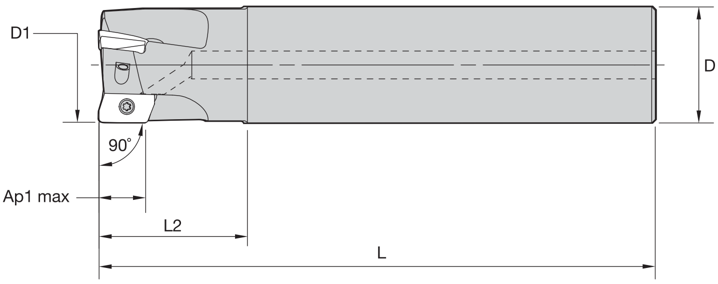
Weldon Shanks

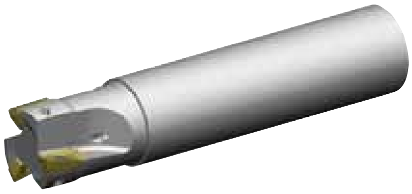
order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5988102	**VSM17D025Z02B25XD17**	25	25	90	33	16,3	2	8.8	Yes	41800	0,26
5988136	**VSM17D032Z02B32XD17**	32	32	100	39	16,3	2	5.7	Yes	34700	0,49
5988103	**VSM17D032Z03B32XD17**	32	32	100	39	16,3	3	5.7	Yes	34700	0,48
5988137	**VSM17D040Z03B40XD17**	40	40	110	39	16,2	3	4.0	Yes	29800	0,88
5988104	**VSM17D040Z04B40XD17**	40	40	110	39	16,2	4	4.0	Yes	29800	0,87

Spare Parts

 insert screw	 Nm	 wrench
191.725	3,5	**170.025**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

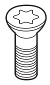


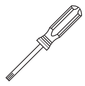


Cylindrical End Mills

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5988055	**VSM17D025Z02A25XD17L110**	25	25	110	44	16,3	2	8.8	Yes	41800	0,32
5988056	**VSM17D025Z02A25XD17L170**	25	25	170	44	16,3	2	8.8	Yes	41800	0,54
5988107	**VSM17D032Z02A32XD17L120**	32	32	120	50	16,3	2	5.7	Yes	34700	0,60
5988057	**VSM17D032Z03A32XD17L120**	32	32	120	50	16,3	3	5.7	Yes	34700	0,60
5988109	**VSM17D040Z03A32XD17L130**	40	32	130	50	16,2	3	4.0	Yes	29800	0,77
5988059	**VSM17D040Z04A32XD17L130**	40	32	130	50	16,2	4	4.0	Yes	29800	0,77

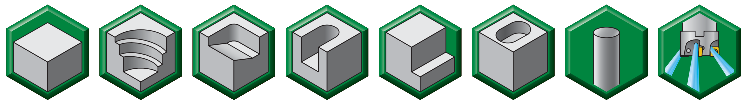
Spare Parts

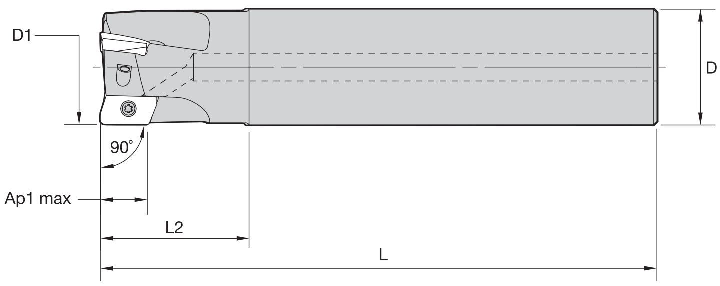


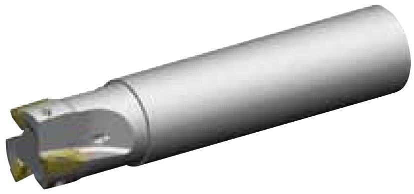


insert screw	Nm	wrench
191.725	3,5	**170.025**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.



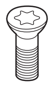


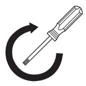


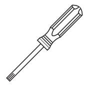
Cylindrical End Mills • Long Shank

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5988108	**VSM17D032Z02A32XD17L210**	32	32	210	50	16,3	2	5.7	Yes	34700	1,14
5988058	**VSM17D032Z03A32XD17L210**	32	32	210	50	16,3	3	5.7	Yes	34700	1,13
5988110	**VSM17D040Z03A32XD17L250**	40	32	250	50	16,2	3	4.0	Yes	29800	1,49
5988060	**VSM17D040Z04A32XD17L250**	40	32	250	50	16,2	4	4.0	Yes	29800	1,49

Spare Parts

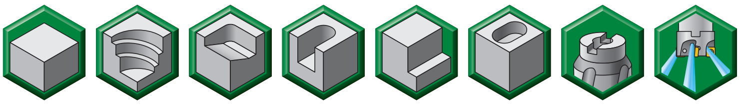


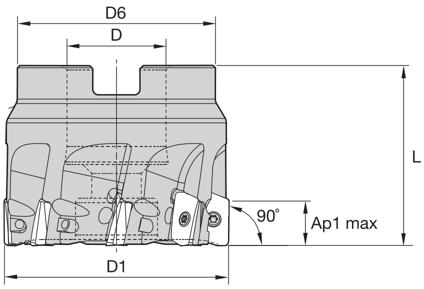




insert screw	Nm	wrench
191.725	3,5	**170.025**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

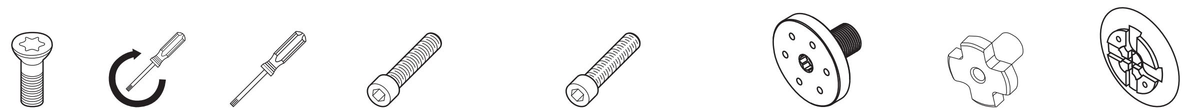




Shell Mills

order number	catalogue number	D1	D	D6	L	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5988094	VSM17D040Z04S16XD17	40	16	37	40	16,2	4	4.0	Yes	29800	0,19
5988095	VSM17D050Z04S22XD17	50	22	45	40	16,1	4	3.0	Yes	25800	0,28
5988096	VSM17D050Z05S22XD17	50	22	45	40	16,1	5	3.0	Yes	25800	0,29
5988134	VSM17D050Z06S22XD17	50	22	45	40	16,1	6	3.0	Yes	25800	0,28
5988097	VSM17D063Z05S22XD17	63	22	50	40	16,0	5	2.1	Yes	22400	0,45
5988135	VSM17D063Z06S22XD17	63	22	50	40	16,0	6	2.1	Yes	22400	0,45
5988098	VSM17D080Z06S27XD17	80	27	60	50	15,9	6	1.6	Yes	19500	0,98
5988133	VSM17D080Z07S27XD17	80	27	60	50	15,9	7	1.6	Yes	19500	0,96
5988099	VSM17D100Z08S32XD17	100	32	80	50	15,8	8	1.2	Yes	17200	1,63
5988100	VSM17D125Z09S40XD17	125	40	90	63	15,7	9	0.9	Yes	15200	2,94
5988101	VSM17D160Z12S40XD17	160	40	100	63	15,6	12	0.7	Yes	13300	3,66

Spare Parts



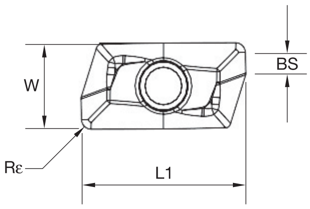
D1	insert screw	Nm	wrench	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw assembly	coolant lock screw	coolant cap
40,0	191.725	3,5	170.025	MS1294	MS1294CG	–	–	–
50,0	191.725	3,5	170.025	MS1234	MS1294CG	–	–	–
50,0	191.725	3,5	170.025	MS1234	MS1234CG	–	–	–
63,0	191.725	3,5	170.025	MS1234	MS1234CG	–	–	–
80,0	191.725	3,5	170.025	MS2038	MS2038CG	–	–	–
100,0	191.725	3,5	170.025	–	–	MS2195C	–	–
125,0	191.725	3,5	170.025	–	–	MS2187C	–	–
160,0	191.725	3,5	170.025	–	–	–	12146107000	12146111100

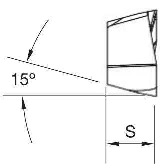
NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.E..ML	WP40PM	**.S..MM**	**WP40PM**	.S..MH	WP40PM
P3–P4	.E..ML	WP35CM	**.S..MM**	**WP35CM**	.S..MH	WP35CM
P5–P6	.E..ML	WP35CM	**.S..MM**	**WU35PM**	.S..MH	WP35CM
M1–M2	.E..ML	WP25PM	**.S..MM**	**WP25PM**	.S..MM	WU35PM
M3	.E..ML	WP35CM	**.S..MM**	**WP35CM**	.S..MH	WP35CM
K1–K2	.S..MM	WK15CM	**.S..MM**	**WK15CM**	.S..MH	WK15CM
K3	.E..ML	WP35CM	**.S..MM**	**WP35CM**	.S..MH	WP35CM
N1–N2	.F..ALP	WN10HM	**.F..ALP**	**WN25PM**	.F..ALP	WN25PM
N3	–	–	–	–	–	–
S1–S2	.S..MM	WP25PM	**.S..MM**	**WU35PM**	.S..MM	WU35PM
S3	.S..MM	WU35PM	**.S..MM**	**WU35PM**	.S..MM	WU35PM
S4	.S..MM	WP25PM	**.S..MM**	**WU35PM**	.S..MM	WU35PM
H1	–	–	–	–	–	–

XDCT-ML





● first choice
○ alternate choice

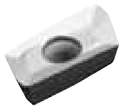
WIDIA VICTORY

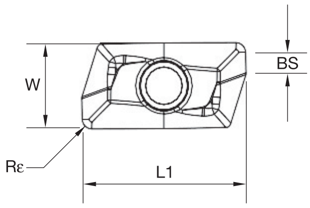
	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
P			○	●	●	●
M			●	○	●	●
K	●		○	○		
N		●				
S			●		○	●
H			●	○		

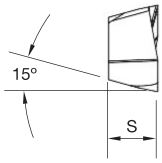
XDCT-ML

catalogue number	cutting edges	L1	BS	S	W	Rε	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
XDCT170404PEERML	2	19,15	2,62	4,90	9,60	0,40	–	–	5989010	–	–	–
XDCT170408PEERML	2	19,15	2,22	4,90	9,60	0,80	–	–	5988983	5988982	5988981	–
XDCT170412PEERML	2	19,16	1,82	4,90	9,60	1,20	–	–	5988988	5988987	5988986	–
XDCT170416PEERML	2	19,17	1,42	4,90	9,60	1,60	–	–	6001257	–	–	–
XDCT170420PEERML	2	19,17	1,01	4,90	9,60	2,00	–	–	6001255	–	–	–
XDCT170424PEERML	2	19,17	0,63	4,90	9,60	2,40	–	–	6001253	–	–	–
XDCT170432PEERML	2	18,85	–	4,88	9,59	3,20	–	–	6001251	–	–	–
XDCT170440PEERML	2	18,33	–	4,87	9,59	4,00	–	–	6001239	–	–	–

WIDIA VICTORY


XDCT-ALP





● first choice
○ alternate choice

■ XDCT-ALP

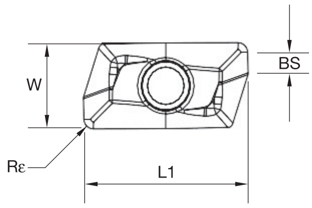
	WN10HM	WN25PM
P		
M		
K		
N	●	●
S		
H		

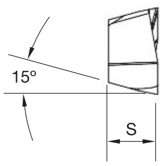
catalogue number	cutting edges	L1	BS	S	W	Rε	WN10HM	WN25PM
XDCT170404PEFRALP	2	19,15	2,62	4,90	9,60	0,40	6007341	6007220
XDCT170408PEFRALP	2	19,15	2,22	4,90	9,60	0,80	6007345	6007344
XDCT170412PEFRALP	2	19,16	1,82	4,90	9,60	1,20	6007342	6001537
XDCT170416PEFRALP	2	19,17	1,42	4,90	9,60	1,60	–	6001256
XDCT170420PEFRALP	2	19,17	1,01	4,90	9,60	2,00	–	6001254
XDCT170424PEFRALP	2	19,17	0,63	4,90	9,60	2,40	–	6001252
XDCT170432PEFRALP	2	18,85	–	4,88	9,59	3,20	–	6001240
XDCT170440PEFRALP	2	18,33	–	4,87	9,59	4,00	–	6001238

WIDIA VICTORY

XDPT-MM

XDPT-MH





● first choice
○ alternate choice

	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
P			○	●	●	●
M			●	○	●	●
K	●		○	○		
N		●				
S			●		○	●
H			●	○		

XDPT-MM

catalogue number	cutting edges	L1	BS	S	W	Rε	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
XDPT170404PESRMM	2	19,15	2,52	4,90	9,60	0,40	-	-	-	-	5987689	5987690
XDPT170408PESRMM	2	19,15	2,15	4,90	9,60	0,80	5987948	-	5987949	5987947	5987946	5987950
XDPT170412PESRMM	2	19,16	1,77	4,90	9,60	1,20	5988138	-	5988151	5988140	5988139	5988152
XDPT170416PESRMM	2	19,17	1,38	4,90	9,60	1,60	5988153	-	5988155	5988156	5988154	-
XDPT170420PESRMM	2	19,17	0,99	4,90	9,60	2,00	-	-	5988158	5988160	5988159	-
XDPT170424PESRMM	2	19,17	0,62	4,90	9,60	2,40	-	-	5988203	-	5988202	-
XDPT170432PESRMM	2	18,85	—	4,89	9,59	3,20	-	-	5988206	5988204	5988205	-
XDPT170440PESRMM	2	18,33	—	4,87	9,59	4,00	-	-	5988970	-	5988969	-

XDPT-MH

catalogue number	cutting edges	L1	BS	S	W	Rε	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
XDPT170408PESRMH	2	19,15	2,10	4,91	9,60	0,80	5989053	-	-	5989054	5989052	-
XDPT170412PESRMH	2	19,16	1,73	4,91	9,60	1,20	5991817	-	-	5991816	5991815	-

Shoulder Mills

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WN25PM			WP25PM			WP35CM			WP40PM			WN10HM			WU35PM		
P	1	–	**–**	–	–	**–**	–	330	**285**	270	455	**395**	370	295	**260**	245	–	**–**	–	260	**230**	215
	2	–	**–**	–	–	**–**	–	275	**240**	200	280	**255**	230	250	**215**	180	–	**–**	–	220	**190**	160
	3	–	**–**	–	–	**–**	–	255	**215**	175	255	**230**	205	230	**195**	160	–	**–**	–	200	**170**	140
	4	–	**–**	–	–	**–**	–	225	**185**	150	190	**175**	160	205	**170**	135	–	**–**	–	180	**150**	120
	5	–	**–**	–	–	**–**	–	185	**170**	150	260	**230**	210	170	**155**	135	–	**–**	–	150	**135**	120
	6	–	**–**	–	–	**–**	–	165	**125**	100	160	**135**	110	150	**115**	90	–	**–**	–	130	**100**	80
M	1	–	**–**	–	–	**–**	–	205	**180**	165	205	**185**	155	195	**170**	155	–	**–**	–	170	**150**	135
	2	–	**–**	–	–	**–**	–	185	**160**	130	185	**160**	140	175	**150**	125	–	**–**	–	155	**130**	110
	3	–	**–**	–	–	**–**	–	140	**120**	95	145	**130**	115	130	**115**	90	–	**–**	–	115	**100**	80
K	1	420	**385**	340	–	**–**	–	230	**205**	185	295	**265**	240	–	**–**	–	190	**170**	150	–	**–**	–
	2	335	**295**	275	–	**–**	–	180	**160**	150	235	**210**	190	–	**–**	–	–	**–**	–	–	**–**	–
	3	280	**250**	230	–	**–**	–	150	**135**	120	195	**175**	160	–	**–**	–	–	**–**	–	–	**–**	–
N	1	–	**–**	–	1075	**945**	875	–	**–**	–	–	**–**	–	–	**–**	–	2000	**1200**	1000	–	**–**	–
	2	–	**–**	–	945	**875**	760	–	**–**	–	–	**–**	–	–	**–**	–	1365	**815**	665	–	**–**	–
	3	–	**–**	–	945	**875**	760	–	**–**	–	–	**–**	–	–	**–**	–	800	**500**	400	–	**–**	–
S	1	–	**–**	–	–	**–**	–	40	**35**	25	–	**–**	–	40	**35**	30	–	**–**	–	35	**30**	25
	2	–	**–**	–	–	**–**	–	40	**35**	25	–	**–**	–	40	**35**	30	–	**–**	–	35	**30**	25
	3	–	**–**	–	–	**–**	–	50	**40**	25	–	**–**	–	50	**40**	30	–	**–**	–	45	**35**	25
	4	–	**–**	–	–	**–**	–	70	**50**	35	66	**50**	33	65	**50**	35	–	**–**	–	60	**45**	30
H	1	–	**–**	–	–	**–**	–	120	**90**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..ALP	0,12	**0,23**	0,58	0,08	**0,17**	0,42	0,06	**0,13**	0,31	0,06	**0,11**	0,27	0,05	**0,10**	0,25	.F..ALP
.E..ML	0,16	**0,35**	0,70	0,12	**0,25**	0,50	0,09	**0,19**	0,38	0,08	**0,16**	0,33	0,07	**0,15**	0,30	.E..ML
.S..MM	0,16	**0,46**	0,87	0,12	**0,33**	0,63	0,09	**0,25**	0,47	0,08	**0,22**	0,41	0,07	**0,20**	0,38	.S..MM
.S..MH	0,23	**0,58**	0,93	0,17	**0,42**	0,67	0,13	**0,31**	0,50	0,11	**0,27**	0,44	0,10	**0,25**	0,40	.S..MH

NOTE: Use “Light Machining” value as starting feed rate.

Order a VSM17™ Kit to achieve true 90° high-performance shoulder milling!

Victory™ Shoulder Mill 17™ Starter Kits

Order one of our starter kits and test the performance of our new VSM17 platform. The kits are set up to serve the majority of shoulder milling applications, delivered with a cutter body and the latest WIDIA™ Victory™ grades. Detailed order information can be found in the table below.

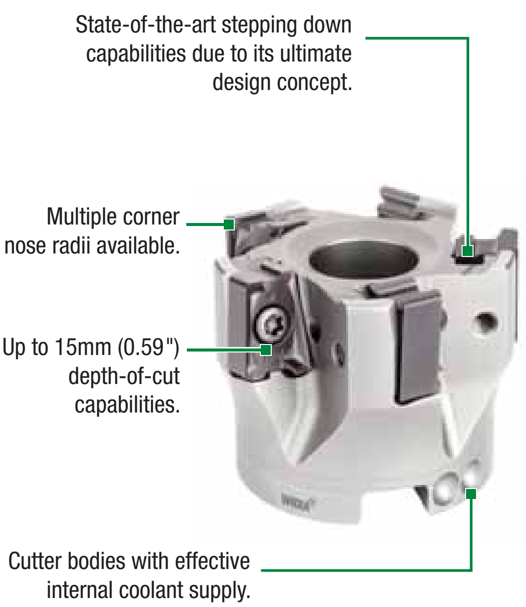
VSM17 Starter Kits • Metric

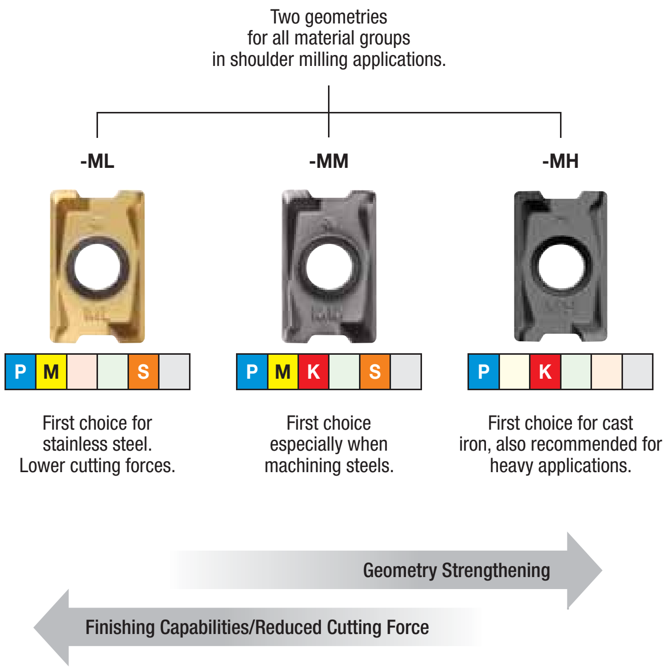
order number	catalogue number	diameter D1 (mm)	cutter body type	material group	content					
					cutter	qty	inserts	qty	grade	Z (Pocket Seats)
6049187	VSM17KITCD025Z2WP40PM	25	CYLINDRICAL	P	VSM17D025Z02A25XD17L110	1	XDPT170408PESRMM	10	WP40PM	2
6049185	VSM17KITSW025Z2WP40PM	25	SCREW ON	P	VSM17D025Z02M12XD17	1	XDPT170408PESRMM	10	WP40PM	2
6049186	VSM17KITWD025Z2WP40PM	25	WELDON	P	VSM17D025Z02B25XD17	1	XDPT170408PESRMM	10	WP40PM	2
6049190	VSM17KITCD032Z3WP40PM	32	CYLINDRICAL	P	VSM17D032Z03A32XD17L120	1	XDPT170408PESRMM	10	WP40PM	3
6049188	VSM17KITSW032Z3WP40PM	32	SCREW ON	P	VSM17D032Z03M16XD17	1	XDPT170408PESRMM	10	WP40PM	3
6049189	VSM17KITWD032Z3WP40PM	32	WELDON	P	VSM17D032Z03B32XD17	1	XDPT170408PESRMM	10	WP40PM	3
6049311	VSM17KITCD032Z2WP40PM	32	CYLINDRICAL	P	VSM17D032Z02A32XD17L120	1	XDPT170408PESRMM	10	WP40PM	2
6049313	VSM17KITCD040Z4WP40PM	40	CYLINDRICAL	P	VSM17D040Z04A32XD17L130	1	XDPT170408PESRMM	10	WP40PM	4
6049312	VSM17KITSD040Z4WP40PM	40	SHELL MILL	P	VSM17D040Z04S16XD17	1	XDPT170408PESRMM	10	WP40PM	4
6049314	VSM17KITSD050Z4WP40PM	50	SHELL MILL	P	VSM17D050Z04S22XD17	1	XDPT170408PESRMM	10	WP40PM	4
6049315	VSM17KITSD050Z5WP40PM	50	SHELL MILL	P	VSM17D050Z05S22XD17	1	XDPT170408PESRMM	10	WP40PM	5
6049316	VSM17KITSD063Z5WP40PM	63	SHELL MILL	P	VSM17D063Z05S22XD17	1	XDPT170408PESRMM	10	WP40PM	5
6049317	VSM17KITSD080Z6WP40PM	80	SHELL MILL	P	VSM17D080Z06S27XD17	1	XDPT170408PESRMM	10	WP40PM	6
6049318	VSM17KITSD100Z8WP40PM	100	SHELL MILL	P	VSM17D100Z08S32XD17	1	XDPT170408PESRMM	10	WP40PM	8
6049321	VSM17KITCD025Z2WK15CM	25	CYLINDRICAL	K	VSM17D025Z02A25XD17L110	1	XDPT170408PESRMM	10	WK15CM	2
6049319	VSM17KITSW025Z2WK15CM	25	SCREW ON	K	VSM17D025Z02M12XD17	1	XDPT170408PESRMM	10	WK15CM	2
6049320	VSM17KITWD025Z2WK15CM	25	WELDON	K	VSM17D025Z02B25XD17	1	XDPT170408PESRMM	10	WK15CM	2
6049324	VSM17KITCD032Z3WK15CM	32	CYLINDRICAL	K	VSM17D032Z03A32XD17L120	1	XDPT170408PESRMM	10	WK15CM	3
6049322	VSM17KITSW032Z3WK15CM	32	SCREW ON	K	VSM17D032Z03M16XD17	1	XDPT170408PESRMM	10	WK15CM	3
6049323	VSM17KITWD032Z3WK15CM	32	WELDON	K	VSM17D032Z03B32XD17	1	XDPT170408PESRMM	10	WK15CM	3
6049325	VSM17KITCD032Z2WK15CM	32	CYLINDRICAL	K	VSM17D032Z02A32XD17L120	1	XDPT170408PESRMM	10	WK15CM	2
6049327	VSM17KITCD040Z4WK15CM	40	CYLINDRICAL	K	VSM17D040Z04A32XD17L130	1	XDPT170408PESRMM	10	WK15CM	4
6049326	VSM17KITSD040Z4WK15CM	40	SHELL MILL	K	VSM17D040Z04S16XD17	1	XDPT170408PESRMM	10	WK15CM	4
6049328	VSM17KITSD050Z4WK15CM	50	SHELL MILL	K	VSM17D050Z04S22XD17	1	XDPT170408PESRMM	10	WK15CM	4
6049329	VSM17KITSD050Z5WK15CM	50	SHELL MILL	K	VSM17D050Z05S22XD17	1	XDPT170408PESRMM	10	WK15CM	5
6049330	VSM17KITSD063Z5WK15CM	63	SHELL MILL	K	VSM17D063Z05S22XD17	1	XDPT170408PESRMM	10	WK15CM	5
6049331	VSM17KITSD080Z6WK15CM	80	SHELL MILL	K	VSM17D080Z06S27XD17	1	XDPT170408PESRMM	10	WK15CM	6
6049332	VSM17KITSD100Z8WK15CM	100	SHELL MILL	K	VSM17D100Z08S32XD17	1	XDPT170408PESRMM	10	WK15CM	8

VSM490-15

WIDIA™ Victory™ Shoulder Milling Series (VSM series) is specially engineered to achieve excellent surface quality as well as higher material removal rates in shoulder milling applications. The VSM490 series, with its unique design, enables the tool to be applied in multiple passes (stepping down) with outstanding results. VSM490-15 is applicable in a wide range of workpiece materials: steel, cast iron, stainless steel, and titanium, from roughing to finishing applications.

- Double-sided strong insert with 4 cutting edges.
- High positive geometry for lower cutting forces.
- Superior wall and surface finish capabilities.





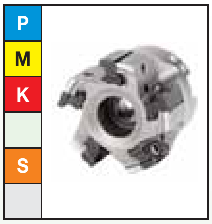
90° Shoulder Mills

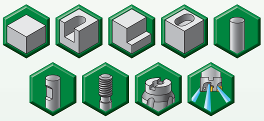
VSM490™-15

Max depth of cut: 15mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 25–160mm

Pages: J32–J40





VSM490™-15 • Unbeatable Performance in Shoulder Milling

- "Stepless" solution.
- No mismatch when machining walls in different steps.

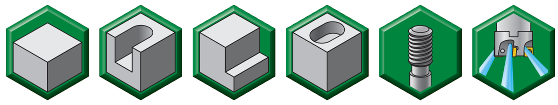
Competitor Tool • Wall Quality

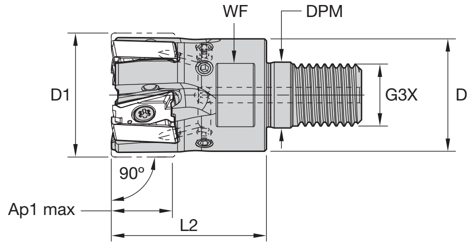
Traditional tools are designed to achieve a 90° wall, but exhibit poor performance when machining walls in multiple passes.

VSM490-15 • Wall Quality

VSM490-15 minimises the marks left. By increasing wall quality and avoiding a second tool, productivity increases significantly.

- Superior wall and surface finish capabilities.
- "Stepless" solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.

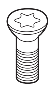


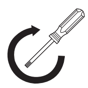


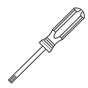
Screw-On End Mills

order number	catalogue number	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	kg	max RPM
5873211	**VSM490D025Z02M12XN15**	25	21	13	M12	32	17	15,0	2	0,18	26700
5873212	**VSM490D032Z03M16XN15**	32	29	17	M16	40	24	15,0	3	0,18	22000
5873213	**VSM490D032Z04M16XN15**	32	29	17	M16	40	24	15,0	4	0,18	22000
5873214	**VSM490D035Z04M16XN15**	35	29	17	M16	40	24	15,0	4	0,19	20600

Spare Parts

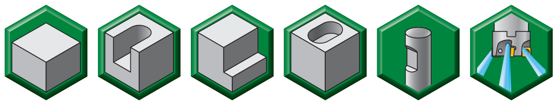


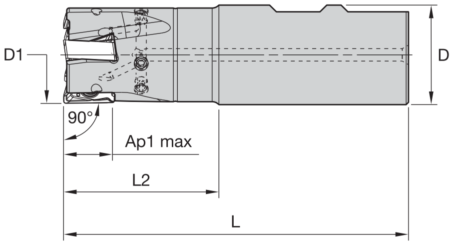




insert screw	Nm	Torx Plus driver
MS-2071	3,5	**DT15IP**

- Superior wall and surface finish capabilities.
- “Stepless” solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.



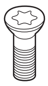


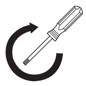
Weldon Shanks

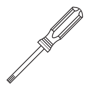
order number	catalogue number	D1	D	L	L2	Ap1 max	Z	kg	max RPM
5710285	**VSM490D025Z02B25XN15**	25	25	89	32	15,0	2	0,28	26700
5710286	**VSM490D032Z03B32XN15**	32	32	111	50	15,0	3	0,58	22000
5873215	**VSM490D040Z03B32XN15**	40	32	111	50	15,0	3	0,65	18800

NOTE: Weldon type not recommended for finishing operations.

Spare Parts

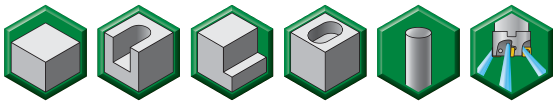


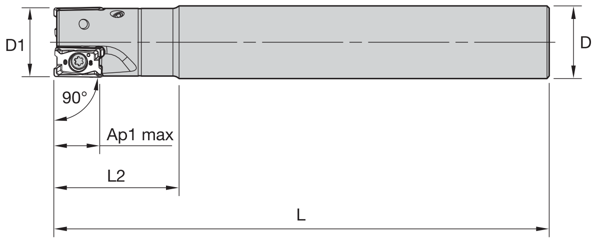


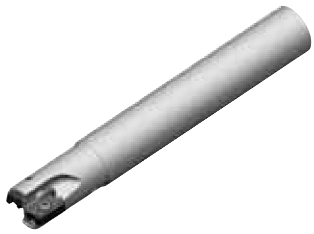


insert screw	Nm	Torx Plus driver
MS-2071	3,5	**DT15IP**

- Superior wall and surface finish capabilities.
- "Stepless" solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.



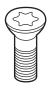
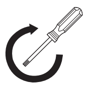
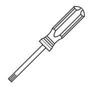




Cylindrical End Mills

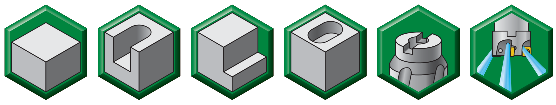
order number	catalogue number	D1	D	L	L2	Ap1 max	Z	kg	max RPM
5873216	VSM490D025Z02A25XN15L100	25	25	100	43	15,0	2	0,32	26700
5710287	VSM490D025Z02A25XN15L170	25	25	170	43	15,0	2	0,59	26700
5873217	VSM490D032Z03A32XN15L110	32	32	110	49	15,0	3	0,59	22000
5710288	VSM490D032Z03A32XN15L200	32	32	200	50	15,0	3	1,14	22000
5873218	VSM490D032Z04A32XN15L110	32	32	110	49	15,0	4	0,58	22000
5873219	VSM490D032Z04A32XN15L200	32	32	200	50	15,0	4	1,14	22000

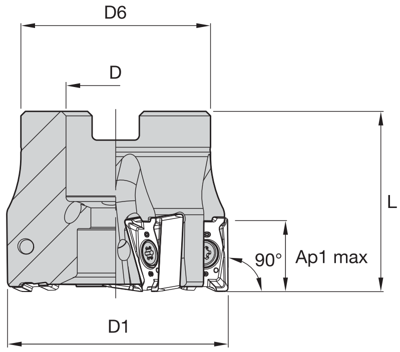
Spare Parts

insert screw	Nm	Torx Plus driver
MS-2071	3,5	DT15IP

- Superior wall and surface finish capabilities.
- “Stepless” solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.

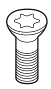


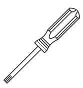
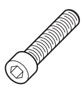
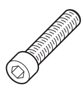
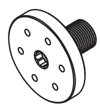
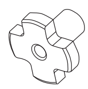
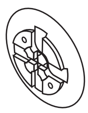


Shell Mills

order number	catalogue number	D1	D	D6	L	Ap1 max	Z	kg	max RPM
5710289	VSM490D040Z04S16XN15	40	16	37	40	15,0	4	0,20	18800
5710520	VSM490D040Z05S16XN15	40	16	37	40	15,0	5	0,19	18800
5873221	VSM490D050Z04S22XN15	50	22	42	40	15,0	4	0,28	16300
5710521	VSM490D050Z05S22XN15	50	22	42	40	15,0	5	0,28	16300
5710522	VSM490D050Z06S22XN15	50	22	42	40	15,0	6	0,28	16300
5873222	VSM490D063Z05S22XN15	63	22	50	40	15,0	5	0,50	14200
5710523	VSM490D063Z06S22XN15	63	22	50	40	15,0	6	0,49	14200
5710524	VSM490D063Z07S22XN15	63	22	50	40	15,0	7	0,48	14200
5873223	VSM490D080Z05S27XN15	80	27	60	50	15,0	5	1,03	12300
5710525	VSM490D080Z07S27XN15	80	27	60	50	15,0	7	1,03	12300
5873224	VSM490D080Z09S27XN15	80	27	60	50	15,0	9	1,04	12300
5710526	VSM490D100Z08S32XN15	100	32	80	50	15,0	8	1,61	10900
5873225	VSM490D100Z11S32XN15	100	32	80	50	15,0	11	1,64	10900
5873226	VSM490D125Z09S40XN15	125	40	90	63	15,0	9	2,96	9600
5873227	VSM490D125Z12S40XN15	125	40	90	63	15,0	12	3,11	9600
5873228	VSM490D160Z12S40XN15	160	40	110	63	15,0	12	4,80	8400

Spare Parts



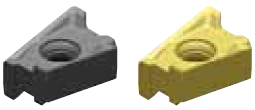







D1	insert screw	Nm	Torx Plus driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw assembly	coolant lock screw	coolant shower plate
40	MS-2071	3,5	DT15IP	125.825	MS1294CG	–	–	–
50	MS-2071	3,5	DT15IP	125.025	MS1234CG	–	–	–
63	MS-2071	3,5	DT15IP	125.025	MS1234CG	–	–	–
80	MS-2071	3,5	DT15IP	125.230	MS2038CG	–	–	–
100	MS-2071	3,5	DT15IP	–	–	MS2189C	–	–
125	MS-2071	3,5	DT15IP	–	–	MS2187C	–	–
160	MS-2071	3,5	DT15IP	–	–	–	420.200	470.233

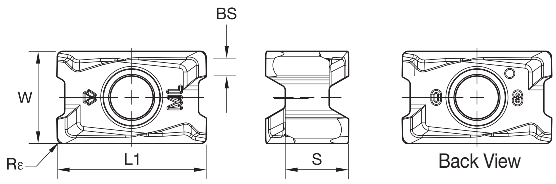
NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	XNGU-ML	WP40PM	**XNPU-ML**	**WP40PM**	XNPU-MM	WP40PM
P3–P4	XNGU-ML	WP25PM	**XNPU-MM**	**WP35CM**	XNPU-MM	WP40PM
P5–P6	XNGU-MM	WP25PM	**XNPU-MM**	**WP35CM**	XNPU-MM	WP35CM
M1–M2	XNGU-ML	WP25PM	**XNGU-ML**	**WU35PM**	XNGU-MM	WU35PM
M3	XNGU-ML	WP25PM	**XNGU-ML**	**WU35PM**	XNGU-MM	WU35PM
K1–K2	XNGU-MH	WK15CM	**XNGU-MH**	**WK15CM**	XNGU-MH	WP35CM
K3	XNGU-MH	WK15PM	**XNGU-MH**	**WK15PM**	XNGU-MH	WP40PM
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	XNGU-ML	WP25PM	**XNGU-ML**	**WU35PM**	XNGU-MM	WU35PM
S3	XNGU-ML	WP25PM	**XNGU-ML**	**WU35PM**	XNGU-MM	WU35PM
S4	XNGU-ML	WU35PM	**XNGU-ML**	**WU35PM**	XNPU-MM	WU35PM
H1	–	–	–	–	–	–



XNGU-ML XNGU-ML



- -ML geometry is the first choice for machining stainless steel. With reduced cutting forces, this is recommended for improved wall finishing capabilities in steels.

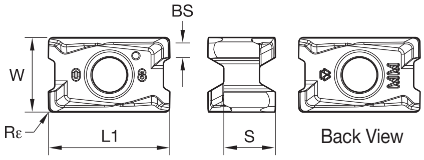
● first choice
○ alternate choice

	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
P		○	●	●		●
M		●	●	●		○
K	●	○			●	○
N						
S		●	●	○		
H						

XNGU-ML • Precision Finishing

catalogue number	cutting edges	L1	S	W	BS	Rε	hm	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
XNGU15T604ERML	4	16,20	6,88	10,00	2,20	0,40	0,08	–	5890821	5890823	5890822	–	–
XNGU15T608ERML	4	16,20	6,88	10,00	1,80	0,80	0,08	–	5873481	5873483	5873482	–	–

XNGU-MM XNPU-MM | XNGU-ML XNPU-ML | XNGU-MH



- -ML geometry is the first choice for machining stainless steel. With reduced cutting forces, this is recommended for improved wall finishing capabilities in steels.
- -MM is the universal geometry for VSM490-15. First choice when machining steel, as well as stainless steel and high-temp alloys in heavy applications.
- -MH geometry is the first choice for cast iron machining in the medium and heavy applications.

● first choice
○ alternate choice

	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
P		○	●	●		●
M		●	●	●		○
K	●	○			●	○
N						
S		●	●	○		
H						

XNGU-MM • Precision Finishing

catalogue number	cutting edges	L1	S	W	BS	Rε	hm	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
XNGU15T604SRMM	4	16,20	6,88	10,00	2,20	0,40	0,10	-	5949204	5949206	5949205	-	-
XNGU15T608SRMM	4	16,20	6,88	10,00	1,90	0,80	0,10	-	5710527	5710529	5710528	-	-

XNPU-ML • Utility Roughing

catalogue number	cutting edges	L1	S	W	BS	Rε	hm	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
XNPU15T608ERML	4	16,10	6,88	10,00	1,90	0,80	0,08	-	5883097	5883099	5883098	-	-

XNPU-MM • Utility Roughing

catalogue number	cutting edges	L1	S	W	BS	Rε	hm	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
XNPU15T608SRMM	4	16,10	6,88	10,00	1,90	0,80	0,10	5873419	5873415	5873417	5873416	5873420	5873418
XNPU15T612SRMM	4	16,10	6,88	10,00	1,50	1,20	0,10	5890762	5890728	5890730	5890729	5890763	5890761
XNPU15T616SRMM	4	16,10	6,88	10,00	1,10	1,60	0,10	5883521	5883447	5883449	5883448	5883522	5883450

XNGU-MH • Utility Roughing

catalogue number	cutting edges	L1	S	W	BS	Rε	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
XNGU15T608SRMH	4	16,20	6,88	10,00	1,80	0,80	6003724	6003570	6003722	6003721	6003725	6003723
XNGU15T616SRMH	4	16,20	6,88	10,00	1,00	1,60	6030378	6030376	-	-	6030380	6030377

Shoulder Mills

Recommended Starting Speeds [m/min]

Material Group		WK15PM			WP25PM			WU35PM			WP40PM			WK15CM			WP35CM		
P	1	–	**–**	–	330	**285**	270	260	**230**	215	300	**260**	250	–	**–**	–	455	**395**	370
	2	–	**–**	–	275	**240**	200	220	**190**	160	250	**220**	180	–	**–**	–	280	**255**	230
	3	–	**–**	–	255	**215**	175	200	**170**	140	230	**200**	160	–	**–**	–	255	**230**	205
	4	–	**–**	–	225	**185**	150	180	**150**	120	210	**170**	140	–	**–**	–	190	**175**	160
	5	–	**–**	–	185	**170**	150	150	**135**	120	170	**160**	140	–	**–**	–	260	**230**	210
	6	–	**–**	–	165	**125**	100	130	**100**	80	150	**120**	90	–	**–**	–	160	**135**	110
M	1	–	**–**	–	205	**180**	165	170	**150**	135	200	**170**	160	–	**–**	–	205	**185**	155
	2	–	**–**	–	185	**160**	130	155	**130**	110	180	**150**	130	–	**–**	–	185	**160**	140
	3	–	**–**	–	140	**120**	95	115	**100**	80	130	**120**	90	–	**–**	–	145	**130**	115
K	1	270	**245**	215	230	**205**	185	–	**–**	–	–	**–**	–	420	**385**	340	295	**265**	240
	2	210	**190**	175	180	**160**	150	–	**–**	–	–	**–**	–	335	**295**	275	235	**210**	190
	3	175	**160**	145	150	**135**	120	–	**–**	–	–	**–**	–	280	**250**	230	195	**175**	160
N	1–2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	40	**35**	25	35	**30**	25	40	**40**	30	–	**–**	–	–	**–**	–
	2	–	**–**	–	40	**35**	25	35	**30**	25	40	**40**	30	–	**–**	–	–	**–**	–
	3	–	**–**	–	50	**40**	25	45	**35**	25	50	**40**	30	–	**–**	–	–	**–**	–
	4	–	**–**	–	70	**50**	35	60	**45**	30	70	**50**	40	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
XN.U-ML	0,17	**0,29**	0,46	0,13	**0,21**	0,33	0,09	**0,16**	0,25	0,08	**0,14**	0,22	0,08	**0,13**	0,20	XN.U-ML
XN.U-MM	0,21	**0,39**	0,58	0,15	**0,28**	0,42	0,11	**0,21**	0,31	0,10	**0,19**	0,27	0,09	**0,17**	0,25	XN.U-MM
XNGU-MH	0,23	**0,45**	0,70	0,17	**0,33**	0,50	0,13	**0,24**	0,38	0,11	**0,21**	0,33	0,10	**0,20**	0,30	XNGU-MH

NOTE: Use "Light Machining" values as starting feed rate.

Order a VSM490™ Kit and experience the next level of shoulder milling!

VSM490-15 Starter Kits

Order one of our starter kits and test the performance of our new VSM490-15 platform. The kits are set up to serve the majority of shoulder milling applications and workpiece materials, delivered with a cutter body as well as 20 inserts from a premium WIDIA™ grade. Detailed order information can be found in the table below.

■ VSM490-15 Starter Kits • Metric

order number	catalogue number	cutter diameter/ flutes	cutter body type	material group	application range	content: cutter	qty	inserts	grade	qty
5966234	VSM490KITC-D25Z02WP40PM	25z2	CYLINDRICAL	P	∇∇	VSM490D025Z02A25XN15L170	1	XNPU15T608SRMM	WP40PM	20
5966235	VSM490KITC-D32Z03WP40PM	32z3	CYLINDRICAL	P	∇∇	VSM490D032Z03A32XN15L200	1	XNPU15T608SRMM	WP40PM	20
5966236	VSM490KITS-D40Z04WP40PM	40z4	SHELL MILL	P	∇∇	VSM490D040Z04S16XN15	1	XNPU15T608SRMM	WP40PM	20
5966237	VSM490KITS-D50Z05WP40PM	50z5	SHELL MILL	P	∇∇	VSM490D050Z05S22XN15	1	XNPU15T608SRMM	WP40PM	20
5966238	VSM490KITS-D50Z06WP40PM	50z6	SHELL MILL	P	∇∇	VSM490D050Z06S22XN15	1	XNPU15T608SRMM	WP40PM	20
5966239	VSM490KITS-D63Z06WP40PM	63z6	SHELL MILL	P	∇∇	VSM490D063Z06S22XN15	1	XNPU15T608SRMM	WP40PM	20
5966240	VSM490KITS-D80Z07WP40PM	80z7	SHELL MILL	P	∇∇	VSM490D080Z07S27XN15	1	XNPU15T608SRMM	WP40PM	20
5966251	VSM490KITS-D100Z08WP40PM	100z8	SHELL MILL	P	∇∇∇	VSM490D100Z08S32XN15	1	XNPU15T608SRMM	WP40PM	20

∇ Heavy/Roughing
∇∇ Medium
∇∇∇ Light Machining/Finishing

(continued)

(VSM490-15 Starter Kits • Metric — continued)

order number	catalogue number	cutter diameter/ flutes	cutter body type	material group	application range	content				
						cutter	qty	inserts	grade	qty
5966252	VSM490KITC-D25Z02WU35PM	25z2	CYLINDRICAL	M+S	∇∇∇	VSM490D025Z02A25XN15L170	1	XNGU15T608ERML	WU35PM	20
5966253	VSM490KITC-D32Z03WU35PM	32z3	CYLINDRICAL	M+S	∇∇∇	VSM490D032Z03A32XN15L200	1	XNGU15T608ERML	WU35PM	20
5966255	VSM490KITS-D40Z04WU35PM	40z4	SHELL MILL	M+S	∇∇∇	VSM490D040Z04S16XN15	1	XNGU15T608ERML	WU35PM	20
5966256	VSM490KITS-D50Z05WU35PM	50z5	SHELL MILL	M+S	∇∇∇	VSM490D050Z05S22XN15	1	XNGU15T608ERML	WU35PM	20
5966257	VSM490KITS-D50Z06WU35PM	50z6	SHELL MILL	M+S	∇∇∇	VSM490D050Z06S22XN15	1	XNGU15T608ERML	WU35PM	20
5966258	VSM490KITS-D63Z06WU35PM	63z6	SHELL MILL	M+S	∇∇∇	VSM490D063Z06S22XN15	1	XNGU15T608ERML	WU35PM	20
5966259	VSM490KITS-D80Z07WU35PM	80z7	SHELL MILL	M+S	∇∇∇	VSM490D080Z07S27XN15	1	XNGU15T608ERML	WU35PM	20
5966260	VSM490KITC-D25Z02WK15PM	25z2	CYLINDRICAL	K	∇	VSM490D025Z02A25XN15L170	1	XNPU15T608SRMM	WK15PM	20
5966261	VSM490KITC-D32Z03WK15PM	32z3	CYLINDRICAL	K	∇	VSM490D032Z03A32XN15L200	1	XNPU15T608SRMM	WK15PM	20
5966262	VSM490KITS-D40Z04WK15PM	40z4	SHELL MILL	K	∇	VSM490D040Z04S16XN15	1	XNPU15T608SRMM	WK15PM	20
5966263	VSM490KITS-D50Z05WK15PM	50z5	SHELL MILL	K	∇	VSM490D050Z05S22XN15	1	XNPU15T608SRMM	WK15PM	20
5966264	VSM490KITS-D50Z06WK15PM	50z6	SHELL MILL	K	∇	VSM490D050Z06S22XN15	1	XNPU15T608SRMM	WK15PM	20
5966265	VSM490KITS-D63Z07WK15PM	63z7	SHELL MILL	K	∇	VSM490D063Z07S22XN15	1	XNPU15T608SRMM	WK15PM	20
5966266	VSM490KITS-D80Z09WK15PM	80z9	SHELL MILL	K	∇	VSM490D080Z09S27XN15	1	XNPU15T608SRMM	WK15PM	20
5966267	VSM490KITS-D100Z11WK15PM	100z11	SHELL MILL	K	∇	VSM490D100Z11S32XN15	1	XNPU15T608SRMM	WK15PM	20

∇ Heavy/Roughing
∇∇ Medium
∇∇∇ Light Machining/Finishing

Good for You, Better for the Environment!

The WIDIA™ Carbide Recycling Program can turn accumulated scrap carbide tooling in your shop into cash.

Carbide Recycling

EXTREME **CHALLENGES.** EXTREME **RESULTS.**

We pay cash for used carbide tooling, including coated or non-coated carbide inserts, drills, end mills, reamers, and taps, regardless of brand.

It's good for the environment and a responsible way to dispose of scrap carbide.

Our carbide recycling program features:

- Easy-to-use web portal that shows what your scrap carbide is worth before sending it to us.
- Online forms that make it easy to ship scrap carbide to WIDIA.
- Green Box™ containers for safe, convenient shipping of scrap carbide to WIDIA.
- Cash payment for used carbide tooling.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

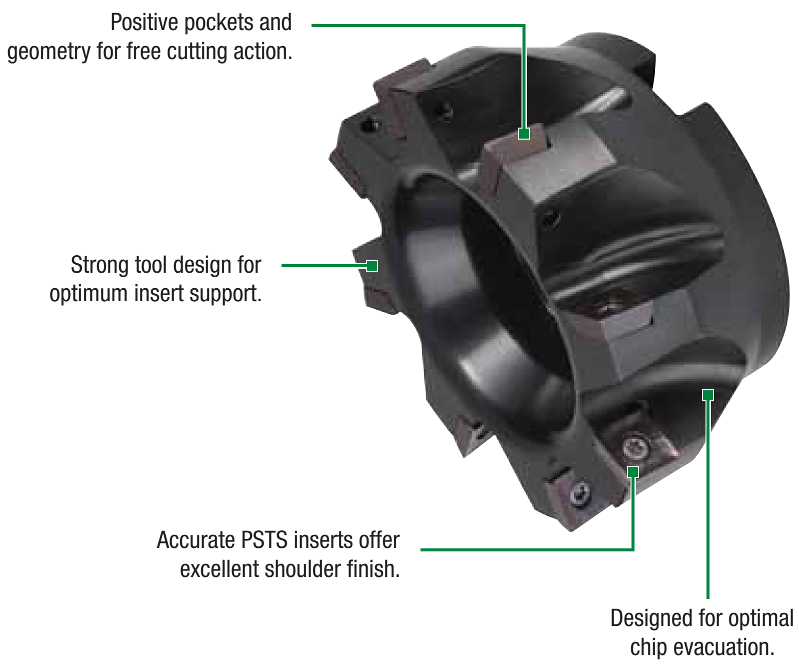
First Choice for Economical Shoulder Milling •

M690 Series 90° Shoulder Mills

M690

Designed to streamline even your most challenging milling operations, the M690 Series provides optimal chip evacuation, excellent shoulder finish, free cutting action, and solid tool design for optimal insert support.

- New SDMX inserts — helical cutting edges for smooth cutting.
- Strong insert and tool design for maximum productivity.
- Four cutting edges enable excellent machining economy.



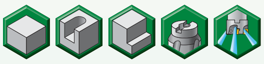
90° Shoulder Mills

M690 SD1204..

Max depth of cut: 10mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–160mm

Pages: J44–J47

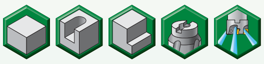


M690 SD1506..

Max depth of cut: 12mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–125mm

Pages: J48–J51

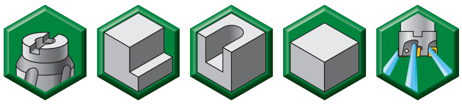


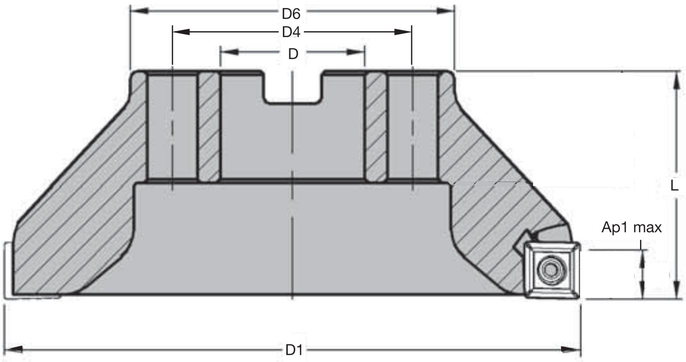
Insert Offering

12mm iC insert

15mm iC insert

- Four cutting edges.
- 90° shoulders.
- Excellent for slot and profile milling.



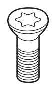


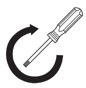
Shell Mills

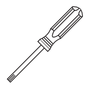
order number	catalogue number	D1	D	D4	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2003556	**12396953800**	50	22	—	47	40	10,0	4	22400	Yes	0,3
2003557	**12396954000**	50	22	—	47	40	10,0	5	22400	Yes	0,3
2003573	**12396954200**	63	22	—	50	40	10,0	5	20000	Yes	0,5
2003574	**12396954400**	63	22	—	50	40	10,0	6	20000	Yes	0,5
2003580	**12396954600**	80	27	—	60	50	10,0	6	17700	Yes	1,0
2003581	**12396954800**	80	27	—	60	50	10,0	8	17700	Yes	1,1
2003596	**12396955000**	100	32	—	78	50	10,0	8	15800	No	1,5
2003597	**12396955200**	100	32	—	78	50	10,0	10	15800	No	1,6
2003693	**12396955400**	125	40	—	89	63	10,0	9	14200	No	3,0
2003694	**12396955600**	125	40	—	89	63	10,0	12	14200	No	3,0
2003793	**12396955800**	160	40	66,7	90	63	10,0	12	12500	No	3,6
2003794	**12396956000**	160	40	66,7	90	63	10,0	15	12500	No	3,6

NOTE: Standard milling cutters will accept insert nose radius up to 2mm without modification.
For tool body modification instructions, see page J16.

Spare Parts





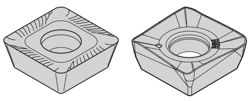


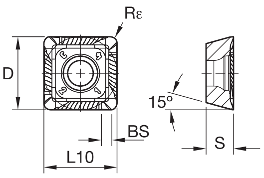
insert screw	Nm	Torx driver
12148037700	4,0	**12148000600**

Insert Selection Guide

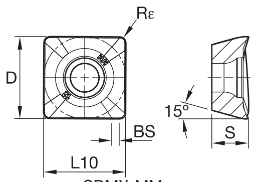
Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
P3–P4	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
P5–P6	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
M1–M2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
M3	.E..ML	TN7535	**.S..MM**	**TN7535**	.S..MH	TN7535
K1–K2	.E..ML	WK15CM	**.E..ML**	**WK15CM**	.S..MH	WK15CM
K3	.E..ML	WK15CM	**.S..MM**	**TN6525**	.S..MH	TN6525
N1–N2	.ALP	THM-U	**.E..ML**	**THM-U**	.S..ML	THM-U
N3	.ALP	THM-U	**.E..ML**	**THM-U**	.S..ML	THM-U
S1–S2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540
S3	.E..ML	TN6540	**.S..MM**	**WS30PM**	.S..MM	TN6540
S4	.E..ML	TN6540	**.S..MM**	**WS30PM**	.S..MM	TN6540
H1	.S..MM	WS30PM	**.S..MM**	**WS30PM**	.S..MM	WS30PM

Inserts • SD1204..


SDMT-ML SDMX-MM



SDMT-ML



SDMX-MM

● first choice
○ alternate choice

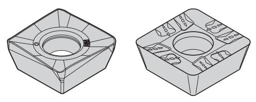
	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
P	○		●	●	●	●		
M			○	●	○	○		○
K	●	●	○	○		○	●	
N								
S				●				●
H	●							

SDMT-ML

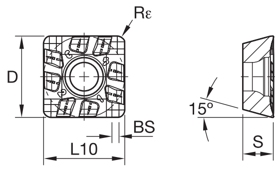
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMT1204PDRML	4	12,70	12,70	4,77	1,10	1,20	0,08	-	3094667	-	3020185	2030439	2030437	5427423	-

SDMX-MM

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMX120408RMM	4	12,70	12,70	4,76	1,93	0,80	0,10	-	-	3950588	3950589	3950590	3950591	-	5522490
SDMX120412RMM	4	12,70	12,70	4,76	1,50	1,20	0,10	-	-	3950596	3950597	3950599	3950600	-	5519572
SDMX120416RMM	4	12,70	12,70	4,76	1,50	1,60	0,10	-	4145063	4145064	4145065	-	-	-	-
SDMX120424RMM	4	12,70	12,70	4,76	0,60	2,40	0,10	-	-	-	4145072	-	4145093	-	-
SDMX120432RMM	4	12,70	12,70	4,76	—	3,20	0,10	-	-	-	4145094	-	4145095	-	-



SDMX-MH SDMT-MH



● first choice
○ alternate choice

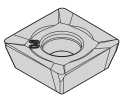
		TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
P		○		●	●	●	●		
M				○	●	○	○		○
K		●	●	○	○		○	●	
N									
S					●				●
H		●							

SDMX-MH

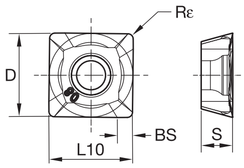
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMX120408RMH	4	12,70	12,70	4,76	1,93	0,80	0,14	-	-	-	3950592	3950594	3950595	5427427	-
SDMX120412RMH	4	12,70	12,70	4,76	1,54	1,20	0,14	-	3950614	3950601	3950603	3950605	3950606	5427428	-
SDMX120416RMH	4	12,70	12,70	4,76	1,50	1,60	0,14	-	-	-	3950607	-	3950609	-	-

SDMT-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMT1204PDRMH	4	12,70	12,70	4,81	1,10	1,20	0,14	2028314	3094669	3325040	3326330	2030419	2030417	5427422	-



SDEX-ALP



● first choice
○ alternate choice

		THM-U
P		
M		
K		
N		●
S		
H		

SDEX-ALP

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	THM-U
SDEX120408FRALP	4	12,70	12,70	4,76	1,52	0,80	0,02	5281790

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6520			TN6525			TN6540			TN7525		
P	0	–	**–**	–	–	**–**	–	340	**265**	235	300	**235**	200	340	**260**	235
	1	550	**485**	450	–	**–**	–	340	**265**	235	300	**235**	200	340	**260**	235
	2	340	**310**	275	–	**–**	–	265	**210**	180	210	**160**	140	260	**210**	180
	3	310	**275**	255	–	**–**	–	235	**180**	155	180	**140**	115	235	**180**	155
	4	230	**215**	190	–	**–**	–	195	**140**	120	150	**110**	90	195	**140**	120
	5	275	**250**	230	–	**–**	–	260	**195**	165	200	**150**	125	260	**195**	165
	6	190	**170**	145	–	**–**	–	170	**135**	110	135	**100**	85	170	**135**	110
M	1	225	**200**	175	–	**–**	–	160	**100**	65	110	**65**	50	205	**185**	155
	2	205	**175**	160	–	**–**	–	100	**65**	40	65	**40**	35	185	**160**	140
	3	160	**145**	125	–	**–**	–	105	**65**	45	70	**40**	35	145	**130**	115
K	1	350	**300**	250	375	**265**	190	230	**205**	185	185	**170**	150	315	**235**	200
	2	300	**250**	210	325	**210**	160	180	**160**	150	145	**130**	115	270	**200**	165
	3	250	**210**	165	250	**190**	135	150	**135**	120	130	**120**	105	200	**165**	140
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–	40	**30**	25	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	20	**15**	10	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	60	**35**	25	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–	50	**25**	20	–	**–**	–
H	1	115	**90**	60	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	115	**90**	60	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	85	**65**	45	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

Material Group		TN7535			WK15CM			WS30PM			TTI25			THM-U		
P	0	455	**395**	370	–	**–**	–	–	**–**	–	360	**300**	250	–	**–**	–
	1	455	**395**	370	–	**–**	–	–	**–**	–	360	**300**	250	–	**–**	–
	2	280	**255**	230	–	**–**	–	–	**–**	–	260	**210**	180	–	**–**	–
	3	255	**230**	205	–	**–**	–	–	**–**	–	260	**210**	180	–	**–**	–
	4	190	**175**	160	–	**–**	–	–	**–**	–	220	**180**	150	–	**–**	–
	5	260	**230**	210	–	**–**	–	–	**–**	–	265	**195**	165	–	**–**	–
	6	160	**135**	110	–	**–**	–	–	**–**	–	120	**90**	75	–	**–**	–
M	1	205	**185**	155	–	**–**	–	225	**200**	185	400	**260**	180	–	**–**	–
	2	185	**160**	140	–	**–**	–	205	**180**	145	270	**170**	120	–	**–**	–
	3	145	**130**	115	–	**–**	–	155	**135**	105	265	**175**	120	–	**–**	–
K	1	295	**265**	240	420	**385**	340	–	**–**	–	185	**155**	130	190	**170**	150
	2	235	**210**	190	335	**295**	275	–	**–**	–	150	**120**	105	–	**–**	–
	3	195	**175**	160	280	**250**	230	–	**–**	–	120	**105**	85	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	2000	**1200**	1000
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	1365	**815**	665
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	800	**500**	400
S	1	–	**–**	–	–	**–**	–	45	**40**	30	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	45	**40**	30	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	55	**45**	30	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	85	**60**	40	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

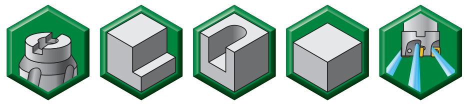
Recommended Starting Feeds [mm]

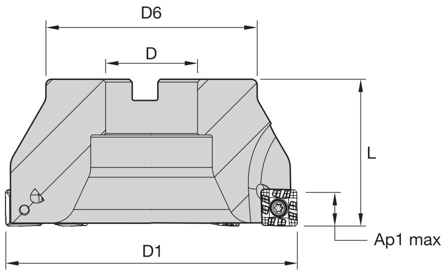
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..ALP	0,12	**0,23**	0,46	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	.F..ALP
.E..ML	0,12	**0,35**	0,58	0,08	**0,25**	0,42	0,06	**0,19**	0,31	0,06	**0,17**	0,27	0,05	**0,15**	0,25	.E..ML
.S..MM	0,12	**0,42**	0,70	0,08	**0,30**	0,50	0,06	**0,23**	0,38	0,06	**0,20**	0,33	0,05	**0,18**	0,30	.S..MM
.S..MH	0,23	**0,54**	0,85	0,17	**0,39**	0,61	0,13	**0,29**	0,46	0,11	**0,25**	0,40	0,10	**0,23**	0,36	.S..MH

NOTE: Use "Light Machining" value as starting feed rate.

- Four cutting edges.
- 90° shoulders.
- Excellent for slot and profile milling.

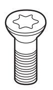


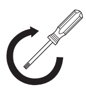


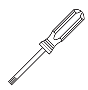
Shell Mills

order number	catalogue number	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2003555	**12396943800**	50	22	47	40	12,0	4	18500	Yes	0,3
2003562	**12396944200**	63	22	50	40	12,0	5	16100	Yes	0,4
2003579	**12396944600**	80	27	60	50	12,0	6	14000	Yes	0,9
2003595	**12396945000**	100	32	78	50	12,0	8	12300	No	1,3
2003682	**12396945400**	125	40	89	63	12,0	9	10800	No	2,7

Spare Parts





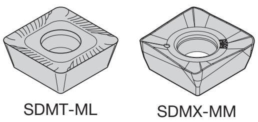


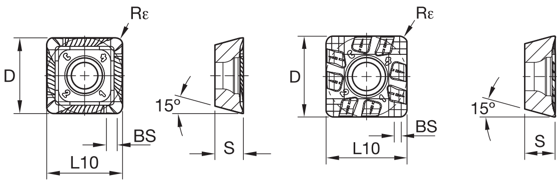
insert screw	Nm	Torx driver
MS2260	6,0	**12148007500**

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
P3–P4	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
P5–P6	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
M1–M2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
M3	.E..ML	TN7535	**.S..MM**	**TN7535**	.S..MH	TN7535
K1–K2	.E..ML	WK15CM	**.E..ML**	**WK15CM**	.S..MH	WK15CM
K3	.E..ML	WK15CM	**.S..MM**	**WK15CM**	.S..MH	WK15CM
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540
S3	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540
S4	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540
H1	.S..MM	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540

Inserts • SD1506..





● first choice
○ alternate choice

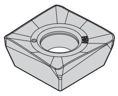
	TN2510	TN6540	TN7525	TN7535	WK15CM
P	○	●	●	●	
M		●	○	○	
K	●	○		○	●
N					
S		●			
H	●				

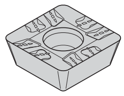
SDMT-ML

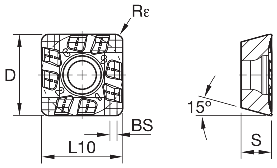
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6540	TN7525	TN7535	WK15CM
SDMT1506PDRML	4	15,88	15,88	6,32	1,10	1,20	0,08	-	3378677	2030434	2030420	5427425

SDMX-MM

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6540	TN7525	TN7535	WK15CM
SDMX150612RMM	4	15,88	15,88	6,35	1,45	1,20	0,14	-	3949807	3949809	-	-


SDMX-MH


SDMT-MH



● first choice
○ alternate choice

		TN2510	TN6540	TN7525	TN7535	WK15CM
P		○	●	●	●	
M			●	○	○	
K		●	○		○	●
N						
S			●			
H		●				

SDMX-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6540	TN7525	TN7535	WK15CM
SDMX150612RMH	4	15,88	15,88	6,35	1,45	1,20	0,20	-	3949811	3950583	3950584	5427426
SDMX150616RMH	4	15,88	15,88	6,35	1,51	1,60	0,20	-	3950585	-	3950587	-

SDMT-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6540	TN7525	TN7535	WK15CM
SDMT1506PDRMH	4	15,88	15,88	6,35	1,10	1,20	0,20	2028325	3378676	2030414	2030400	5427424

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6540			TN7525			TN7535			WK15CM		
P	0	–	**–**	–	300	**235**	200	340	**260**	235	455	**395**	370	–	**–**	–
	1	550	**485**	450	300	**235**	200	340	**260**	235	455	**395**	370	–	**–**	–
	2	340	**310**	275	210	**160**	140	260	**210**	180	280	**255**	230	–	**–**	–
	3	310	**275**	255	180	**140**	115	235	**180**	155	255	**230**	205	–	**–**	–
	4	230	**215**	190	150	**110**	90	195	**140**	120	190	**175**	160	–	**–**	–
	5	275	**250**	230	200	**150**	125	260	**195**	165	260	**230**	210	–	**–**	–
	6	190	**170**	145	135	**100**	85	170	**135**	110	160	**135**	110	–	**–**	–
M	1	225	**200**	175	110	**65**	50	205	**185**	155	205	**185**	155	–	**–**	–
	2	205	**175**	160	65	**40**	35	185	**160**	140	185	**160**	140	–	**–**	–
	3	160	**145**	125	70	**40**	35	145	**130**	115	145	**130**	115	–	**–**	–
K	1	350	**300**	250	185	**170**	150	315	**235**	200	295	**265**	240	420	**385**	340
	2	300	**250**	210	145	**130**	115	270	**200**	165	235	**210**	190	335	**295**	275
	3	250	**210**	165	130	**120**	105	200	**165**	140	195	**175**	160	280	**250**	230
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	40	**30**	25	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	20	**15**	10	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	60	**35**	25	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	50	**25**	20	–	**–**	–	–	**–**	–	–	**–**	–
H	1	115	**90**	60	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	115	**90**	60	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	85	**65**	45	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

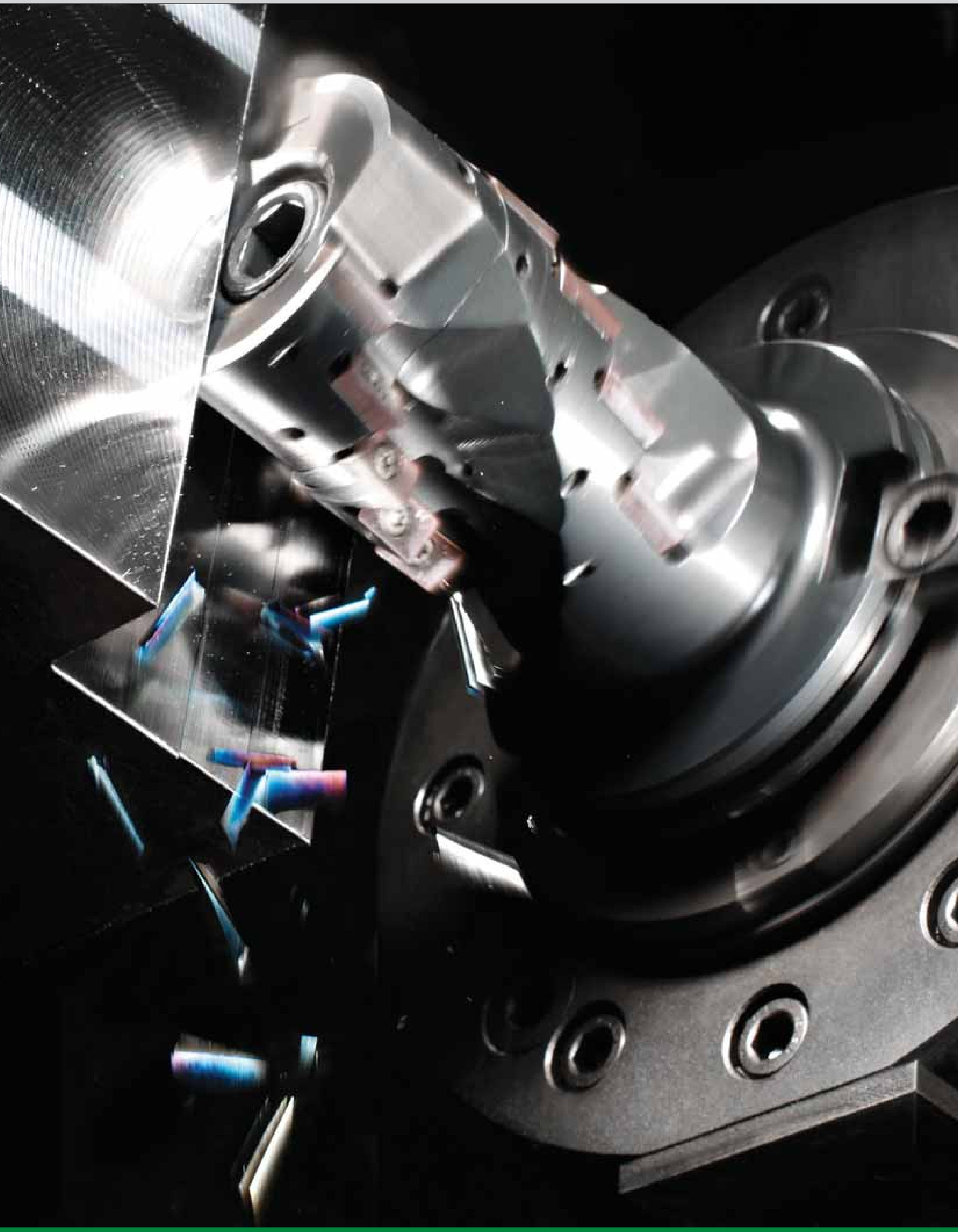
Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
.F..ALP	0,12	**0,23**	0,46	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	.F..ALP
.E..ML	0,12	**0,35**	0,58	0,08	**0,25**	0,42	0,06	**0,19**	0,31	0,06	**0,17**	0,27	0,05	**0,15**	0,25	.E..ML
.S..MM	0,12	**0,42**	0,70	0,08	**0,30**	0,50	0,06	**0,23**	0,38	0,06	**0,20**	0,33	0,05	**0,18**	0,30	.S..MM
.S..MH	0,23	**0,54**	0,85	0,17	**0,39**	0,61	0,13	**0,29**	0,46	0,11	**0,25**	0,40	0,10	**0,23**	0,36	.S..MH

NOTE: Use “Light Machining” value as starting feed rate.



Indexable Milling • Helical Mills

M390

With a replaceable nose collar and positive helix for increased productivity, the M390 Series Helical Mills provide optimal chip evacuation and performance with lower maintenance costs.

- Strong insert and tool design for maximum productivity.
- New SDMX inserts — helical cutting edge for smooth cutting.
- Long edge shoulder ensures stable insert support.

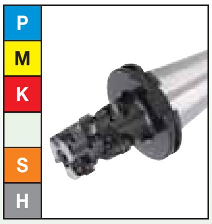
Helical Mills

M390 SD1204...

Max depth of cut: 17mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–80mm

Pages: K4–K9



Maximum cutting depth (Ap1) and contact width (ae) ratios based on application type

Slot Milling

ae = 1 x D1
Ap1 max = 0,6 x D1

**Not recommended in ISO "H" materials.*

Contouring

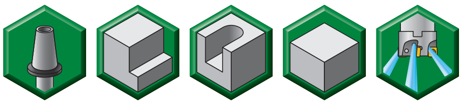
ae = 0,25–0,4 x D1
Ap1 max = 1 x D1
ae = >0,4 x D1
Ap1 max = 0,6 x D1

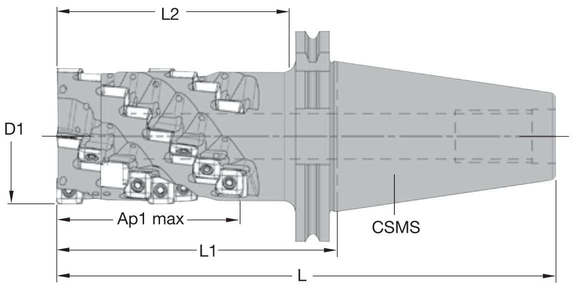
**Not recommended in ISO "H" materials.*

Profiling

ae = <0,25 x D1
Ap1 max = Ap1 max

- Four cutting edges per insert.
- Replaceable end cap.
- Positive helix for high productivity.





Integral

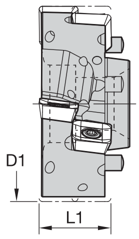
order number	catalogue number	D1	L	L1	L2	Ap1 max	Z	Z U	CSMS system size	max RPM	coolant supply	kg
2021422	**12393041200**	50	207	105	82	64,0	18	3	DV50	14000	Yes	3,4
2021423	**12393041400**	63	232	130	107	85,0	32	4	DV50	12000	Yes	4,3
2021424	**12393041800**	80	262	160	137	117,0	55	5	DV50	10500	Yes	6,3

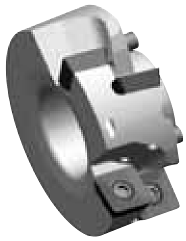
NOTE: Z = number of pocket seats.
ZU = number of effective teeth.

Spare Parts

D1	insert screw	Nm	Torx wrench	end cap	socket-head cap screw
50	**12148037700**	4,0	**12148000600**	**12393051200**	**12147625400**
63	**12148037700**	4,0	**12148000600**	**12393051400**	**12148783700**
80	**12148037700**	4,0	**12148000600**	**12393051800**	**12148783700**

- Four cutting edges per insert.
- Replaceable end cap.
- Positive helix for high productivity.





End Cap

order number	catalogue number	D1	L1	Z U	Z	kg
2021428	**12393051200**	50	21	3	6	0,2
2021429	**12393051400**	63	21	4	8	0,3
2021430	**12393051800**	80	21	5	10	0,5

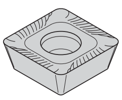
NOTE: Z = number of pocket seats.
ZU = number of effective teeth.

Insert Selection Guide

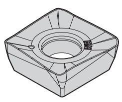
Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
P3–P4	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
P5–P6	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
M1–M2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
M3	.E..ML	TN7535	**.S..MM**	**TN7535**	.S..MH	TN7535
K1–K2	.E..ML	WK15CM	**.E..ML**	**WK15CM**	.S..MH	WK15CM
K3	.E..ML	WK15CM	**.S..MM**	**TN6525**	.S..MH	TN6525
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540
S3	.E..ML	TN6540	**.S..MM**	**WS30PM**	.S..MM	TN6540
S4	.E..ML	TN6540	**.S..MM**	**WS30PM**	.S..MM	TN6540
H1	.S..MM	WS30PM	**.S..MM**	**WS30PM**	.S..MM	WS30PM

Helical Mills

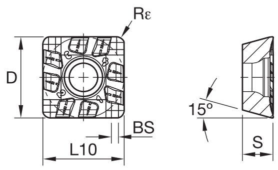
Inserts • SD1204..



SDMT-ML



SDMX-MM



● first choice
○ alternate choice

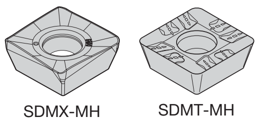
	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
P		●	●	●	●		
M		○	●	○	○		○
K	●	○	○		○	●	
N							
S			●				●
H							

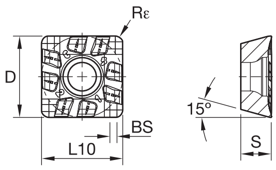
SDMT-ML

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMT1204PDRML	4	12,70	12,70	4,77	1,10	1,20	0,08	3094667	–	3020185	2030439	2030437	5427423	–

SDMX-MM

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMX120408RMM	4	12,70	12,70	4,76	1,93	0,80	0,10	–	3950588	3950589	3950590	3950591	–	5522490
SDMX120412RMM	4	12,70	12,70	4,76	1,50	1,20	0,10	–	3950596	3950597	3950599	3950600	–	5519572
SDMX120416RMM	4	12,70	12,70	4,76	1,50	1,60	0,10	4145063	4145064	4145065	–	–	–	–
SDMX120424RMM	4	12,70	12,70	4,76	0,60	2,40	0,10	–	–	4145072	–	4145093	–	–
SDMX120432RMM	4	12,70	12,70	4,76	—	3,20	0,10	–	–	4145094	–	4145095	–	–





● first choice
○ alternate choice

		TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
P			●	●	●	●		
M			○	●	○	○		○
K		●	○	○		○	●	
N								
S				●				●
H								

SDMX-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMX120408RMH	4	12,70	12,70	4,76	1,93	0,80	0,14	-	-	3950592	3950594	3950595	5427427	-
SDMX120412RMH	4	12,70	12,70	4,76	1,54	1,20	0,14	3950614	3950601	3950603	3950605	3950606	5427428	-
SDMX120416RMH	4	12,70	12,70	4,76	1,50	1,60	0,14	-	-	3950607	-	3950609	-	-

SDMT-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMT1204PDRMH	4	12,70	12,70	4,81	1,10	1,20	0,14	3094669	3325040	3326330	2030419	2030417	5427422	-

Recommended Starting Speeds [m/min]

Material Group		TN6520			TN6525			TN6540			TN7525		
P	0	–	**–**	–	340	**265**	235	300	**235**	200	340	**260**	235
	1	–	**–**	–	340	**265**	235	300	**235**	200	340	**260**	235
	2	–	**–**	–	265	**210**	180	210	**160**	140	260	**210**	180
	3	–	**–**	–	235	**180**	155	180	**140**	115	235	**180**	155
	4	–	**–**	–	195	**140**	120	150	**110**	90	195	**140**	120
	5	–	**–**	–	260	**195**	165	200	**150**	125	260	**195**	165
	6	–	**–**	–	170	**135**	110	135	**100**	85	170	**135**	110
M	1	–	**–**	–	160	**100**	65	110	**65**	50	205	**185**	155
	2	–	**–**	–	100	**65**	40	65	**40**	35	185	**160**	140
	3	–	**–**	–	105	**65**	45	70	**40**	35	145	**130**	115
K	1	375	**265**	190	230	**205**	185	185	**170**	150	315	**235**	200
	2	325	**210**	160	180	**160**	150	145	**130**	115	270	**200**	165
	3	250	**190**	135	150	**135**	120	130	**120**	105	200	**165**	140
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	40	**30**	25	–	**–**	–
	2	–	**–**	–	–	**–**	–	20	**15**	10	–	**–**	–
	3	–	**–**	–	–	**–**	–	60	**35**	25	–	**–**	–
	4	–	**–**	–	–	**–**	–	50	**25**	20	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		TN7535			WK15CM			WS30PM		
P	0	455	**395**	370	–	**–**	–	–	**–**	–
	1	455	**395**	370	–	**–**	–	–	**–**	–
	2	280	**255**	230	–	**–**	–	–	**–**	–
	3	255	**230**	205	–	**–**	–	–	**–**	–
	4	190	**175**	160	–	**–**	–	–	**–**	–
	5	260	**230**	210	–	**–**	–	–	**–**	–
	6	160	**135**	110	–	**–**	–	–	**–**	–
M	1	205	**185**	155	–	**–**	–	225	**200**	185
	2	185	**160**	140	–	**–**	–	205	**180**	145
	3	145	**130**	115	–	**–**	–	155	**135**	105
K	1	295	**265**	240	420	**385**	340	–	**–**	–
	2	235	**210**	190	335	**295**	275	–	**–**	–
	3	195	**175**	160	280	**250**	230	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	45	**40**	30
	2	–	**–**	–	–	**–**	–	45	**40**	30
	3	–	**–**	–	–	**–**	–	55	**45**	30
	4	–	**–**	–	–	**–**	–	85	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
.F..ALP	0,12	**0,23**	0,46	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	.F..ALP
.E..ML	0,12	**0,35**	0,58	0,08	**0,25**	0,42	0,06	**0,19**	0,31	0,06	**0,17**	0,27	0,05	**0,15**	0,25	.E..ML
.S..MM	0,12	**0,42**	0,70	0,08	**0,30**	0,50	0,06	**0,23**	0,38	0,06	**0,20**	0,33	0,05	**0,18**	0,30	.S..MM
.S..MH	0,23	**0,54**	0,85	0,17	**0,39**	0,61	0,13	**0,29**	0,46	0,11	**0,25**	0,40	0,10	**0,23**	0,36	.S..MH

NOTE: Use "Light Machining" value as starting feed rate.

Helical Mills

Indexable Milling • Slotting Mills

Reliable, Powerful, and Durable Milling Tools •

M16 Series T-Slotting Mills

M16

Designed for maximum chip evacuation and optimum security, the M16 Series Slotting Mills are an excellent choice for T-slot milling of steel and cast iron.

- Strong and sturdy tool design ensures reliable steel and cast iron machining, time after time.
- Maximum chip evacuation streamlines your most challenging milling operations.

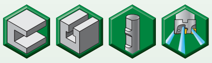
Slotting Mills

M16

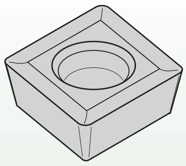
Slot Width Range:
11–21,9mm

Indexes per insert: 2
Diameter: 25–50mm

Pages: L4–L7



Insert Offering



Inserts with positive chipbreaker providing low cutting forces.

T-Slotting

Steel
- If machining a vertical slot, minimise depth; reference Figure 1. If the depth is greater than Figure 1, chip evacuation problems could occur.
- Vibrations could occur when the T-slot cutter diameter increases; use Figure 1 as the starting point. If vibrations are a concern, adopt the Figure 2 solution.

Cast Iron
- Fewer problems with chip evacuation and reduced cutting forces enable deeper vertical slots as shown in Figures 2 and 3.

Figure 1

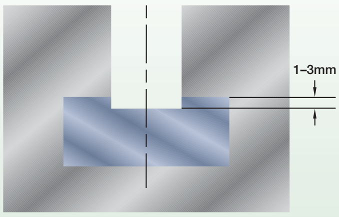


Figure 2

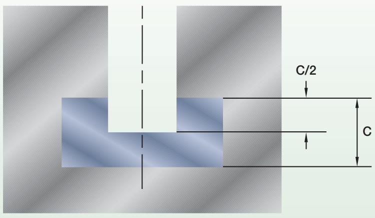
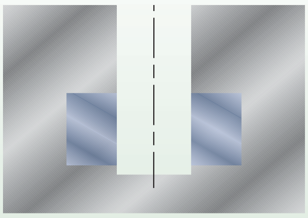
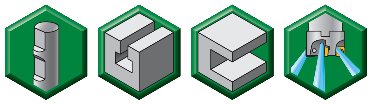


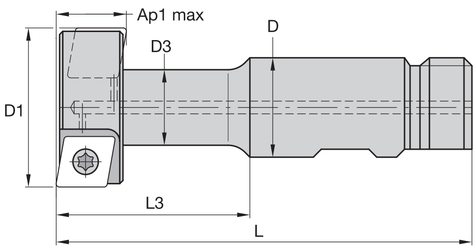
Figure 3



NOTE: Air blast is recommended to disperse the chips.

- T-slot mill.
- Ideal for steel and cast iron machining.



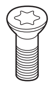


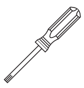
Weldon Shanks

order number	catalogue number	D1	D	D3	L	L3	Ap1 max	Z	Z U	insert 1	coolant supply	kg
2021380	**12391602600M**	25	16	13	80	32	11,0	4	2	CPNT060204T	Yes	0,1
2021381	**12391603000**	32	16	15	90	42	13,9	4	2	CPNT080308T	Yes	0,2
2021382	**12391603400**	40	25	19	105	49	17,9	4	2	CPNT09T308T	Yes	0,4
2021383	**12391603800**	50	32	25	120	60	21,9	4	2	CPNT120408T	Yes	0,7

NOTE: Z = number of pocket seats.
ZU = number of effective teeth.

Spare Parts

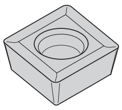




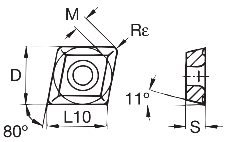
D1	insert screw	Nm	Torx driver	Torx wrench
25	**12148068700**	1,0	**12148086600**	–
32	**12148067200**	2,0	**12148086600**	–
40	**12148038800**	3,0	–	**12148000600**
50	**12148007200**	4,0	–	**12148007500**

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	CPNT	WP40PM	**CPNT**	**WP40PM**	CPNT	WP40PM
P3–P4	CPNT	WP35CM	**CPNT**	**WP35CM**	CPNT	WP35CM
P5–P6	CPNT	WP35CM	**CPNT**	**WP40PM**	CPNT	WP40PM
M1–M2	CPNT	WP40PM	**CPNT**	**WP40PM**	CPNT	WP40PM
M3	CPNT	TN7535	**CPNT**	**WP35CM**	CPNT	WP35CM
K1–K2	CPNT	WK15CM	**CPNT**	**WK15CM**	CPNT	WK15CM
K3	CPNT	WK15CM	**CPNT**	**WP35CM**	CPNT	WP35CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**–**	**–**	–	–
S3	–	–	**–**	**–**	–	–
S4	–	–	**–**	**–**	–	–
H1	–	–	**–**	**–**	–	–



CPNT



● first choice
○ alternate choice

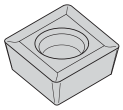
	WK15CM	WP35CM	WP40PM
P		●	●
M		○	●
K	●	○	
N			
S			○
H			

CPNT • CP0602..

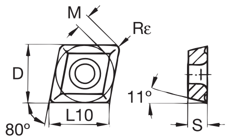
catalogue number	cutting edges	D	L10	M	S	Rε	hm	WK15CM	WP35CM	WP40PM
CPNT060204T	2	6,35	6,45	1,54	2,38	0,40	0,03	5903680	5903676	5578222

CPNT • CP0803..

catalogue number	cutting edges	D	L10	M	S	Rε	hm	WK15CM	WP35CM	WP40PM
CPNT080308T	2	7,94	8,06	1,76	3,18	0,80	0,09	5903701	5903677	-



CPNT



● first choice
○ alternate choice

		WK15CM	WP35CM	WP40PM
P			●	●
M			○	●
K		●	○	
N				
S				○
H				

CPNT • CP09T3..

catalogue number	cutting edges	D	L10	M	S	Rε	hm	WK15CM	WP35CM	WP40PM
CPNT09T308T	2	9,52	9,67	2,20	3,97	0,80	0,04	5903702	5903678	-

CPNT • CP1204..

catalogue number	cutting edges	D	L10	M	S	Rε	hm	WK15CM	WP35CM	WP40PM
CPNT120408T	2	12,70	12,90	3,08	4,76	0,80	0,03	5903703	5903679	-

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP35CM			WP40PM		
P	0	–	–	–	455	**395**	370	295	**260**	245
	1	–	–	–	455	**395**	370	295	**260**	245
	2	–	–	–	280	**255**	230	250	**215**	180
	3	–	–	–	255	**230**	205	230	**195**	160
	4	–	–	–	190	**175**	160	205	**170**	135
	5	–	–	–	260	**230**	210	170	**155**	135
	6	–	–	–	160	**135**	110	150	**115**	90
M	1	–	–	–	205	**185**	155	195	**170**	155
	2	–	–	–	185	**160**	140	175	**150**	125
	3	–	–	–	145	**130**	115	130	**115**	90
K	1	420	**385**	340	295	**265**	240	–	–	–
	2	335	**295**	275	235	**210**	190	–	–	–
	3	280	**250**	230	195	**175**	160	–	–	–
N	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	40	**35**	30
	2	–	–	–	–	–	–	40	**35**	30
	3	–	–	–	–	–	–	50	**40**	30
	4	–	–	–	66	**50**	33	65	**50**	35
H	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–

NOTE: FIRST choice starting speeds are in ***bold*** *type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
CPNT	0,12	**0,29**	0,46	0,09	**0,21**	0,33	0,07	**0,16**	0,25	0,06	**0,14**	0,22	0,05	**0,13**	0,20	CPNT
CPNT	0,12	**0,29**	0,46	0,09	**0,21**	0,33	0,07	**0,16**	0,25	0,06	**0,14**	0,22	0,05	**0,13**	0,20	CPNT
CPNT	0,12	**0,29**	0,46	0,08	**0,21**	0,33	0,06	**0,16**	0,25	0,06	**0,14**	0,22	0,05	**0,13**	0,20	CPNT
CPNT	0,12	**0,35**	0,58	0,08	**0,25**	0,42	0,06	**0,19**	0,32	0,06	**0,16**	0,28	0,05	**0,15**	0,25	CPNT

NOTE: Use "Light Machining" value as starting feed rate.

For Precise Slotting and Grooving Applications •

M94 Series Slotting Mills

M94

The M94 Series Slotting Mills are equipped with three cutting edges per insert and precise cooling capabilities for the most demanding small width slotting and grooving operations.

- Coolant grooves provide accurate and consistent cooling performance.
- Perfect choice when shallow grooving and slotting are required.
- Tangential mounted inserts ensure maximum strength and stability.

Slotting Mills

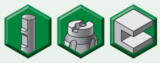
M94

Slot Width Range:
1,93–5,23mm

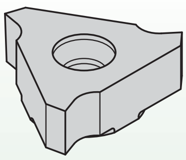
Indexes per insert: 3
Diameter: 25–80mm

Pages: L10–L14

P
M
K

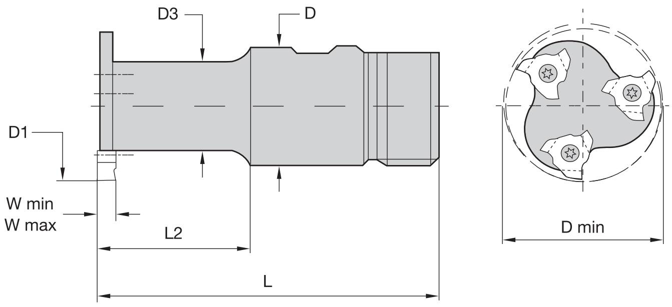


Insert Offering



Inserts with free-cutting geometry providing low cutting forces.

- Three cutting edges per insert.
- Tangential mounted inserts.
- Shallow grooving and slotting.

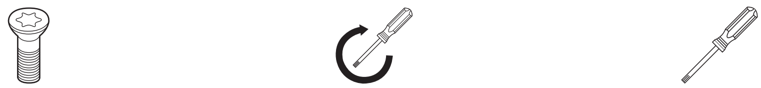


Weldon Shanks

order number	catalogue number	D1	D	D3	D min	L	L2	W min	W max	Z	insert 1	coolant supply	kg
2022619	**12290900800**	25	25	21	34	100	44	1,93	2,73	3	TCAX1103ZZ..	No	0,4
2022620	**12290901200**	40	32	32	65	110	50	2,73	4,26	3	TNAX1604ZZ..	No	0,7

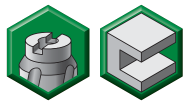
NOTE: D min = minimum internal hole diameter required for clearance.

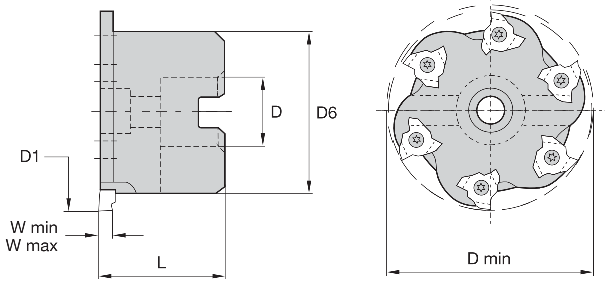
Spare Parts



D1	insert screw	Nm	Torx driver
25	**12148080000**	1,0	**12148086600**
40	**12148067200**	3,5	**12148086600**

- Three cutting edges per insert.
- Tangential mounted inserts.
- Shallow grooving and slotting.



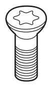
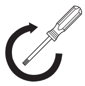
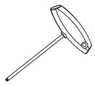
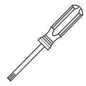


Shell Mills

order number	catalogue number	D1	D	D min	D6	L	W min	W max	Z	insert 1	coolant supply	kg
2022621	**12290911600**	63	22	85	55	40	2,73	4,26	6	TNAX1604ZZ..	No	0,7
2022622	**12290911800**	80	27	102	68	50	4,26	5,23	6	TNAX2206ZZ..	No	1,3

NOTE: D min = minimum internal hole diameter required for clearance.

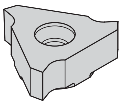
Spare Parts

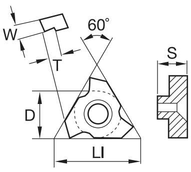
D1	insert screw	Nm	Torx driver	Torx driver
63	**12148067200**	3,5	–	**12148086600**
80	**12148007200**	6,0	**12148007500**	–

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
P3–P4	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
P5–P6	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
M1–M2	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
M3	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
K1–K2	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
K3	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
N1–N2	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
N3	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
S1–S2	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
S3	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
S4	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
H1	–	–	**–**	**–**	–	–



TCAX
TNAX



● first choice
○ alternate choice

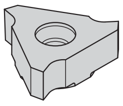
	THM	TTM	TTM08
P		●	●
M		○	○
K	○	○	○
N	●		
S	○		
H			

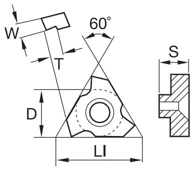
TCAX • 1103..

catalogue number	cutting edges	D	LI	W	T	S	hm	THM	TTM	TTM08
TCAX1103ZZ18	3	6,35	11,00	1,93	2,10	3,20	0,07	-	-	2014041
TCAX1103ZZ21	3	6,35	11,00	2,23	2,25	3,20	0,07	2026017	-	2026018
TCAX1103ZZ26	3	6,35	11,00	2,73	2,35	3,20	0,07	2014054	2014056	-

TNAX • 1604..

catalogue number	cutting edges	D	LI	W	T	S	hm	THM	TTM	TTM08
TNAX1604ZZ26	3	9,52	16,49	2,73	3,08	4,76	0,07	2014152	-	2014164
TNAX1604ZZ31	3	9,52	16,49	3,26	3,04	4,76	0,07	2014166	-	2014168
TNAX1604ZZ41	3	9,52	16,49	4,26	3,32	4,76	0,07	2014170	2014172	-


TNAX



● first choice
○ alternate choice

		THM	TTM	TTM08
P			●	●
M			○	○
K		○	○	○
N		●		
S		○		
H				

■ TNAX • 2206..

catalogue number	cutting edges	D	LI	W	T	S	hm	THM	TTM	TTM08
TNAX2206ZZ41	3	12,70	22,00	4,26	4,02	6,40	0,07	-	2014176	-
TNAX2206ZZ51	3	12,70	22,00	5,23	4,43	6,40	0,07	-	2026022	-

Recommended Starting Speeds [m/min]

Material Group		THM			TTM/TTM08		
P	1	–	**–**	–	560	**490**	460
	2	–	**–**	–	345	**280**	245
	3	–	**–**	–	345	**280**	245
	4	–	**–**	–	280	**195**	180
	5	–	**–**	–	360	**280**	260
	6	–	**–**	–	165	**130**	115
M	1	–	**–**	–	330	**195**	130
	2	–	**–**	–	195	**115**	80
	3	–	**–**	–	215	**130**	100
K	1	395	**295**	245	–	**–**	–
	2	410	**330**	230	–	**–**	–
	3	425	**310**	195	–	**–**	–
N	1	2950	**1970**	1640	–	**–**	–
	2	2245	**1525**	1265	–	**–**	–
	3	1475	**920**	655	–	**–**	–
S	1	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
TCAX/TNAX	0,12	**0,29**	0,45	0,08	**0,21**	0,33	0,06	**0,16**	0,25	0,06	**0,14**	0,21	0,05	**0,13**	0,20	TCAX/TNAX

NOTE: Use "Light Machining" value as starting feed rate.

Easy Access to Proven Metalworking Expertise!

WIDIA™ Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of WIDIA tooling.

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WIDIA™

M95

M95 slotting cutters are ideal for deeper applications that require the cutting load to be shared from one insert to the other. They provide groove widths from 4–10mm and cutter diameters from 100–200mm as well as an economical way to achieve balanced cutting.

Features and Benefits

- Cutters available in arbour mount.
- Inserts with four indexes.
- Staggered keyways in mounting bore, used for multiple ganged cutters.
- Slot width 4–10mm.
- Three insert geometries available; SNHX in 11 and 12mm iC.
- Requires only one spare part.
- Economical to use.
- Available in Latest WIDIA™ Victory™ Grade.

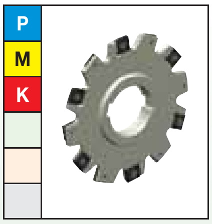
Slotting Mills

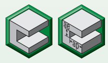
M95

Slot Width Range:
4–10mm

Indexes per insert: 4
Diameter: 100–200mm

Pages: L18–L21



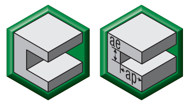


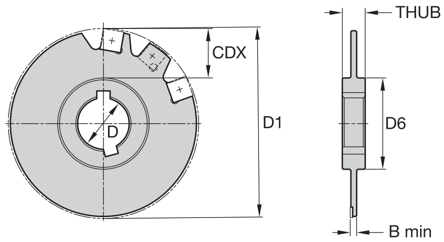
Insert Offering

SNHX

Inserts with free-cutting geometry providing low cutting forces.

WIDIA

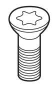


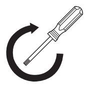


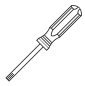
M95

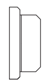
order number	catalogue number	D1	D	D6	B min	CDX	THUB	Z	Z S	coolant supply	kg
2016502	12299510400	100	27	48	4	25,0	12,0	12	6	No	0,3
2016514	12299515500	100	27	48	5	25,0	12,0	12	6	No	0,3
2016516	12299515600	100	27	48	6	25,0	12,0	10	5	No	0,3
2016518	12299515700	100	27	48	7	25,0	12,0	9	3	No	0,3
2016520	12299515800	100	27	48	8	25,0	12,0	9	3	No	0,4
2016524	12299520400	125	40	58	4	32,5	12,0	14	7	No	0,4
2016526	12299525500	125	40	58	5	32,5	12,0	14	7	No	0,4
2016528	12299525600	125	40	58	6	32,5	12,0	12	6	No	0,5
2016530	12299525700	125	40	58	7	32,5	12,0	12	4	No	0,5
2016532	12299525800	125	40	58	8	32,5	12,0	12	4	No	0,6
2016544	12299526000	125	40	58	10	32,5	12,0	12	6	No	0,6
2016547	12299530400	160	40	68	4	45,0	12,0	18	9	No	0,7
2022648	12299535500	160	40	68	5	45,0	12,0	18	9	No	0,7
2016551	12299535600	160	40	68	6	45,0	12,0	16	8	No	1,0
2022649	12299535700	160	40	68	7	45,0	12,0	15	5	No	1,0
2016555	12299535800	160	40	68	8	45,0	12,0	15	5	No	1,1
2022650	12299536000	160	40	68	10	45,0	12,0	16	8	No	1,2
2016562	12299546000	200	22	72	10	63,0	12,0	18	9	No	1,9
2022652	12299545800	200	50	72	8	63,0	12,0	18	6	No	1,6

Spare Parts





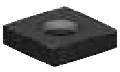




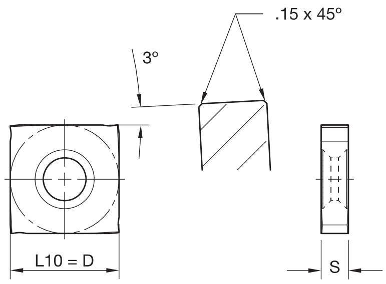
D1	B min	insert screw	Nm	wrench	bushing
100	4	12147548500	1,2	170.023	–
100	5	12147562300	1,2	170.023	12147676800
100	6	12147548600	5,0	170.025	12147676900
100	7	12147548600	5,0	170.025	12147676900
100	8	12147548600	5,0	170.025	12147676900
125	4	12147548500	1,2	170.023	–
125	5	12147562300	1,2	170.023	12147676800
125	6	12147548600	5,0	170.025	12147676900
125	7	12147548600	5,0	170.025	12147676900
125	8	12147548600	5,0	170.025	12147676900
125	10	12147572400	5,0	170.025	12147677000
160	4	12147548500	1,2	170.023	–
160	5	12147562300	1,2	170.023	12147676800
160	6	12147548600	5,0	170.025	12147676900
160	7	12147548600	5,0	170.025	12147676900
160	8	12147548600	5,0	170.025	12147676900
160	10	12147572400	5,0	170.025	12147677000
200	8	12147548600	5,0	170.025	12147676900
200	10	12147572400	5,0	170.025	12147677000

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	SNHX	WP40PM	**SNHX**	**WP40PM**	SNHX	WP40PM
P3–P4	SNHX	WP35CM	**SNHX**	**WP35CM**	SNHX	WP35CM
P5–P6	SNHX	WP35CM	**SNHX**	**WP35CM**	SNHX	WP35CM
M1–M2	SNHX	WP40PM	**SNHX**	**WP40PM**	SNHX	WP40PM
M3	SNHX	WP35CM	**SNHX**	**WP35CM**	SNHX	WP35CM
K1–K2	SNHX	WK15CM	**SNHX**	**WK15CM**	SNHX	WK15CM
K3	SNHX	WP35CM	**SNHX**	**WP35CM**	SNHX	WP35CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**–**	**–**	–	–
S3	–	–	**–**	**–**	–	–
S4	–	–	**–**	**–**	–	–
H1	–	–	**–**	**–**	–	–



SNHX



● first choice
○ alternate choice

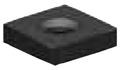
	WK15CM	WP35CM	WP40PM
P		●	●
M		○	●
K	●	○	
N			
S			○
H			

SNHX • 12,7mm iC

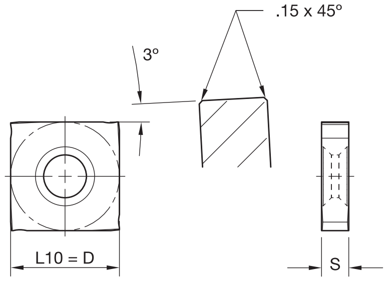
catalogue number	cutting edges	D	L10	S	hm	WK15CM	WP35CM	WP40PM
123506601	4	12,70	12,70	3,18	0,08	5903650	5903674	5903646

SNHX • 11mm iC

catalogue number	cutting edges	D	L10	S	hm	WK15CM	WP35CM	WP40PM
123506599	4	11,00	11,00	2,38	0,08	5903648	5903672	5903644



SNHX



● first choice
○ alternate choice

	WK15CM	WP35CM	WP40PM
P		●	●
M		○	●
K	●	○	
N			
S			○
H			

SNHX • 11mm iC

catalogue number	cutting edges	D	L10	S	hm	WK15CM	WP35CM	WP40PM
123506600	4	11,00	11,00	2,70	0,08	5903649	5903673	5903645

SNHX • 12,7mm iC

catalogue number	cutting edges	D	L10	S	hm	WK15CM	WP35CM	WP40PM
123506602	4	12,70	12,70	5,40	0,08	5903671	5903675	5903647

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP35CM			WP40PM		
P	0	–	**–**	–	455	**395**	370	295	**260**	245
	1	–	**–**	–	455	**395**	370	295	**260**	245
	2	–	**–**	–	280	**255**	230	250	**215**	180
	3	–	**–**	–	255	**230**	205	230	**195**	160
	4	–	**–**	–	190	**175**	160	205	**170**	135
	5	–	**–**	–	260	**230**	210	170	**155**	135
	6	–	**–**	–	160	**135**	110	150	**115**	90
M	1	–	**–**	–	205	**185**	155	195	**170**	155
	2	–	**–**	–	185	**160**	140	175	**150**	125
	3	–	**–**	–	145	**130**	115	130	**115**	90
K	1	420	**385**	340	295	**265**	240	–	**–**	–
	2	335	**295**	275	235	**210**	190	–	**–**	–
	3	280	**250**	230	195	**175**	160	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	66	**50**	33	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
SNHX	0,12	**0,28**	0,71	0,08	**0,20**	0,51	0,06	**0,15**	0,38	0,06	**0,13**	0,33	0,05	**0,12**	0,30	SNHX

NOTE: Use "Light Machining" value as starting feed rate.

Slotting Mills

The WIDIA M900 Series is a multipurpose slotting cutter with high-precision capability for numerous operations. The cutter is one of the most productive of its kind for slotting and for cut-off operations. Two keyways in the cutter provide wide slot options by mounting several cutters together in a gang-slotting style operation.

M900

Features

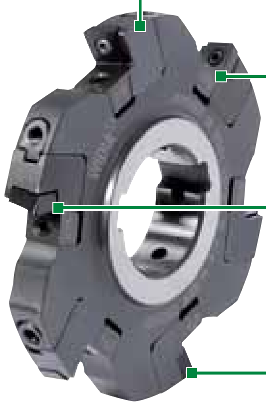
- Insert geometries and grades for various workpiece materials.
- Easy setting for desired width.
- Superior cartridge sliding mechanism.
- Available in arbour and shell mount.
- Two keyways for staggered slotting.
- Strong, reliable pocket seat.

Benefits

- Wide range of slot width options.
- High accuracy of slots.
- Security/stability of cartridge cutter.
- Wide range of mounting options.
- Multiple slots by gang slotting.

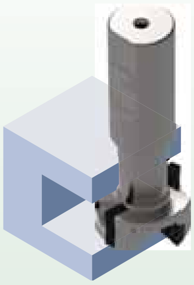
Application

- Full slotting.
- Half slotting (left and right styles).
- Gang slotting.
- Shoulder milling.
- Face milling.
- Back face milling.



WIDIA

Slotting Mills

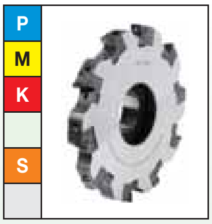


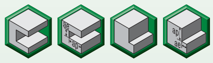
M900™

Slot Width Range:
12–22mm

Indexes per insert: 2
Diameter: 100–315mm

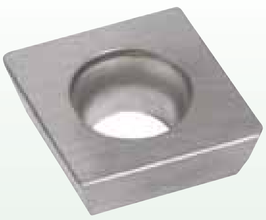
Pages: L24–L30, L32–L33



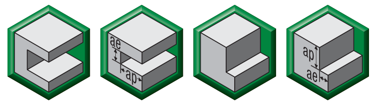


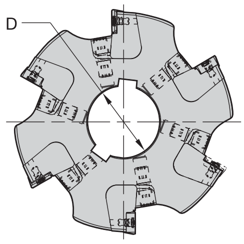
Insert Offering

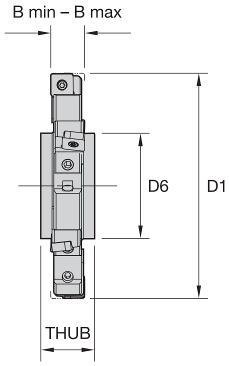
MDHX Geometry
iC 09mm



MDHW Geometry
iC 12mm





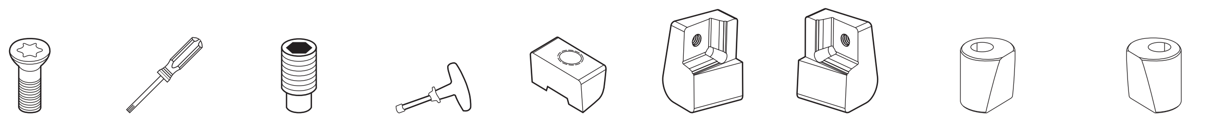


Slotting Mills

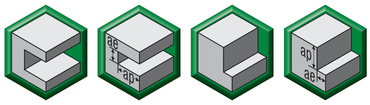
Arbour Mount • 9mm

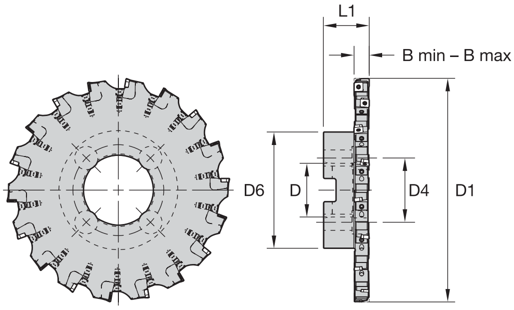
order number	catalogue number	D1	D	D6	B min	B max	THUB	Z	max RPM	coolant supply	kg
2003598	12399010200	100	32	48	12	14	16,0	6	7070	No	0,5
2067540	12399011400	100	32	48	14	16	16,0	6	7070	No	0,8
2003695	12399010400	125	40	58	12	14	16,0	8	6370	No	0,8
2003696	12399011600	125	40	58	14	16	16,0	8	6370	No	0,9
2003697	12399012800	125	40	58	16	18	20,0	8	6370	No	1,1
2003796	12399011800	160	40	58	14	16	16,0	10	5600	No	1,6
2003797	12399013000	160	40	58	16	18	20,0	10	5600	No	1,9
2065591	12399010800	200	50	72	12	14	16,0	12	5040	No	2,1
2003879	12399012000	200	50	72	14	16	16,0	12	5040	No	2,6
2003880	12399013200	200	50	72	16	18	20,0	12	5040	No	2,9
2067541	12399013400	250	50	72	16	18	20,0	16	4480	No	7,0
2116241	12399013600	315	60	84	16	18	20,0	20	3990	No	7,6

Spare Parts



D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
100	12148067200	12749726100	12148574100	12148050000	12748307600	12748210100	12748210200	12748551100	12748551200
100	12148067200	12749726100	12148574100	12148050000	12748307600	12748210300	12748210400	12748551100	12748551200
125	12148067200	12749726100	12148574100	12148050000	12748307600	12748210100	12748210200	12748551100	12748551200
125	12148067200	12749726100	12148574100	12148050000	12748307600	12748210300	12748210400	12748551100	12748551200
125	12148067200	12749726100	12148574100	12148050000	12748307700	12748210500	12748210600	12748551100	12748551200
160	12148067200	12749726100	12148574100	12148050000	12748307600	12748210300	12748210400	12748551100	12748551200
160	12148067200	12749726100	12148574100	12148050000	12748307700	12748210500	12748210600	12748551100	12748551200
200	12148067200	12749726100	12148574100	12148050000	12748307600	12748210100	12748210200	12748551100	12748551200
200	12148067200	12749726100	12148574100	12148050000	12748307600	12748210300	12748210400	12748551100	12748551200
200	12148067200	12749726100	12148574100	12148050000	12748307700	12748210500	12748210600	12748551100	12748551200
250	12148067200	12749726100	12148574100	12148050000	12748307700	12748210500	12748210600	12748551100	12748551200
315	12148067200	12749726100	12148574100	12148050000	12748307700	12748210500	12748210600	12748551100	12748551200

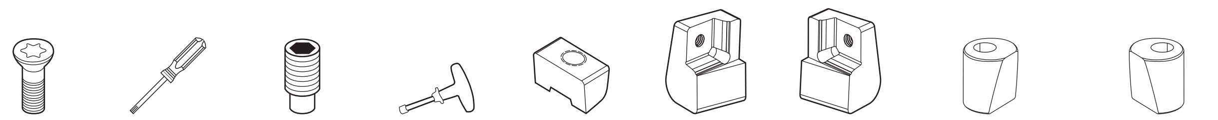




Shell Mount • 9mm

order number	catalogue number	D1	D	D4	D6	B min	B max	L1	Z	max RPM	coolant supply	kg
2003602	12399111400	100	27	–	48	14	16	33,0	6	7070	No	0,8
2003700	12399110400	125	32	–	58	12	14	37,0	8	6370	No	1,1
2003701	12399111600	125	32	–	58	14	16	37,0	8	6370	No	1,2
2003702	12399112800	125	32	–	58	16	18	37,0	8	6370	No	1,4
2003800	12399110600	160	40	–	70	12	14	42,0	10	5600	No	1,8
2003801	12399111800	160	40	–	70	14	16	42,0	10	5600	No	2,1
2003802	12399113000	160	40	–	70	16	18	42,0	10	5600	No	2,3
2003897	12399110800	200	40	67	90	12	14	44,0	12	5040	No	3,0
2003898	12399112000	200	40	67	90	14	16	44,0	12	5040	No	3,3
2003899	12399113200	200	40	67	90	16	18	44,0	12	5040	No	3,7
2003997	12399113400	250	60	102	130	16	18	50,0	16	4480	No	7,0
2004095	12399113600	315	60	102	130	16	18	50,0	20	3990	No	9,7

Spare Parts



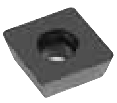
D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
125	12148067200	12749726100	12148574100	12148050000	12748307600	12748210100	12748210200	12748551100	12748551200
100	12148067200	12749726100	12148574100	12148050000	12748307600	12748210300	12748210400	12748551100	12748551200
125	12148067200	12749726100	12148574100	12148050000	12748307600	12748210100	12748210200	12748551100	12748551200
125	12148067200	12749726100	12148574100	12148050000	12748307700	12748210500	12748210600	12748551100	12748551200
160	12148067200	12749726100	12148574100	12148050000	12748307600	12748210100	12748210200	12748551100	12748551200
160	12148067200	12749726100	12148574100	12148050000	12748307600	12748210300	12748210400	12748551100	12748551200
160	12148067200	12749726100	12148574100	12148050000	12748307700	12748210500	12748210600	12748551100	12748551200
200	12148067200	12749726100	12148574100	12148050000	12748307600	12748210100	12748210200	12748551100	12748551200
200	12148067200	12749726100	12148574100	12148050000	12748307600	12748210300	12748210400	12748551100	12748551200
200	12148067200	12749726100	12148574100	12148050000	12748307700	12748210500	12748210600	12748551100	12748551200
250	12148067200	12749726100	12148574100	12148050000	12748307700	12748210500	12748210600	12748551100	12748551200
315	12148067200	12749726100	12148574100	12148050000	12748307700	12748210500	12748210600	12748551100	12748551200

Insert Selection Guide

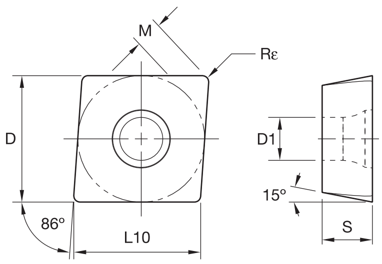
Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	MDHX	WP40PM	**MDHX**	**WP40PM**	MDHX	WP40PM
P3–P4	MDHX	WP35CM	**MDHX**	**WP35CM**	MDHX	WP35CM
P5–P6	MDHX	WP35CM	**MDHX**	**WP40PM**	MDHX	WU35PM
M1–M2	MDHX	WP25PM	**MDHX**	**WP25PM**	MDHX	WU35PM
M3	MDHX	WP35CM	**MDHX**	**WP40PM**	MDHX	WU35PM
K1–K2	MDHX	WK15CM	**MDHX**	**WK15CM**	MDHX	WK15CM
K3	MDHX	WK15CM	**MDHX**	**WP35CM**	MDHX	WP35CM
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	MDHX	WP25PM	**MDHX**	**WU35PM**	MDHX	WU35PM
S3	MDHX	WU35PM	**MDHX**	**WU35PM**	MDHX	WU35PM
S4	MDHX	WP25PM	**MDHX**	**WU35PM**	MDHX	WU35PM
H1	–	–	–	–	–	–

Slotting Mills

Inserts • MDH..


MDHX


MDHX



● first choice
○ alternate choice

	WK15CM	WP25PM	WU35PM	WP35CM	WP40PM
P		●	●	●	●
M		●	●	○	●
K	●	○		○	
N					
S		●	●		○
H		○			

MDHX

catalogue number	cutting edges	D	D1	L10	M	S	Rε	WK15CM	WP25PM	WU35PM	WP35CM	WP40PM
MDHX09T308	2	9,53	3,40	9,55	1,85	3,97	0,80	5903706	5903722	5903710	5903708	5903704

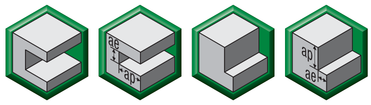
Recommended Starting Feeds

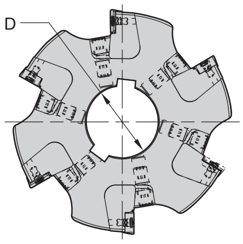
Recommended Starting Feeds [mm]

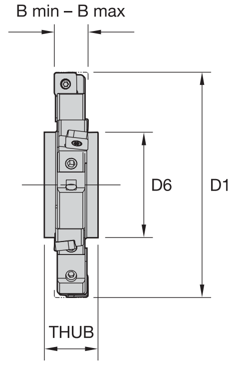
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MDHX	0,12	**0,23**	0,46	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	MDHX

NOTE: Use “Light Machining” value as starting feed rate.



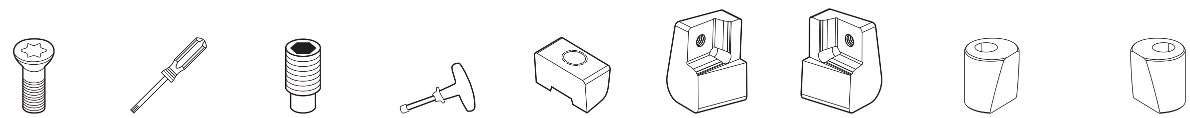




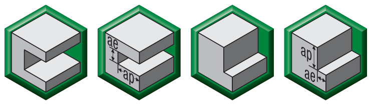
■ Arbour Mount • 12mm

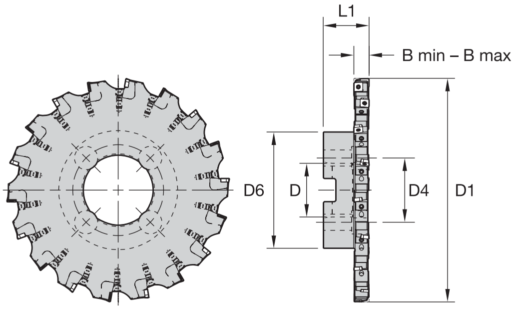
order number	catalogue number	D1	D	D6	B min	B max	THUB	Z	max RPM	coolant supply	kg
2003881	**12399014400**	200	50	72	18	20	20,0	12	5040	No	3,2
2003882	**12399015600**	200	50	72	20	22	24,0	12	3990	No	3,7
2003993	**12399014600**	250	50	72	18	20	20,0	16	4480	No	5,1
2003994	**12399015800**	250	50	72	20	22	24,0	16	3570	No	5,9
2004081	**12399014800**	315	60	84	18	20	20,0	20	3990	No	8,1
2004082	**12399016000**	315	60	84	20	22	24,0	20	3220	No	9,4

■ Spare Parts



D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
200	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
200	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**
250	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
250	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**
315	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
315	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**

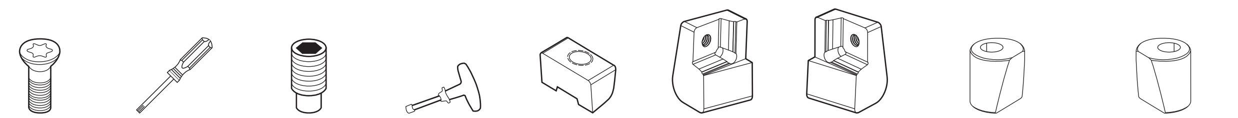




Shell Mount • 12mm

order number	catalogue number	D1	D	D4	D6	B min	B max	L1	Z	max RPM	coolant supply	kg
2003900	**12399114400**	200	40	67	90	18	20	44,8	12	5040	No	3,8
2003901	**12399115600**	200	40	67	90	20	22	46,0	12	3990	No	4,3
2003998	**12399114600**	250	60	102	130	18	20	51,8	16	4480	No	7,2
2003999	**12399115800**	250	60	102	130	20	22	53,0	16	3570	No	7,9
2004096	**12399114800**	315	60	102	130	18	20	51,8	20	3990	No	10,2
2004097	**12399116000**	315	60	102	130	20	22	53,0	20	3220	No	11,3

Spare Parts

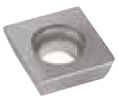


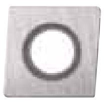
D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
200	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
200	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**
250	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
250	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**
315	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
315	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**

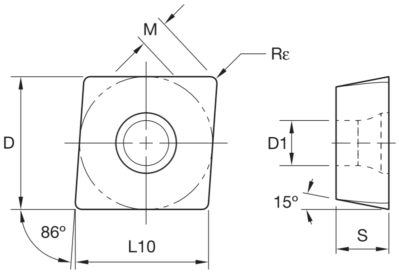
Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	MDHW	WP40PM	**MDHW**	**WP40PM**	MDHW	WP40PM
P3–P4	MDHW	WP35CM	**MDHW**	**WP35CM**	MDHW	WP35CM
P5–P6	MDHW	WP35CM	**MDHW**	**WP40PM**	MDHW	WU35PM
M1–M2	MDHW	WP25PM	**MDHW**	**WP25PM**	MDHW	WU35PM
M3	MDHW	WP35CM	**MDHW**	**WP40PM**	MDHW	WU35PM
K1–K2	MDHW	WK15CM	**MDHW**	**WK15CM**	MDHW	WK15CM
K3	MDHW	WK15CM	**MDHW**	**WP35CM**	MDHW	WP35CM
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	MDHW	WP25PM	**MDHW**	**WU35PM**	MDHW	WU35PM
S3	MDHW	WU35PM	**MDHW**	**WU35PM**	MDHW	WU35PM
S4	MDHW	WP25PM	**MDHW**	**WU35PM**	MDHW	WU35PM
H1	–	–	–	–	–	–

Inserts • MDH..


MDHW


MDHW



● first choice
○ alternate choice

MDHW

	WK15CM	WP25PM	WU35PM	WP35CM	WP40PM
P		●	●	●	●
M		●	●	○	●
K	●	○		○	
N					
S		●	●		○
H		○			

catalogue number	cutting edges	D	D1	L10	M	S	Rε	WK15CM	WP25PM	WU35PM	WP35CM	WP40PM
MDHW120408	2	12,70	5,50	12,73	2,58	4,76	0,80	5903707	5903723	5903721	5903709	5903705

Slotting Mills

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP25PM			WU35PM			WP35CM			WP40PM		
P	0	–	–	–	330	**285**	270	260	**230**	215	455	**395**	370	295	**260**	245
	1	–	–	–	330	**285**	270	260	**230**	215	455	**395**	370	295	**260**	245
	2	–	–	–	275	**240**	200	220	**190**	160	280	**255**	230	250	**215**	180
	3	–	–	–	255	**215**	175	200	**170**	140	255	**230**	205	230	**195**	160
	4	–	–	–	225	**185**	150	180	**150**	120	190	**175**	160	205	**170**	135
	5	–	–	–	185	**170**	150	150	**135**	120	260	**230**	210	170	**155**	135
	6	–	–	–	165	**125**	100	130	**100**	80	160	**135**	110	150	**115**	90
M	1	–	–	–	205	**180**	165	170	**150**	135	205	**185**	155	195	**170**	155
	2	–	–	–	185	**160**	130	155	**130**	110	185	**160**	140	175	**150**	125
	3	–	–	–	140	**120**	95	115	**100**	80	145	**130**	115	130	**115**	90
K	1	420	**385**	340	230	**205**	185	–	–	–	295	**265**	240	–	–	–
	2	335	**295**	275	180	**160**	150	–	–	–	235	**210**	190	–	–	–
	3	280	**250**	230	150	**135**	120	–	–	–	195	**175**	160	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	40	**35**	25	35	**30**	25	–	–	–	40	**35**	30
	2	–	–	–	40	**35**	25	35	**30**	25	–	–	–	40	**35**	30
	3	–	–	–	50	**40**	25	45	**35**	25	–	–	–	50	**40**	30
	4	–	–	–	70	**50**	35	60	**45**	30	66	**50**	33	65	**50**	35
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MDHW	0,12	**0,23**	0,46	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	MDHW

NOTE: Use "Light Machining" value as starting feed rate.

WIDIA™ Knowledge Center

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EXTREME **RESULTS.**

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Regional Training

The Regional Application Engineering Program is designed to provide a broad base of knowledge for the selection and use of metalcutting tools. Instruction includes lecture-style presentations and video demonstrations. Participants receive notes and text materials, and the video demonstrations reinforce the theories presented in the lecture.

Metalcutting Application Training

The Comprehensive Metalworking Application Course provides a broad base of knowledge for the selection and use of metalcutting tools. Lecture-style presentations and laboratory demonstrations enhance course material through actual cutting tests and reinforce the theories presented in the lecture.

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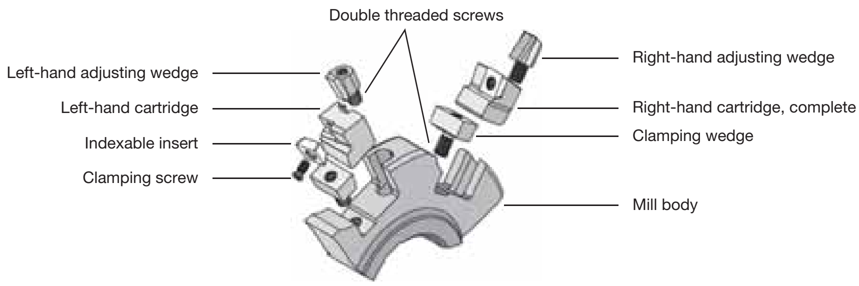
WIDIA™

Assembly and Operating Instructions

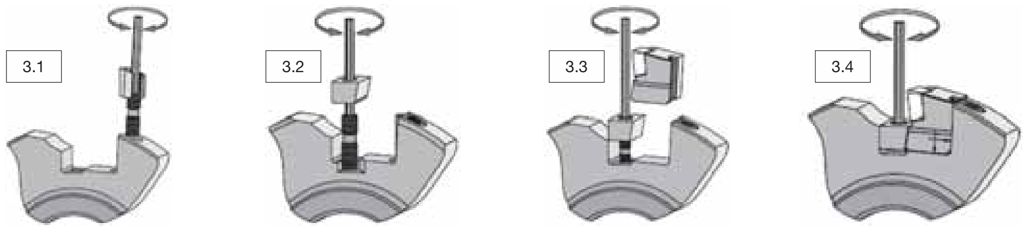
1. General

The runout tolerance of the milling cutter has a decisive effect on the quality of workpieces and the life cycle of tools. Proper tool fitting and the precise axial setting of the milling insert are essential for a successful application and optimum results. One key requirement for assembly and setting work is that all components are clean. Bearing surfaces must be free from grease, and only the threads of indexable insert clamping screws and double threaded screws of clamping and adjusting wedges should be lubricated with copper grease. The indexable inserts should be inserted in the cleaned insert seats so that they are positioned correctly on the bearing surfaces. The indexable insert clamping screws should be tightened with the specified torque.

2. Exploded Diagram of Spare Parts



3. Mounting the Cartridges in the Mill Body



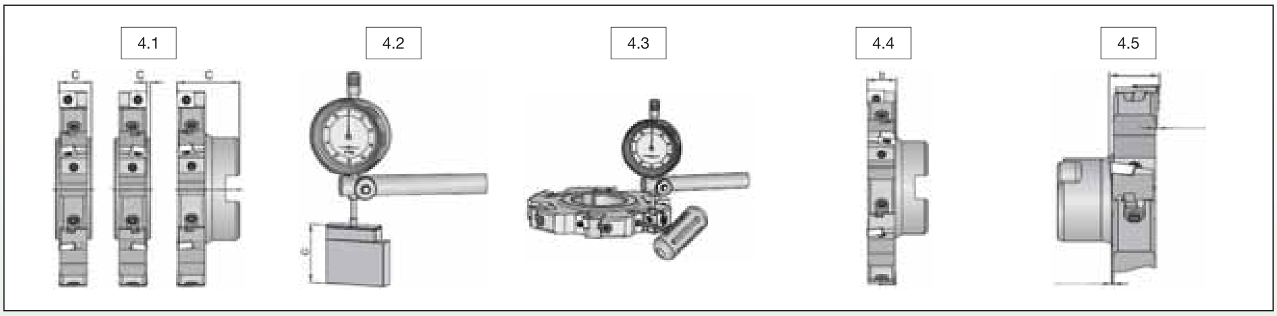
3.1 Turn double threaded screw one turn clockwise in the adjusting wedge. Then insert both parts in the slot in the mill body and turn the double threaded screw clockwise until the adjusting wedge is flush with the milling cutter.

3.2 Turn double threaded screw three turns clockwise in the mill body. Then mount the clamping wedge on the double threaded screw and screw both parts together until the lower edge of the clamping wedge is at the same height as the chip space runout.

3.3 Push the top of the fully assembled cartridge into the mill body using the rear bearing surface of the milling cutter so that the cartridge slot makes contact with the adjusting wedge spring. Ensure a perfect axial/radial surface.

3.4 Secure the correctly positioned cartridge by tightening the clamping wedge with a preset torque of MApre = 1 Nm to set the runout or cutting width.

4. Setting the Runout for Milling Cutters with 2–3 Cutting Edges



4.1 Possible interpretations of the measuring dimension C.

4.2 Set gage to desired measurement C using gage blocks set to 0.

4.3 Set cartridge to ~0,1mm before final measurement. Clamping wedge is tightened with torque MApre = 1 Nm. Then briefly loosen clamping wedge and tighten again.

4.4 Set cartridge to 0,02mm before final measurement. Then briefly loosen clamping wedge so that the contact surfaces can level out. Tighten clamping.

4.4 Wedge again with torque MApre = 1 Nm.

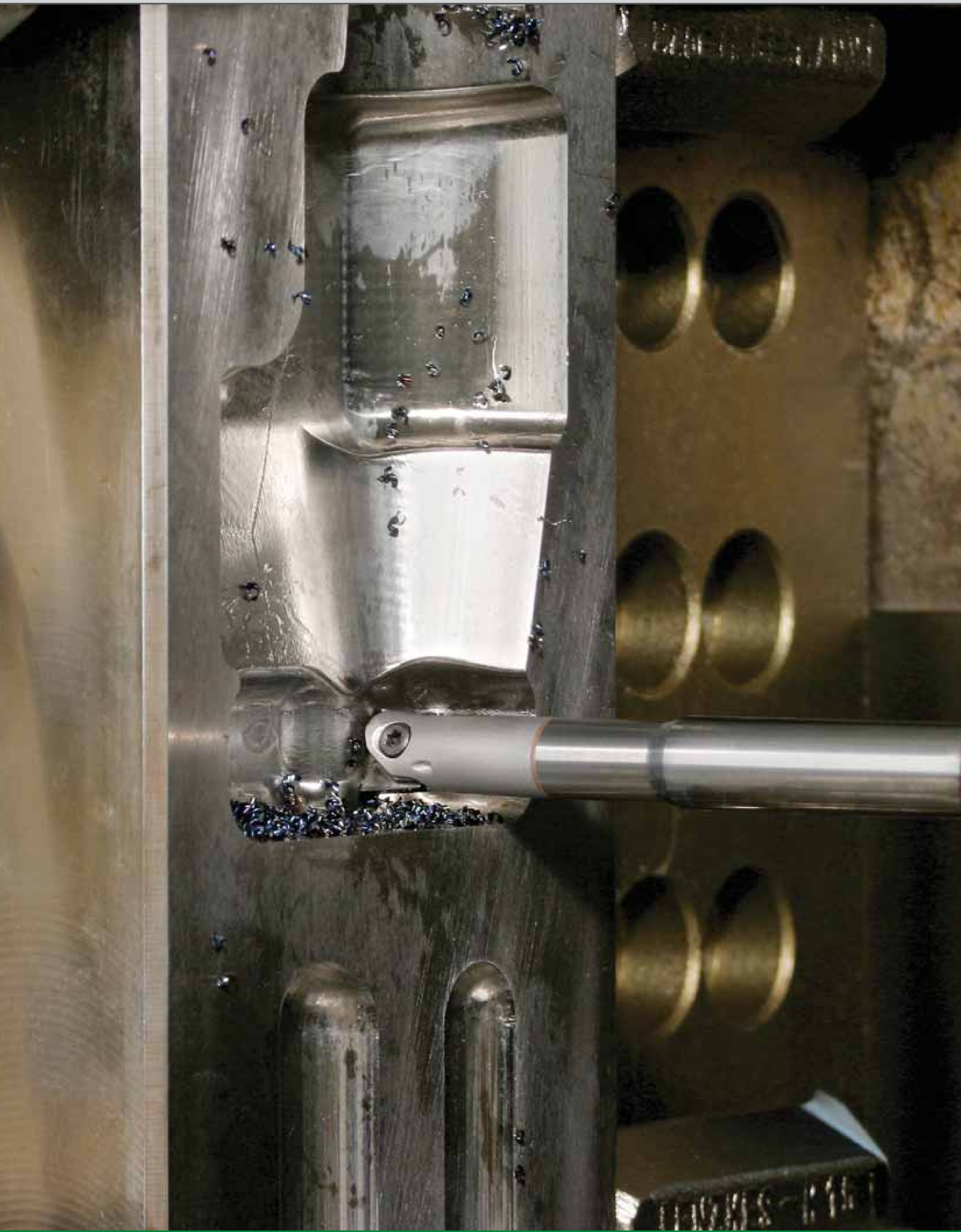
4.5 Adjust cartridge to final measurement. Tighten clamping wedge with torque MA = 4 Nm. Check runout of the fully adjusted milling cutter.

5. Setting the Runout for Milling Cutters with 3 Cutting Edges

The cutting widths for milling cutters with three cutting edges are set using purpose-designed optical tool presetting equipment. Note that the projection of the cartridges from the mill body must be almost exactly the same on both sides. The sequence of steps required for setting the cartridge is identical to those for tools with two cutting edges.

ATTENTION:

At each tool adjustment, the body, cartridges, indexable inserts, and spare parts must be checked and replaced if necessary. Before each tool use, the clamping and double threaded screws must be tightened with the specified torque. The tools must only be used in accordance with their function. We accept no liability for their improper use. Changes of any kind and/or printing errors are not valid grounds for claims.



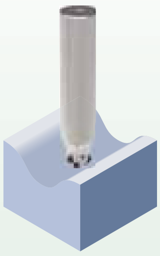
Indexable Milling • Copy Mills

M370

Designed for high feed rate productivity, M370 Series provides the latest insert technology with outstanding performance and reliability. Its double-sided concept and six cutting edges provide security and optimal metal removal with an efficient cost per edge.

- Double-sided design offers six cutting edges per insert.
- Extremely high metal removal rates.
- First choice for high-feed roughing applications.

Copy Mills

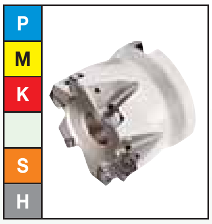


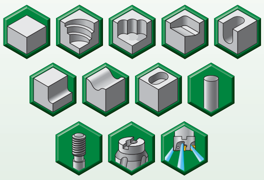
M370™

Max depth of cut: up to 2mm

Indexes per insert: 6
Diameter: 25–125mm

Pages: M4–M16



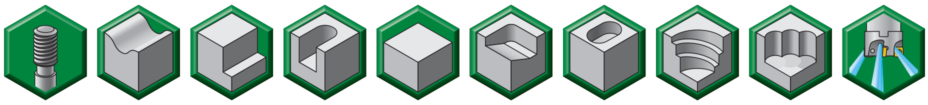


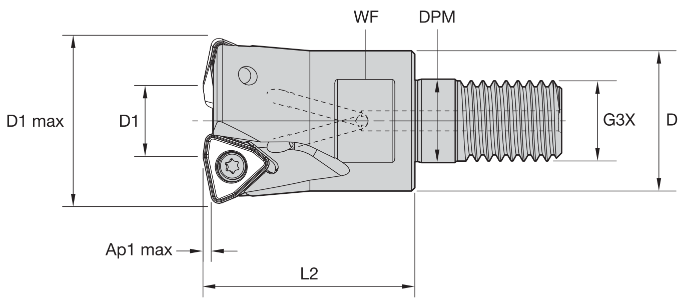
Insert Offering

8mm iC Insert WOEJ0804
Up to 1,3mm Ap max
Diameter range 25–80mm

12mm iC Insert WOEJ1207
Up to 2mm Ap max
Diameter range 42–125mm

- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.

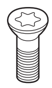
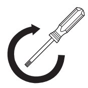
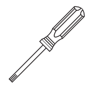




Screw-On End Mills

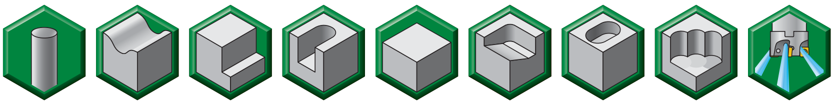
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
4056186	**M370D025Z02M12WO08**	25	11	21	12,5	M12	35	17	1,3	2	2.1°	46000	Yes	0,09
4170918	**M370D025Z03M12WO08**	25	11	21	12,5	M12	35	17	1,3	3	2.1°	46000	Yes	0,09
4056187	**M370D032Z04M16WO08**	32	18	29	17,0	M16	43	24	1,3	4	1.4°	38700	Yes	0,21
4056188	**M370D042Z05M16WO08**	42	28	29	17,0	M16	43	24	1,3	5	1.0°	32500	Yes	0,57

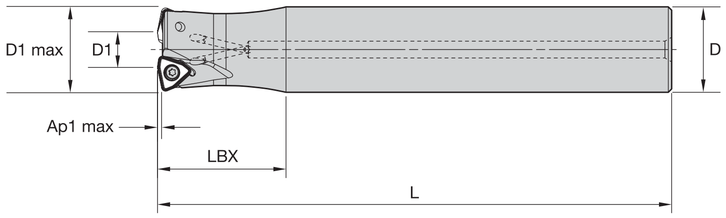
Spare Parts

D1 max	insert screw	Nm	Torx driver
25	**MS2219**	1,8	**DT9IP**
32	**MS2219**	1,8	**DT9IP**
42	**MS2219**	1,8	**DT9IP**

- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.

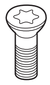


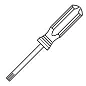


Cylindrical End Mills

order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4056189	**M370D025Z03A25WO08L150**	25	11	25	150	40	1,3	3	46000	Yes	0,50
4008281	**M370D025Z02A25WO08L200**	25	11	25	200	50	1,3	2	46000	Yes	0,68
4170919	**M370D025Z03A25WO08L200**	25	11	25	200	40	1,3	3	46000	Yes	0,69
4170920	**M370D025Z02A25WO08L300**	25	11	25	300	40	1,3	2	46000	Yes	1,08
4056190	**M370D028Z03A25WO08L200**	28	14	25	200	40	1,3	3	42400	Yes	0,70
4056192	**M370D032Z04A32WO08L200**	32	18	32	200	50	1,3	4	38700	Yes	1,14
4056191	**M370D032Z04A32WO08L150**	32	18	32	150	40	1,3	4	38700	Yes	0,84
4170921	**M370D032Z03A32WO08L300**	32	18	32	300	40	1,3	3	38700	Yes	0,84

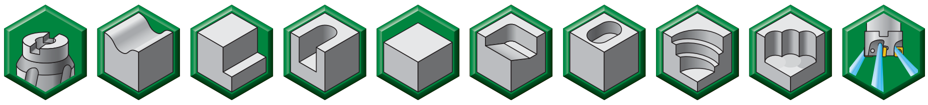
Spare Parts

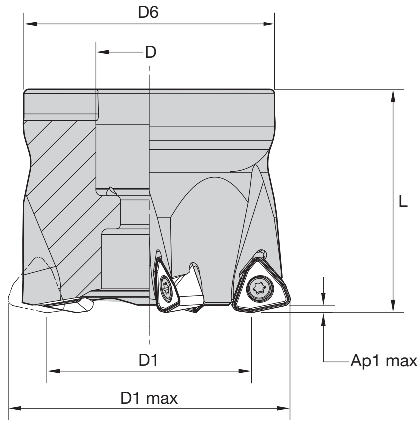




D1 max	insert screw	Nm	wrench
25	**MS2219**	1,8	**DT9IP**
28	**MS2219**	1,8	**DT9IP**
32	**MS2219**	1,8	**DT9IP**

- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.

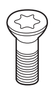
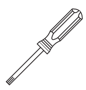
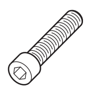
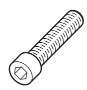




Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
4056193	**M370D040Z04WO08**	40	26	16	37	40	1,3	4	33500	Yes	0,19
4170922	**M370D040Z05WO08**	40	26	16	37	40	1,3	5	33500	Yes	0,19
4008276	**M370D050Z05WO08**	50	36	22	44	40	1,3	5	29200	Yes	0,29
4171223	**M370D050Z06WO08**	50	36	22	44	40	1,3	6	29200	Yes	0,29
4171224	**M370D052Z06WO08**	52	38	22	44	50	1,3	6	28600	Yes	0,40
4056194	**M370D052Z05WO08**	52	38	22	44	50	1,3	5	28600	Yes	0,41
4056195	**M370D063Z06WO08**	63	49	22	60	50	1,3	6	25500	Yes	0,74
4008277	**M370D066Z06WO08**	66	52	27	60	50	1,3	6	24900	Yes	0,77
4171225	**M370D080Z07WO08**	80	66	27	60	50	1,3	7	24900	Yes	2,36

Spare Parts

D1 max	insert screw	Nm	Torx Plus driver	socket-head cap screw	socket-head cap screw with coolant groove
40	**MS2219**	1,8	**DT9IP**	**125.825**	**MS1294CG**
50	**MS2219**	1,8	**DT9IP**	**12146120500**	**MS1234CG**
52	**MS2219**	1,8	**DT9IP**	**12146120500**	**MS1234CG**
63	**MS2219**	1,8	**DT9IP**	**12146120500**	**MS1234CG**
66	**MS2219**	1,8	**DT9IP**	**MS2038**	**MS2038CG**
80	**MS2219**	1,8	**DT9IP**	**MS2038**	**MS2038CG**

NOTE: Socket-head cap screw with coolant groove must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	..MM	WP40PM	**..MM**	**WP40PM**	..MM	WP40PM
P3–P4	..MM	WP25PM	**..MM**	**WP40PM**	..MH	WP40PM
P5–P6	..MM	WP25PM	**..MH**	**WP25PM**	..MH	WP40PM
M1–M2	..MM	WP25PM	**..MM**	**WS30PM**	..MM	WP40PM
M3	..MM	WP25PM	**..MM**	**WP25PM**	..MM	WP40PM
K1–K2	..MH	WK15CM	**..MH**	**WK15CM**	..MH	WK15CM
K3	..MH	TN6520	**..MH**	**TN6520**	..MH	WK15CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	..MM	WP25PM	**..MM**	**WS30PM**	..MM	WP40PM
S3	..MM	WS30PM	**..MM**	**WS30PM**	..MM	WP40PM
S4	..MM	WS30PM	**..MM**	**WP40PM**	..MM	WP40PM
H1	..MH	WP25PM	**–**	**–**	–	–

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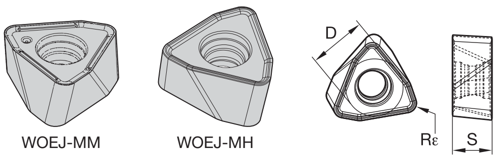


- -MM geometry provides lower cutting forces. First choice for steel, stainless steel, and high-temp alloys.
- -MH geometry is the first choice for high-strength steel and cast iron.

● first choice
○ alternate choice

		TN6520	TN6525	TN7535	WK15CM	WP25PM	WS30PM	WP40PM
P		○	●	●		●		●
M			○	○		●	○	●
K		●	○	○	●	○		
N								
S						●	●	○
H			○			○		

WOEJ-MM

catalogue number	cutting edges	D	S	Rε	TN6520	TN6525	TN7535	WK15CM	WP25PM	WS30PM	WP40PM
WOEJ080412SRMM	6	7,79	4,70	1,22	-	4113892	4113916	-	5564597	5520248	5544753

WOEJ-MH

catalogue number	cutting edges	D	S	Rε	TN6520	TN6525	TN7535	WK15CM	WP25PM	WS30PM	WP40PM
WOEJ080412SRMH	6	7,79	4,75	1,22	4136480	4052411	4068517	5427443	5564596	-	5544752

Recommended Starting Speeds [m/min]

Material Group		TN6520			TN6525			TN7535			WK15CM		
P	1	–	**–**	–	410	**320**	280	545	**475**	445	–	**–**	–
	2	–	**–**	–	320	**250**	215	335	**305**	275	–	**–**	–
	3	–	**–**	–	280	**215**	185	305	**275**	245	–	**–**	–
	4	–	**–**	–	235	**170**	145	230	**210**	190	–	**–**	–
	5	–	**–**	–	310	**235**	200	310	**275**	250	–	**–**	–
	6	–	**–**	–	205	**160**	130	190	**160**	130	–	**–**	–
M	1	–	**–**	–	190	**120**	80	245	**220**	185	–	**–**	–
	2	–	**–**	–	120	**80**	50	220	**190**	170	–	**–**	–
	3	–	**–**	–	125	**80**	55	175	**155**	140	–	**–**	–
K	1	450	**320**	230	275	**245**	220	355	**320**	290	505	**460**	410
	2	390	**250**	190	215	**190**	180	280	**250**	230	400	**355**	330
	3	300	**230**	160	180	**160**	145	235	**210**	190	335	**300**	275
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WP25PM			WS30PM			WP40PM		
P	1	395	**340**	325	–	–	–	355	**310**	295
	2	330	**290**	240	–	–	–	300	**260**	215
	3	305	**260**	210	–	–	–	275	**235**	190
	4	270	**220**	180	–	–	–	245	**205**	160
	5	220	**205**	180	–	–	–	205	**185**	160
	6	200	**150**	120	–	–	–	180	**140**	110
M	1	245	**215**	200	270	**240**	220	235	**205**	185
	2	220	**190**	155	245	**215**	175	210	**180**	150
	3	170	**145**	115	185	**160**	125	155	**140**	110
K	1	275	**245**	220	–	–	–	–	–	–
	2	215	**190**	180	–	–	–	–	–	–
	3	180	**160**	145	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
S	1	50	**40**	30	55	**50**	35	50	**40**	35
	2	50	**40**	30	55	**50**	35	50	**40**	35
	3	60	**50**	30	65	**55**	35	60	**50**	35
	4	85	**60**	40	100	**70**	50	80	**60**	40
H	1	145	**110**	85	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

For Plunging Applications

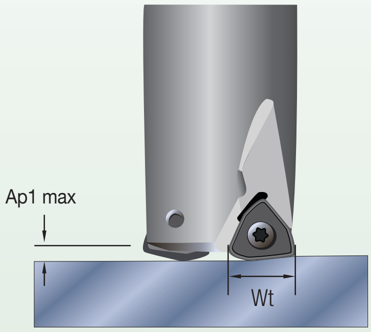
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
..MM	0,90	**1,67**	4,09	0,65	**1,19**	2,83	0,48	**0,88**	2,08	0,42	**0,77**	1,80	0,38	**0,70**	1,64	..MM
..MH	0,90	**2,34**	5,00	0,65	**1,66**	3,41	0,48	**1,23**	2,49	0,42	**1,07**	2,16	0,38	**0,98**	1,97	..MH

NOTE: Use “Light Machining” value as starting feed rate.

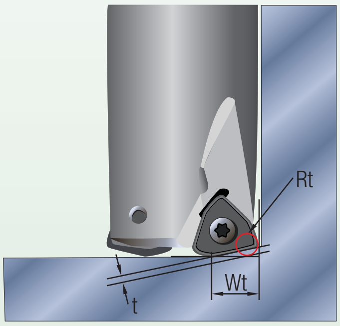
Copy Mills

Applying High-Feed Tools

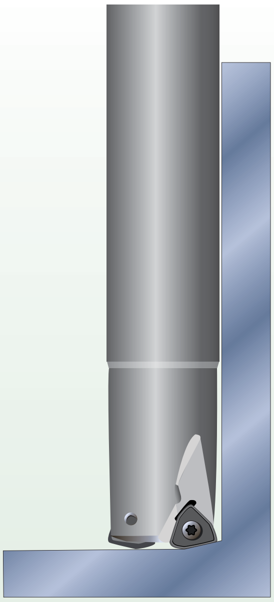
The high-feed concept bases its strategy on small depth of cut and higher fz values, which results in a higher MRR and productivity with low radial forces.



Small Ap1 values and higher feed rates generate lower cutting forces versus traditional milling strategies.



For CAM programming, the tools can be programmed as a toroidal tool type by using the Rt value as the insert radius.



Recommended when long overhang is necessary due to lower radial forces. Maximum L/D ratio of 10 x D.

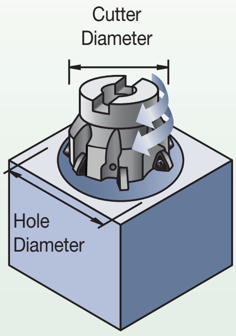
General Programming Information for Applying M370

L/D ratio	starting Ap1	starting fz range
<3	0,9mm	1–1,3mm
>3–<5	0,6mm	1–1,3mm
>5–<7	0,4mm	0,6–1mm

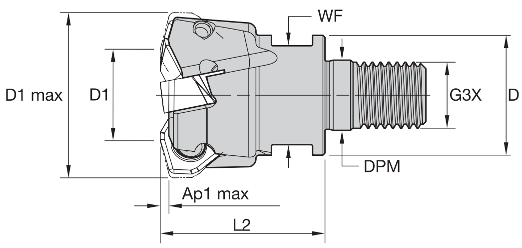
Rt	t	Wt
2,5mm	1mm	7,5mm

■ Maximum Linear Ramping and Helical Interpolation from Solid • Metric

cutter diameter	max linear ramp angle (straight line)	min hole diameter	max hole diameter	Ap1 max per revolution
25	3,1°	30,2	49,5	1,25
28	2,6°	36,1	55,5	1,25
32	2,9°	44,1	63,5	1,25
40	1,6°	60	79,5	1,25
42	1,5°	64	83,5	1,25
50	1,3°	80	99,5	1,25
52	1,2°	84	103,5	1,25
63	1°	106	125,5	1,25
66	1°	112	131,5	1,25
80	0,8°	140	155,5	1,25



- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.



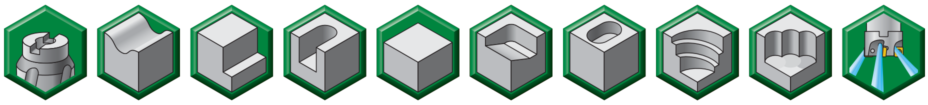
Screw-On End Mills

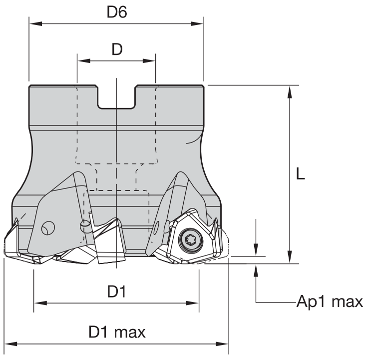
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
5338912	**M370D42Z03M16WO12**	42	25	29	17,0	M16	40	24	2,0	3	5.1°	21310	Yes	0,22

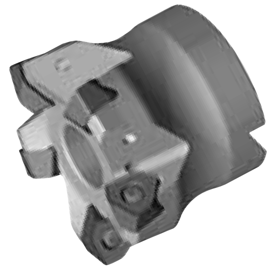
Spare Parts

D1 max	insert screw	Nm	Torx driver
42	**MS2085**	4,0	**DT15IP**

- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.







Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
5338913	M370D50Z04WO12	50,0	33	22	42	50	2,0	4	19530	Yes	0,38
5338914	M370D52Z04WO12	52,0	35	22	49	50	2,0	4	19160	Yes	0,47
5338915	M370D63Z04WO12	63,0	46	22	49	50	2,0	4	17400	Yes	0,57
5338916	M370D63Z05WO12	63,0	46	22	49	50	2,0	5	17400	Yes	0,57
5338917	M370D66Z05WO12	66,0	49	27	60	50	2,0	5	17000	Yes	0,79
5338918	M370D80Z05WO12	80,0	63	27	60	50	2,0	5	15440	Yes	0,94
5338919	M370D80Z06WO12	80,0	63	27	60	50	2,0	6	15440	Yes	0,94
5338920	M370D100Z06WO12	100,0	83	32	78	50	2,0	6	13810	Yes	1,56
5338921	M370D100Z07WO12	100,0	83	32	78	50	2,0	7	13810	Yes	1,57
5338922	M370D125Z07WO12	125,0	108	40	90	63	2,0	7	12350	Yes	2,92
5338923	M370D125Z09WO12	125,0	108	40	90	63	2,0	9	12350	Yes	2,94

Spare Parts

D1 max	insert screw	Nm	Torx Plus driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw	coolant lock screw assembly
50	MS2085	4,0	DT15IP	12146120500	MS1234CG	–	–
52	MS2085	4,0	DT15IP	12146120500	MS1234CG	–	–
63	MS2085	4,0	DT15IP	125.025	MS1234CG	–	–
66	MS2085	4,0	DT15IP	125.230	MS2038CG	–	–
80	MS2085	4,0	DT15IP	125.230	MS2038CG	–	–
100	MS2085	4,0	DT15IP	–	–	KLS32M	MS2195C
125	MS2085	4,0	DT15IP	–	–	KLS40M	MS2187C

NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	.S..MM	WU35PM	**.S..MM**	**WP40PM**	.S..MM	WP40PM
P3–P4	.S..MM	WP25PM	**.S..MM**	**WP25PM**	.S..MH	WP40PM
P5–P6	.S..MM	WP25PM	**.S..MM**	**WP35CM**	.S..MH	WP35CM
M1–M2	.S..MM	WS30PM	**.S..MM**	**WU35PM**	.S..MM	WP40PM
M3	.S..MM	WP25PM	**.S..MM**	**WP35CM**	.S..MM	WP40PM
K1–K2	.S..MH	WK15CM	**.S..MH**	**WK15CM**	.S..MH	WP20CM
K3	.S..MH	WK15CM	**.S..MH**	**WK15CM**	.S..MH	WP20CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	.S..MM	WS30PM	**.S..MM**	**WU35PM**	.S..MM	WP40PM
S3	.S..MM	WS30PM	**.S..MM**	**WU35PM**	.S..MM	WP40PM
S4	.S..MM	WS30PM	**.S..MM**	**WU35PM**	.S..MM	WP40PM
H1	.S..MH	WP35CM	**.S..MR**	**WP25PM**	–	–

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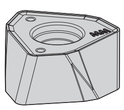
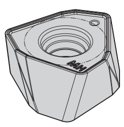
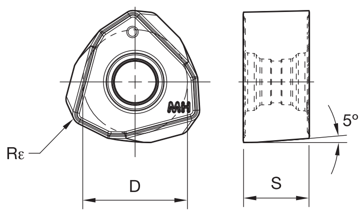


WOEJ-MM



WOEJ-MH



- -MM geometry provides lower cutting forces. First choice for steel, stainless steel, and high-temp alloys.
- -MH geometry is the first choice for high-strength steel and cast iron.
- -MR geometry is designed for heavy-duty steel and cast iron applications.

● first choice
○ alternate choice

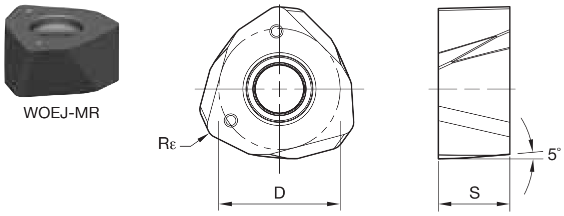
	WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
P		●	●	●	●		●
M		○	●	●	○	○	●
K	●	○	○		○		
N							
S			●	●		●	○
H		○	○				

WOEJ-MM

catalogue number	cutting edges	D	S	Rε	WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
WOEJ120712SRMM	6	12,00	7,30	1,27	–	5419790	5419648	5419649	5419791	5520249	5542346

WOEJ-MH

catalogue number	cutting edges	D	S	Rε	WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
WOEJ120712SRMH	6	12,00	7,30	1,27	5338860	5338861	5338818	5338819	5338862	–	5542347



● first choice
○ alternate choice

		WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
P			●	●	●	●		●
M			○	●	●	○	○	●
K		●	○	○		○		
N								
S				●	●		●	○
H			○	○				

WOEJ-MR

catalogue number	cutting edges	D	S	Rε	WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
WOEJ120712SRMR	6	12,00	7,30	1,27	–	–	5698343	–	–	–	5698342

Recommended Starting Speeds

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP20CM			WP25PM			WU35PM		
P	1	–	**–**	–	660	**580**	540	395	**340**	325	310	**275**	260
	2	–	**–**	–	410	**370**	330	330	**290**	240	265	**230**	190
	3	–	**–**	–	370	**330**	305	305	**260**	210	240	**205**	170
	4	–	**–**	–	275	**260**	230	270	**220**	180	215	**180**	145
	5	–	**–**	–	330	**300**	275	220	**205**	180	180	**160**	145
	6	–	**–**	–	230	**205**	175	200	**150**	120	155	**120**	95
M	1	–	**–**	–	270	**240**	210	245	**215**	200	205	**180**	160
	2	–	**–**	–	245	**210**	190	220	**190**	155	185	**155**	130
	3	–	**–**	–	190	**175**	150	170	**145**	115	140	**120**	95
K	1	505	**460**	410	430	**390**	355	275	**245**	220	–	**–**	–
	2	400	**355**	330	340	**305**	280	215	**190**	180	–	**–**	–
	3	335	**300**	275	290	**260**	240	180	**160**	145	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**40**	30	40	**35**	30
	2	–	**–**	–	–	**–**	–	50	**40**	30	40	**35**	30
	3	–	**–**	–	–	**–**	–	60	**50**	30	55	**40**	30
	4	–	**–**	–	–	**–**	–	85	**60**	40	70	**55**	35
H	1	–	**–**	–	170	**140**	115	145	**110**	85	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WP35CM			WS30PM			WP40PM		
P	1	545	**475**	445	–	**–**	–	355	**310**	295
	2	335	**305**	275	–	**–**	–	300	**260**	215
	3	305	**275**	245	–	**–**	–	275	**235**	190
	4	230	**210**	190	–	**–**	–	245	**205**	160
	5	310	**275**	250	–	**–**	–	205	**185**	160
	6	190	**160**	130	–	**–**	–	180	**140**	110
M	1	245	**220**	185	270	**240**	220	235	**205**	185
	2	220	**190**	170	245	**215**	175	210	**180**	150
	3	175	**155**	140	185	**160**	125	155	**140**	110
K	1	355	**320**	290	–	**–**	–	–	**–**	–
	2	280	**250**	230	–	**–**	–	–	**–**	–
	3	235	**210**	190	–	**–**	–	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	55	**50**	35	50	**40**	35
	2	–	**–**	–	55	**50**	35	50	**40**	35
	3	–	**–**	–	65	**55**	35	60	**50**	35
	4	80	**60**	40	100	**70**	50	80	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

For All Other Applications

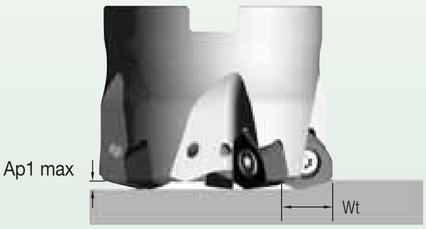
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
..MM	0,90	**1,87**	3,62	0,65	**1,33**	2,52	0,48	**0,99**	1,86	0,42	**0,86**	1,61	0,39	**0,79**	1,47	..MM
..MH	0,90	**2,35**	4,97	0,65	**1,67**	3,40	0,48	**1,23**	2,48	0,42	**1,07**	2,15	0,39	**0,98**	1,96	..MH
..MR	0,90	**2,81**	5,44	0,65	**1,97**	3,69	0,48	**1,46**	2,69	0,42	**1,27**	2,33	0,39	**1,16**	2,13	..MR

NOTE: Use "Light Machining" value as starting feed rate.

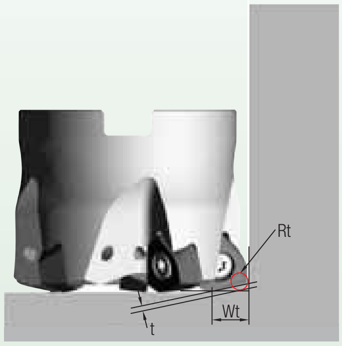
Copy Mills

Applying High-Feed Tools

The high-feed concept bases its strategy on small depth of cut and higher fz values, which results in a higher MRR and productivity with low radial forces.



Small Ap1 values and higher feed rates generate lower cutting forces versus traditional milling strategies.



For CAM programming, the tools can be programmed as a toroidal tool type by using the Rt value as the insert radius.

Recommended when long overhang is necessary due to lower radial forces. Maximum L/D ratio of 10 x D.

General Programming Information for Applying M370

	CAM programming information		
	Rt	Wt	t
mm value	3,2	9	1,4

Maximum Linear Ramping and Helical Interpolation from Solid • Metric

diameter	max ramp angle	max ramp angle for 360° helical interpolation	max plunge depth	min hole diameter (DH min)	max flat-bottom hole diameter (DH1 max)	max diameter (no flat bottom)
42	5,1°	1,44°	1,66	57,36	65,29	84
50	3,7°	1,09°	1,66	73,07	81,24	100
52	3,5°	1,03°	1,66	77,03	85,24	104
63	2,6°	0,78°	1,66	98,88	107,20	126
66	2,4°	0,74°	1,66	104,85	113,20	132
80	1,8°	0,57°	1,66	132,77	141,18	160
100	1,3°	0,43°	1,66	172,70	181,16	200
125	1,0°	0,33°	1,66	222,66	231,15	250

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WIDIA™

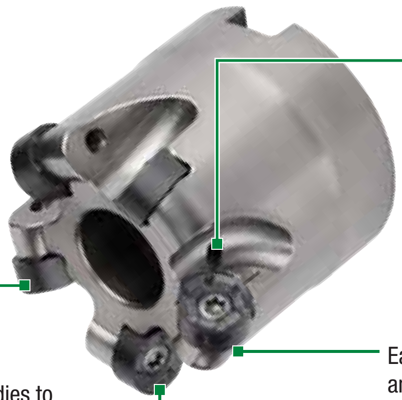
Double-Sided Round Insert •

M200™ Series

Revolutionary double-sided round insert, capable of running in multiple types of milling operations and workpiece materials, increases customer's productivity with the most efficient cost per edge.

M200

- Up to 12 cutting edges per insert.
- Effective anti-rotation feature.
- Able to apply in all type of materials and milling applications.
- Latest WIDIA™ Victory™ grades offered.



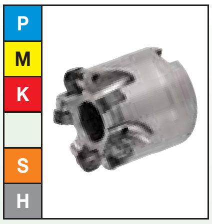
Copy Mills

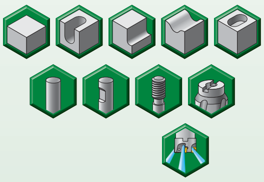
M200™

Max depth of cut: up to 5mm

Indexes per insert: up to 12
Diameter: 25–125mm

Pages: M20–M39





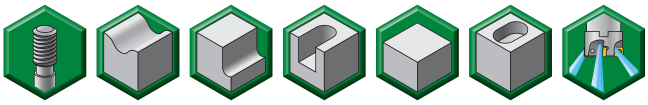
Insert Offering

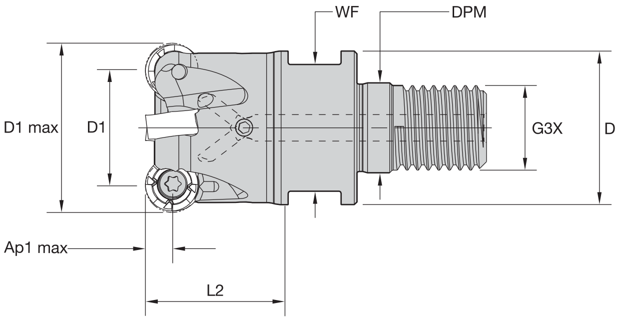
M200 iC 10
10mm iC insert
8 cutting edges

M200 iC 12
12mm iC insert
12 cutting edges

M200 iC 16
16mm iC insert
12 cutting edges

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.

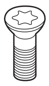
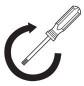
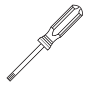




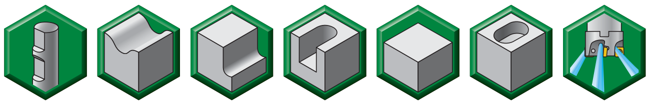
Screw-On End Mills

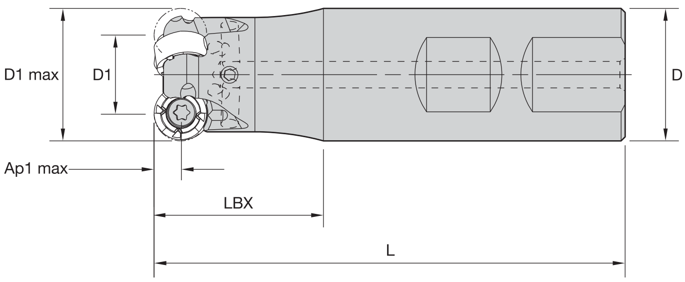
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max RPM	coolant supply	kg
5210273	**M200D25Z03M12RN10**	25	15	21	12,5	M12	32	17	5,0	3	54700	Yes	0,08
5210274	**M200D32Z04M16RN10**	32	22	29	17,0	M16	40	24	5,0	4	48300	Yes	0,18
5210275	**M200D35Z05M16RN10**	35	24	29	17,0	M16	40	24	5,0	5	46200	Yes	0,20
5210276	**M200D42Z06M16RN10**	42	32	29	17,0	M16	40	24	5,0	6	42200	Yes	0,24

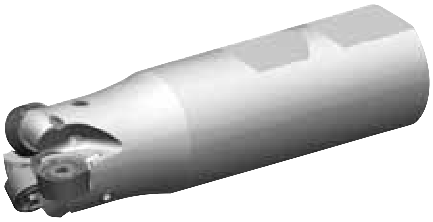
Spare Parts

 insert screw	 Nm	 Torx driver
191.848	2,0	**170.025**

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



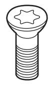


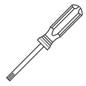


Weldon Shanks

order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
5210277	**M200D25Z03B25RN10**	25	15	25	89	40	5,0	3	54700	Yes	0,27
5210278	**M200D32Z04B32RN10**	32	22	32	101	40	5,0	4	48300	Yes	0,52

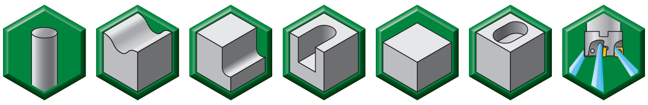
Spare Parts

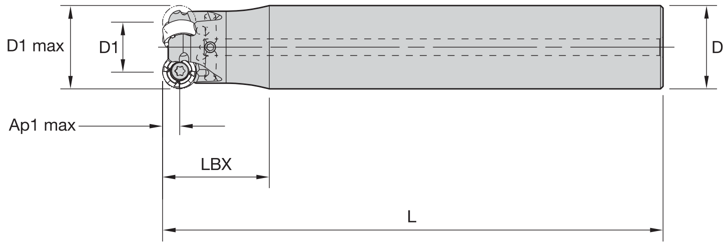


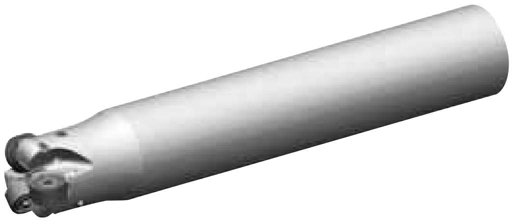


insert screw	Nm	Torx driver
191.848	2,0	**170.025**

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



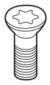


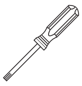


Cylindrical End Mills

order number	catalogue number	D1 max	D1	D	L	LBX	L2	Ap1 max	Z	max RPM	coolant supply	kg
5210279	**M200D25Z03A25RN10L150**	25	15	25	150	32	32	5,0	3	54700	Yes	0,50
5210300	**M200D25Z03A25RN10L200**	25	15	25	200	32	32	5,0	3	54700	Yes	0,69
5210301	**M200D25Z03A32RN10L250**	25	15	32	250	32	32	5,0	3	54700	Yes	1,41
5210302	**M200D28Z03A25RN10L200**	28	18	25	200	40	40	5,0	3	51600	Yes	0,70
5210303	**M200D32Z04A32RN10L150**	32	22	32	150	40	40	5,0	4	48300	Yes	0,83
5210304	**M200D32Z03A32RN10L200**	32	22	32	200	40	40	5,0	3	48300	Yes	1,14

Spare Parts

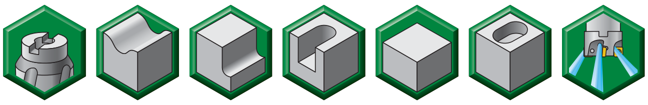


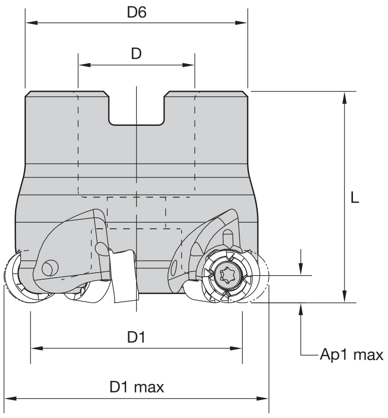


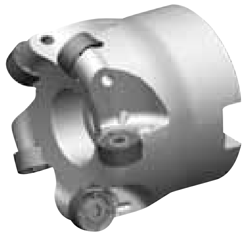
insert screw	Nm	Torx driver
191.848	2,0	**170.025**

Copy Mills

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



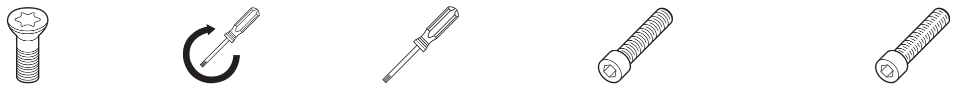




Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
5210305	**M200D40Z04RN10**	40	30	16	38	40	5,0	4	43200	Yes	0,23
5210306	**M200D40Z06RN10**	40	30	16	38	40	5,0	6	43200	Yes	0,24
5210307	**M200D50Z05RN10**	50	40	22	42	40	5,0	5	38600	Yes	0,32
5210308	**M200D50Z06RN10**	50	40	22	42	40	5,0	6	38600	Yes	0,32
5210309	**M200D52Z06RN10**	52	42	22	49	50	5,0	6	37900	Yes	0,52

Spare Parts



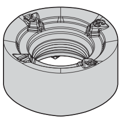
D1 max	insert screw	Nm	wrench	socket-head cap screw	socket-head cap screw with coolant groove
40	**191.848**	2,0	**170.025**	**MS1294**	**MS1294CG**
50	**191.848**	2,0	**170.025**	**MS1234**	**MS1234CG**
52	**191.848**	2,0	**170.025**	**MS1242**	**MS1242CG**

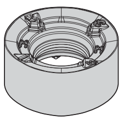
NOTE: Socket-head cap screw and socket-head cap screw with coolant groove must be ordered separately.

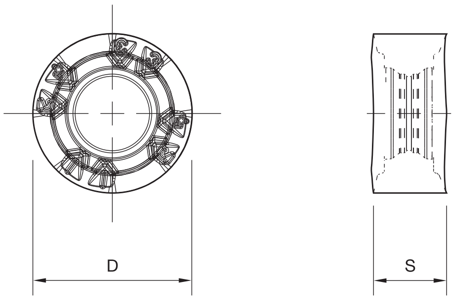
Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	ML	WP25PM	**MM**	**WP40PM**	MM	WP40PM
P3–P4	ML	WP25PM	**MM**	**WP25PM**	MH	WP40PM
P5–P6	ML	WP35CM	**MM**	**WP35CM**	MH	WP35CM
M1–M2	ML	WP25PM	**ML**	**WU35PM**	MM	WU35PM
M3	ML	WP25PM	**MM**	**WU35PM**	MM	WU35PM
K1–K2	MH	WK15CM	**MH**	**WK15CM**	MH	WP20CM
K3	MH	WK15CM	**MH**	**WK15CM**	MH	WP25PM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	ML	WS30PM	**MM**	**WS30PM**	MM	WU35PM
S3	ML	WS30PM	**MM**	**WU35PM**	MM	WU35PM
S4	ML	WS30PM	**MM**	**WU35PM**	MM	WU35PM
H1	MH	WP25PM	**MH**	**WP20CM**	–	–

iC10 • Inserts • RN.J10...


RNGJ-ML


RNGJ-MM



- -ML geometry is the first choice for stainless steel and high-temp alloys.
- -MM geometry is for general purpose, especially for steel.

● first choice
○ alternate choice

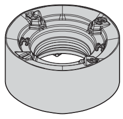
	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
P		●	●		●	●	●
M		○	●	○	●	○	●
K	●	○	○			○	
N							
S			●	●	●		○
H		○	○				

RNGJ-ML

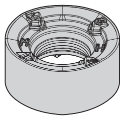
catalogue number	number of indexes	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ10T3M0EML	8	10,00	4,76	-	-	5274456	5520352	5274457	5274455	-

RNGJ-MM

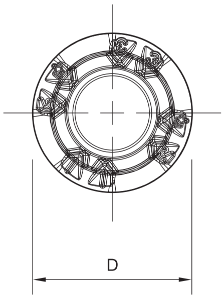
catalogue number	number of indexes	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ10T3M0SMM	8	10,00	4,76	-	-	5274511	5520353	5274512	-	-

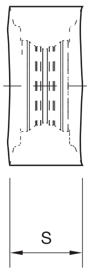


RNGJ-MM



RNPJ-MH





- -MM geometry is for general purpose, especially for steel.
- -MH geometry is the first choice for heavy applications, cast iron, and high-strength steel.

● first choice
○ alternate choice

	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
P		●	●		●	●	●
M		○	●	○	●	○	●
K	●	○	○			○	
N							
S			●	●	●		○
H		○	○				

■ RNPJ-MM

catalogue number	number of indexes	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ10T3M0SMM	8	10,00	4,76	-	5276198	5276197	-	-	5276196	5542327

■ RNPJ-MH

catalogue number	number of indexes	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ10T3M0SMH	8	10,00	4,76	5276243	5276241	5276240	-	5476633	5276199	5542328

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP20CM			WP25PM			WS30PM		
P	1	–	**–**	–	660	**580**	540	395	**340**	325	–	**–**	–
	2	–	**–**	–	410	**370**	330	330	**290**	240	–	**–**	–
	3	–	**–**	–	370	**330**	305	305	**260**	210	–	**–**	–
	4	–	**–**	–	275	**260**	230	270	**220**	180	–	**–**	–
	5	–	**–**	–	330	**300**	275	220	**205**	180	–	**–**	–
	6	–	**–**	–	230	**205**	175	200	**150**	120	–	**–**	–
M	1	–	**–**	–	270	**240**	210	245	**215**	200	270	**240**	220
	2	–	**–**	–	245	**210**	190	220	**190**	155	245	**215**	175
	3	–	**–**	–	190	**175**	150	170	**145**	115	185	**160**	125
K	1	505	**460**	410	430	**390**	355	275	**245**	220	–	**–**	–
	2	400	**355**	330	340	**305**	280	215	**190**	180	–	**–**	–
	3	335	**300**	275	290	**260**	240	180	**160**	145	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**40**	30	55	**50**	35
	2	–	**–**	–	–	**–**	–	50	**40**	30	55	**50**	35
	3	–	**–**	–	–	**–**	–	60	**50**	30	65	**55**	35
	4	–	**–**	–	–	**–**	–	85	**60**	40	100	**70**	50
H	1	–	**–**	–	170	**140**	115	145	**110**	85	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

Material Group		WU35PM			WP35CM			WP40PM		
P	1	310	**275**	260	545	**475**	445	355	**310**	295
	2	265	**230**	190	335	**305**	275	300	**260**	215
	3	240	**205**	170	305	**275**	245	275	**235**	190
	4	215	**180**	145	230	**210**	190	245	**205**	160
	5	180	**160**	145	310	**275**	250	205	**185**	160
	6	155	**120**	95	190	**160**	130	180	**140**	110
M	1	205	**180**	160	245	**220**	185	235	**205**	185
	2	185	**155**	130	220	**190**	170	210	**180**	150
	3	140	**120**	95	175	**155**	140	155	**140**	110
K	1	–	**–**	–	355	**320**	290	–	**–**	–
	2	–	**–**	–	280	**250**	230	–	**–**	–
	3	–	**–**	–	235	**210**	190	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	40	**35**	30	–	**–**	–	50	**40**	35
	2	40	**35**	30	–	**–**	–	50	**40**	35
	3	55	**40**	30	–	**–**	–	60	**50**	35
	4	70	**55**	35	80	**60**	40	80	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

NOTE: FIRST choice starting speeds are in ***bold*** *type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,13	**0,44**	0,80	0,10	**0,32**	0,57	0,07	**0,24**	0,43	0,06	**0,21**	0,37	0,06	**0,19**	0,34	ML
MM	0,28	**0,50**	0,91	0,20	**0,36**	0,66	0,15	**0,27**	0,49	0,13	**0,24**	0,43	0,12	**0,22**	0,39	MM
MH	0,46	**0,58**	0,96	0,33	**0,42**	0,69	0,25	**0,31**	0,51	0,22	**0,27**	0,45	0,20	**0,25**	0,41	MH

At 2,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,15	**0,51**	0,92	0,11	**0,37**	0,66	0,08	**0,27**	0,49	0,07	**0,24**	0,43	0,07	**0,22**	0,39	ML
MM	0,32	**0,58**	1,06	0,23	**0,42**	0,76	0,18	**0,31**	0,57	0,15	**0,27**	0,49	0,14	**0,25**	0,45	MM
MH	0,54	**0,67**	1,11	0,39	**0,48**	0,80	0,29	**0,36**	0,59	0,25	**0,32**	0,52	0,23	**0,29**	0,47	MH

At 1,25 Axial Depth of Cut (ap)

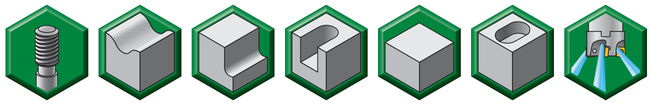
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,20	**0,67**	1,21	0,14	**0,48**	0,87	0,11	**0,36**	0,65	0,09	**0,31**	0,56	0,09	**0,29**	0,52	ML
MM	0,43	**0,77**	1,39	0,31	**0,55**	1,00	0,23	**0,41**	0,74	0,20	**0,36**	0,65	0,18	**0,33**	0,59	MM
MH	0,70	**0,88**	1,46	0,51	**0,63**	1,04	0,38	**0,47**	0,78	0,33	**0,41**	0,68	0,30	**0,38**	0,62	MH

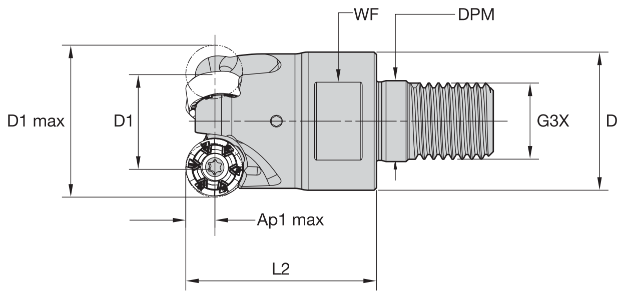
At 0,63 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,27	**0,92**	1,67	0,20	**0,66**	1,19	0,15	**0,49**	0,89	0,13	**0,43**	0,77	0,12	**0,39**	0,71	ML
MM	0,58	**1,05**	1,92	0,42	**0,75**	1,37	0,31	**0,56**	1,02	0,27	**0,49**	0,88	0,25	**0,45**	0,81	MM
MH	0,96	**1,21**	2,02	0,69	**0,87**	1,43	0,52	**0,65**	1,06	0,45	**0,56**	0,93	0,41	**0,52**	0,85	MH

NOTE: Use “Light Machining” value as starting feed rate.

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.

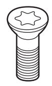


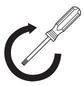


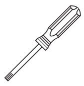
Screw-On End Mills

order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max RPM	coolant supply	kg
4147560	**M200D32Z03M16RN12**	32	20	29	17,0	M16	40	24	3,0	3	39160	Yes	0,18
4147561	**M200D35Z03M16RN12**	35	23	29	17,0	M16	40	24	3,0	3	37440	Yes	0,19
4147562	**M200D42Z04M16RN12**	42	30	29	17,0	M16	40	24	3,0	4	34180	Yes	0,24

Spare Parts

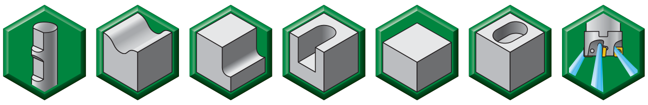


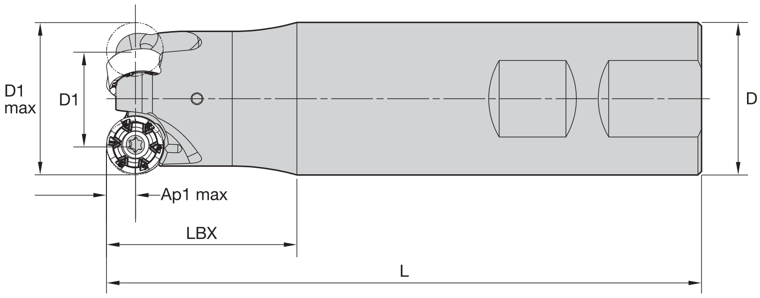


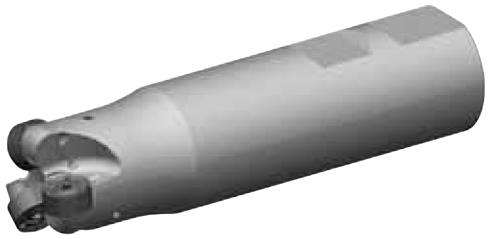


D1 max	insert screw	Nm	Torx driver
32	**193.492**	4,0	**170.025**
35	**193.492**	4,0	**170.025**
42	**193.492**	4,0	**170.025**

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.







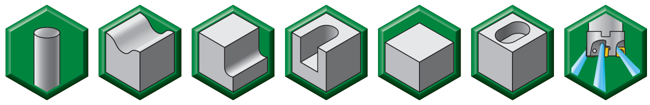
Weldon Shanks

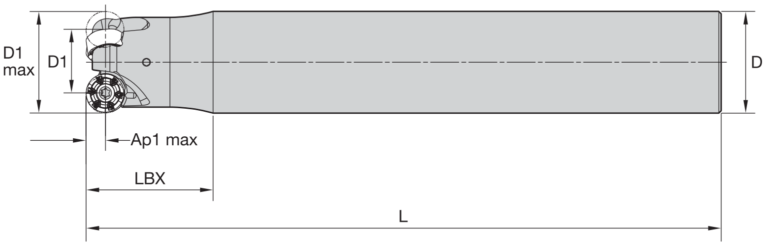
order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4147564	**M200D32Z03B32RN12**	32	20	32	125	40	3,0	3	39160	Yes	0,65

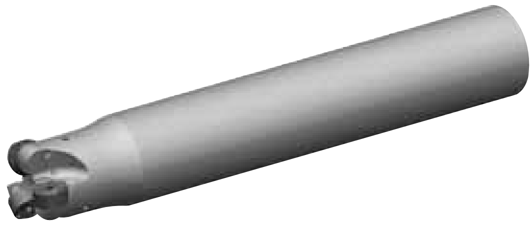
Spare Parts

D1 max	insert screw	Nm	Torx driver
32	**193.492**	4,0	**170.025**

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



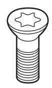
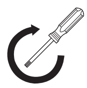
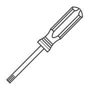




Cylindrical End Mills

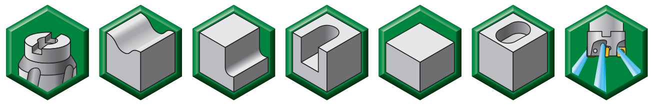
order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4147566	M200D32Z03A32RN12L200	32	20	32	200	40	3,0	3	39160	Yes	1,10
4147567	M200D32Z02A32RN12L250	32	20	32	250	40	3,0	2	39160	Yes	1,41

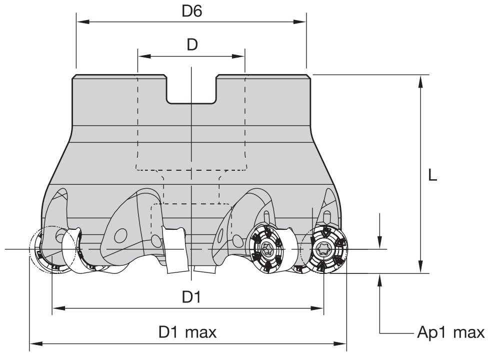
Spare Parts

D1 max	insert screw	Nm	Torx driver
32	**193.492**	4,0	**170.025**

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.

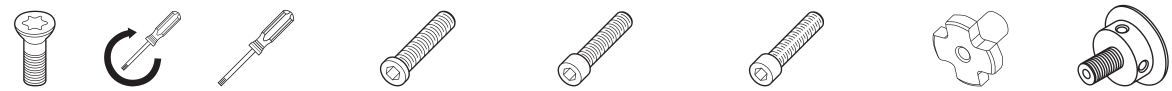




Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
4147568	M200D40Z04RN12	40	28	16	38	40	3,0	4	35020	Yes	0,22
4147569	M200D50Z04RN12	50	38	22	42	40	3,0	4	31330	Yes	0,30
4147570	M200D50Z05RN12	50	38	22	42	40	3,0	5	31330	Yes	0,29
4147571	M200D52Z05RN12	52	40	22	49	50	3,0	5	30720	Yes	0,49
4147572	M200D63Z05RN12	63	51	22	49	50	3,0	5	27910	Yes	0,63
4147573	M200D63Z07RN12	63	51	22	49	50	3,0	7	27910	Yes	0,63
4147574	M200D66Z07RN12	66	54	27	60	50	3,0	7	27260	Yes	0,82
4147575	M200D80Z06RN12	80	68	27	60	50	3,0	6	24760	Yes	1,02
4147576	M200D80Z08RN12	80	68	27	60	50	3,0	8	24760	Yes	1,02
4147577	M200D100Z07RN12	100	88	32	78	50	3,0	7	22150	Yes	1,45
4147578	M200D100Z09RN12	100	88	32	78	50	3,0	9	22150	Yes	1,41

Spare Parts



D1 max	insert screw	Nm	wrench	low-head cap screw	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw	coolant lock screw assembly
40	193.492	4,0	170.025	–	MS1294	MS1294CG	–	–
50	193.492	4,0	170.025	MS1336	–	MS2072CG	–	–
52	193.492	4,0	170.025	–	MS1242	MS1242CG	–	–
63	193.492	4,0	170.025	–	MS1242	MS1242CG	–	–
66	193.492	4,0	170.025	–	MS2038	MS2038CG	–	–
80	193.492	4,0	170.025	–	MS2038	MS2038CG	–	–
100	193.492	4,0	170.025	–	–	–	KLS32M	MS2195C

NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	ML	WP25PM	**MM**	**WP40PM**	MM	WP40PM
P3–P4	ML	WP25PM	**MM**	**WP25PM**	MH	WP40PM
P5–P6	ML	WP35CM	**MM**	**WP35CM**	MH	WP35CM
M1–M2	ML	WP25PM	**ML**	**WU35PM**	MM	WU35PM
M3	ML	WP25PM	**MM**	**WU35PM**	MM	WU35PM
K1–K2	MH	WK15CM	**MH**	**WK15CM**	MH	WP20CM
K3	MH	WK15PM	**MH**	**WK15PM**	MH	WP25PM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	ML	WS30PM	**MM**	**WS30PM**	MM	WU35PM
S3	ML	WS30PM	**MM**	**WU35PM**	MM	WU35PM
S4	ML	WS30PM	**MM**	**WU35PM**	MM	WU35PM
H1	MH	WP25PM	**MH**	**WP20CM**	–	–

Copy Mills

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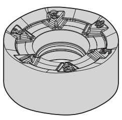
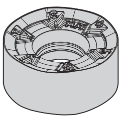
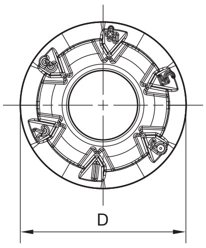
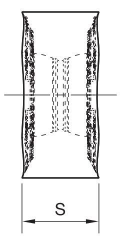

RNGJ-ML


RNGJ-MM





- -ML geometry is the first choice for stainless steel and high-temp alloys.
- -MM geometry is for general purpose, especially for steel.

● first choice
○ alternate choice

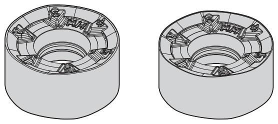
	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
P			●	●		●	●	●
M			○	●	○	●	○	●
K	●	●	○	○			○	
N								
S				●	●	●		○
H			○	○				

RNGJ-ML

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ1204M0EML	12	12,00	4,75	–	–	–	5123863	5520350	5123864	5123865	–

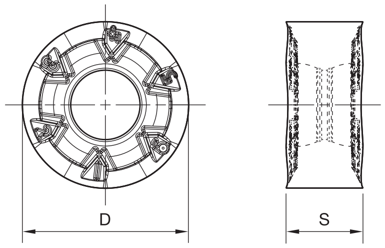
RNGJ-MM

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ1204M0SMM	12	12,00	4,75	5123866	–	–	5123867	5520351	5123868	5123869	–



RNGJ-MH
RNPJ-MH

RNPJ-MM



- -MM geometry is for general purpose, especially for steel.
- -MH geometry is the first choice for heavy applications, cast iron, and high-strength steel.

● first choice
○ alternate choice

	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
P			●	●		●	●	●
M			○	●	○	●	○	●
K	●	●	○	○			○	
N								
S				●	●	●		○
H			○	○				

RNGJ-MH

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ1204M0SMH	12	12,00	4,75	5123900	-	-	5123901	-	5123902	5123903	-

RNPJ-MM

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ1204M0SMM	12	12,00	4,75	-	-	5276362	5276361	-	5476634	5276360	5542329

RNPJ-MH

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ1204M0SMH	12	12,00	4,75	-	5276366	5276365	5276364	-	5476635	5276363	5542340

Recommended Starting Speeds [m/min]

Material Group		WK15PM			WK15CM			WP20CM			WP25PM		
P	1	–	**–**	–	–	**–**	–	660	**580**	540	395	**340**	325
	2	–	**–**	–	–	**–**	–	410	**370**	330	330	**290**	240
	3	–	**–**	–	–	**–**	–	370	**330**	305	305	**260**	210
	4	–	**–**	–	–	**–**	–	275	**260**	230	270	**220**	180
	5	–	**–**	–	–	**–**	–	330	**300**	275	220	**205**	180
	6	–	**–**	–	–	**–**	–	230	**205**	175	200	**150**	120
M	1	–	**–**	–	–	**–**	–	270	**240**	210	245	**215**	200
	2	–	**–**	–	–	**–**	–	245	**210**	190	220	**190**	155
	3	–	**–**	–	–	**–**	–	190	**175**	150	170	**145**	115
K	1	325	**295**	260	505	**460**	410	430	**390**	355	275	**245**	220
	2	250	**230**	210	400	**355**	330	340	**305**	280	215	**190**	180
	3	210	**190**	175	335	**300**	275	290	**260**	240	180	**160**	145
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–	50	**40**	30
	2	–	**–**	–	–	**–**	–	–	**–**	–	50	**40**	30
	3	–	**–**	–	–	**–**	–	–	**–**	–	60	**50**	30
	4	–	**–**	–	–	**–**	–	–	**–**	–	85	**60**	40
H	1	–	**–**	–	–	**–**	–	170	**140**	115	145	**110**	85
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

Material Group		WS30PM			WU35PM			WP35CM			WP40PM		
P	1	–	**–**	–	310	**275**	260	545	**475**	445	355	**310**	295
	2	–	**–**	–	265	**230**	190	335	**305**	275	300	**260**	215
	3	–	**–**	–	240	**205**	170	305	**275**	245	275	**235**	190
	4	–	**–**	–	215	**180**	145	230	**210**	190	245	**205**	160
	5	–	**–**	–	180	**160**	145	310	**275**	250	205	**185**	160
	6	–	**–**	–	155	**120**	95	190	**160**	130	180	**140**	110
M	1	270	**240**	220	205	**180**	160	245	**220**	185	235	**205**	185
	2	245	**215**	175	185	**155**	130	220	**190**	170	210	**180**	150
	3	185	**160**	125	140	**120**	95	175	**155**	140	155	**140**	110
K	1	–	**–**	–	–	**–**	–	355	**320**	290	–	**–**	–
	2	–	**–**	–	–	**–**	–	280	**250**	230	–	**–**	–
	3	–	**–**	–	–	**–**	–	235	**210**	190	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	55	**50**	35	40	**35**	30	–	**–**	–	50	**40**	35
	2	55	**50**	35	40	**35**	30	–	**–**	–	50	**40**	35
	3	65	**55**	35	55	**40**	30	–	**–**	–	60	**50**	35
	4	100	**70**	50	70	**55**	35	80	**60**	40	80	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 6,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,12	**0,18**	0,32	0,09	**0,13**	0,23	0,07	**0,10**	0,18	0,06	**0,08**	0,15	0,05	**0,08**	0,14	ML
MM	0,28	**0,51**	0,84	0,21	**0,37**	0,61	0,15	**0,28**	0,45	0,13	**0,24**	0,39	0,12	**0,22**	0,36	MM
MH	0,46	**0,70**	1,02	0,33	**0,50**	0,73	0,25	**0,38**	0,55	0,22	**0,33**	0,48	0,20	**0,30**	0,44	MH

At 3,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,14	**0,20**	0,37	0,10	**0,15**	0,27	0,08	**0,11**	0,20	0,07	**0,10**	0,18	0,06	**0,09**	0,16	ML
MM	0,33	**0,59**	0,97	0,24	**0,43**	0,70	0,18	**0,32**	0,52	0,16	**0,28**	0,45	0,14	**0,25**	0,42	MM
MH	0,54	**0,81**	1,18	0,39	**0,58**	0,85	0,29	**0,43**	0,63	0,25	**0,38**	0,55	0,23	**0,35**	0,51	MH

At 1,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,18	**0,27**	0,49	0,13	**0,19**	0,35	0,10	**0,15**	0,26	0,09	**0,13**	0,23	0,08	**0,12**	0,21	ML
MM	0,43	**0,77**	1,28	0,31	**0,56**	0,92	0,23	**0,42**	0,68	0,20	**0,36**	0,60	0,19	**0,33**	0,55	MM
MH	0,70	**1,06**	1,56	0,51	**0,76**	1,12	0,38	**0,57**	0,83	0,33	**0,50**	0,72	0,30	**0,45**	0,66	MH

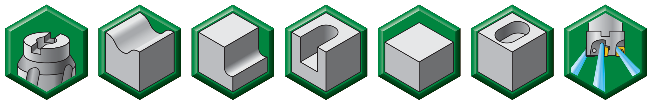
At 0,75 Axial Depth of Cut (ap)

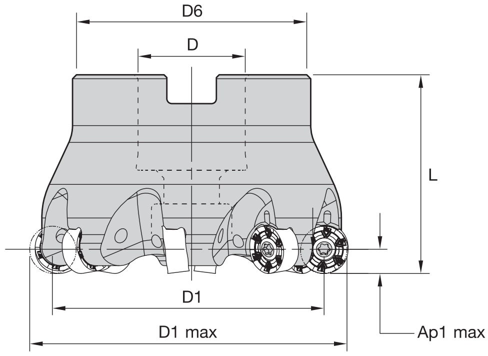
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,25	**0,37**	0,67	0,18	**0,27**	0,48	0,14	**0,20**	0,36	0,12	**0,17**	0,32	0,11	**0,16**	0,29	ML
MM	0,59	**1,06**	1,77	0,43	**0,76**	1,26	0,32	**0,57**	0,94	0,28	**0,50**	0,81	0,25	**0,45**	0,75	MM
MH	0,96	**1,46**	2,16	0,69	**1,04**	1,53	0,52	**0,78**	1,14	0,45	**0,68**	0,99	0,41	**0,62**	0,90	MH

NOTE: Use "Light Machining" value as starting feed rate.

WIDIA

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.





Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
5209989	**M200D50Z04RN16**	50	34	22	42	50	4,0	4	26700	Yes	0,36
5210210	**M200D52Z04RN16**	52	36	22	42	50	4,0	4	26000	Yes	0,39
5210212	**M200D63Z06RN16**	63	47	22	49	50	4,0	6	22700	Yes	0,56
5210211	**M200D63Z04RN16**	63	47	22	49	50	4,0	4	22700	Yes	0,58
5210213	**M200D66Z05RN16**	66	50	27	60	50	4,0	5	22000	Yes	0,69
5210214	**M200D80Z05RN16**	80	64	27	60	50	4,0	5	19500	Yes	0,88
5210215	**M200D80Z07RN16**	80	64	27	60	50	4,0	7	19500	Yes	0,89
5210216	**M200D100Z06RN16**	100	84	32	78	50	4,0	6	17000	Yes	1,36
5210217	**M200D100Z08RN16**	100	84	32	78	50	4,0	8	17000	Yes	1,37
5210218	**M200D125Z08RN16**	125	109	40	90	63	4,0	8	14900	Yes	2,50

Spare Parts

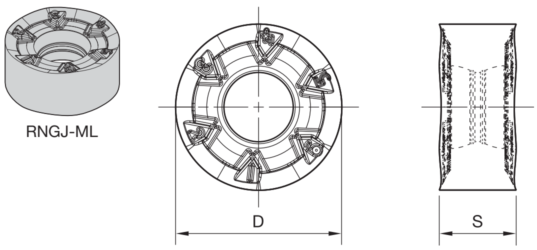
D1 max	insert screw	Nm	wrench	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw	coolant lock screw assembly
50	**192.932**	4,0	**170.026**	**MS1242**	**MS1242CG**	–	–
52	**MS2260**	4,0	**170.026**	**MS1242**	**MS1242CG**	–	–
63	**MS2260**	4,0	**170.026**	**MS1242**	**MS1242CG**	–	–
63	**193.343**	4,0	**170.026**	**MS1242**	**MS1242CG**	–	–
66	**MS2260**	4,0	**170.026**	**MS2038**	**MS2038CG**	–	–
80	**MS2260**	4,0	**170.026**	**MS2038**	**MS2038CG**	–	–
100	**MS2260**	4,0	**170.026**	–	–	**KLS32M**	**MS2195C**
125	**MS2260**	4,0	**170.026**	–	–	**KLS40M**	**MS2187C**

NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	ML	WP25PM	**MM**	**WP40PM**	MM	WP40PM
P3–P4	ML	WP25PM	**MM**	**WP25PM**	MH	WP40PM
P5–P6	ML	WP35CM	**MM**	**WP35CM**	MH	WP35CM
M1–M2	ML	WP25PM	**ML**	**WU35PM**	MM	WU35PM
M3	ML	WP25PM	**MM**	**WU35PM**	MM	WU35PM
K1–K2	MH	WK15CM	**MH**	**WK15CM**	MH	WP20CM
K3	MH	WK15CM	**MH**	**WP20CM**	MH	WP35CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	ML	WS30PM	**ML**	**WS30PM**	ML	WU35PM
S3	ML	WS30PM	**ML**	**WU35PM**	ML	WU35PM
S4	ML	WS30PM	**ML**	**WU35PM**	ML	WU35PM
H1	MH	WP25PM	**MH**	**WP20CM**	–	–

Copy Mills



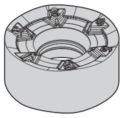
- -ML geometry is the first choice for stainless steel and high-temp alloys.

● first choice
○ alternate choice

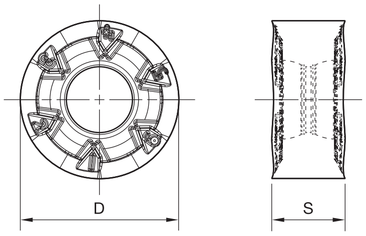
		WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
P			●	●		●	●	●
M			○	●	○	●	○	●
K		●	○	○			○	
N								
S				●	●	●		○
H			○	○				

RNGJ-ML

catalogue number	cutting edges	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ1605M0EML	12	16,00	6,35	–	–	5274561	5520354	5274562	5274560	–



RNPJ-MM
RNPJ-MH



- -MM geometry is for general purpose, especially for steel.
- -MH geometry is the first choice for heavy applications, cast iron, and high-strength steels.

● first choice
○ alternate choice

	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
P		●	●		●	●	●
M		○	●	○	●	○	●
K	●	○	○			○	
N							
S			●	●	●		○
H		○	○				

RNPJ-MM

catalogue number	cutting edges	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ1605M0SMM	12	16,00	6,35	-	5276472	5276471	-	5476637	5276470	5542341

RNPJ-MH

catalogue number	cutting edges	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ1605M0SMH	12	16,00	6,35	5276476	5276475	5276474	-	5476636	5276473	5542342

Recommended Starting Speeds

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP20CM			WP25PM			WS30PM		
P	1	–	**–**	–	660	**580**	540	395	**340**	325	–	**–**	–
	2	–	**–**	–	410	**370**	330	330	**290**	240	–	**–**	–
	3	–	**–**	–	370	**330**	305	305	**260**	210	–	**–**	–
	4	–	**–**	–	275	**260**	230	270	**220**	180	–	**–**	–
	5	–	**–**	–	330	**300**	275	220	**205**	180	–	**–**	–
	6	–	**–**	–	230	**205**	175	200	**150**	120	–	**–**	–
M	1	–	**–**	–	270	**240**	210	245	**215**	200	270	**240**	220
	2	–	**–**	–	245	**210**	190	220	**190**	155	245	**215**	175
	3	–	**–**	–	190	**175**	150	170	**145**	115	185	**160**	125
K	1	505	**460**	410	430	**390**	355	275	**245**	220	–	**–**	–
	2	400	**355**	330	340	**305**	280	215	**190**	180	–	**–**	–
	3	335	**300**	275	290	**260**	240	180	**160**	145	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**40**	30	55	**50**	35
	2	–	**–**	–	–	**–**	–	50	**40**	30	55	**50**	35
	3	–	**–**	–	–	**–**	–	60	**50**	30	65	**55**	35
	4	–	**–**	–	–	**–**	–	85	**60**	40	100	**70**	50
H	1	–	**–**	–	170	**140**	115	145	**110**	85	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

(Recommended Starting Speeds [m/min] — continued)

Material Group		WU35PM			WP35CM			WP40PM		
P	1	310	**275**	260	545	**475**	445	355	**310**	295
	2	265	**230**	190	335	**305**	275	300	**260**	215
	3	240	**205**	170	305	**275**	245	275	**235**	190
	4	215	**180**	145	230	**210**	190	245	**205**	160
	5	180	**160**	145	310	**275**	250	205	**185**	160
	6	155	**120**	95	190	**160**	130	180	**140**	110
M	1	205	**180**	160	245	**220**	185	235	**205**	185
	2	185	**155**	130	220	**190**	170	210	**180**	150
	3	140	**120**	95	175	**155**	140	155	**140**	110
K	1	–	**–**	–	355	**320**	290	–	**–**	–
	2	–	**–**	–	280	**250**	230	–	**–**	–
	3	–	**–**	–	235	**210**	190	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	40	**35**	30	–	**–**	–	50	**40**	35
	2	40	**35**	30	–	**–**	–	50	**40**	35
	3	55	**40**	30	–	**–**	–	60	**50**	35
	4	70	**55**	35	80	**60**	40	80	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Light Machining	General Purpose	Heavy Machining

■ Recommended Starting Feeds [mm]

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,12	**0,37**	0,48	0,09	**0,27**	0,35	0,07	**0,20**	0,26	0,06	**0,17**	0,23	0,05	**0,16**	0,21	ML
MM	0,28	**0,70**	0,81	0,21	**0,50**	0,58	0,15	**0,38**	0,44	0,13	**0,33**	0,38	0,12	**0,30**	0,35	MM
MH	0,53	**0,70**	1,17	0,38	**0,50**	0,84	0,29	**0,38**	0,63	0,25	**0,33**	0,55	0,23	**0,30**	0,50	MH

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,14	**0,43**	0,56	0,10	**0,31**	0,40	0,08	**0,23**	0,30	0,07	**0,20**	0,26	0,06	**0,18**	0,24	ML
MM	0,33	**0,81**	0,94	0,24	**0,58**	0,67	0,18	**0,43**	0,50	0,16	**0,38**	0,44	0,14	**0,35**	0,40	MM
MH	0,62	**0,81**	1,36	0,44	**0,58**	0,97	0,33	**0,43**	0,72	0,29	**0,38**	0,63	0,27	**0,35**	0,58	MH

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,19	**0,56**	0,73	0,14	**0,40**	0,53	0,10	**0,30**	0,40	0,09	**0,26**	0,34	0,08	**0,24**	0,32	ML
MM	0,43	**1,06**	1,24	0,31	**0,76**	0,89	0,23	**0,57**	0,66	0,20	**0,50**	0,57	0,19	**0,45**	0,53	MM
MH	0,81	**1,06**	1,79	0,58	**0,76**	1,28	0,44	**0,57**	0,95	0,38	**0,50**	0,83	0,35	**0,45**	0,76	MH

At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,26	**0,77**	1,01	0,19	**0,55**	0,73	0,14	**0,41**	0,54	0,12	**0,36**	0,47	0,11	**0,33**	0,43	ML
MM	0,59	**1,46**	1,70	0,43	**1,04**	1,21	0,32	**0,78**	0,90	0,28	**0,68**	0,79	0,25	**0,62**	0,72	MM
MH	1,11	**1,46**	2,48	0,80	**1,04**	1,75	0,60	**0,78**	1,30	0,52	**0,68**	1,13	0,48	**0,62**	1,03	MH

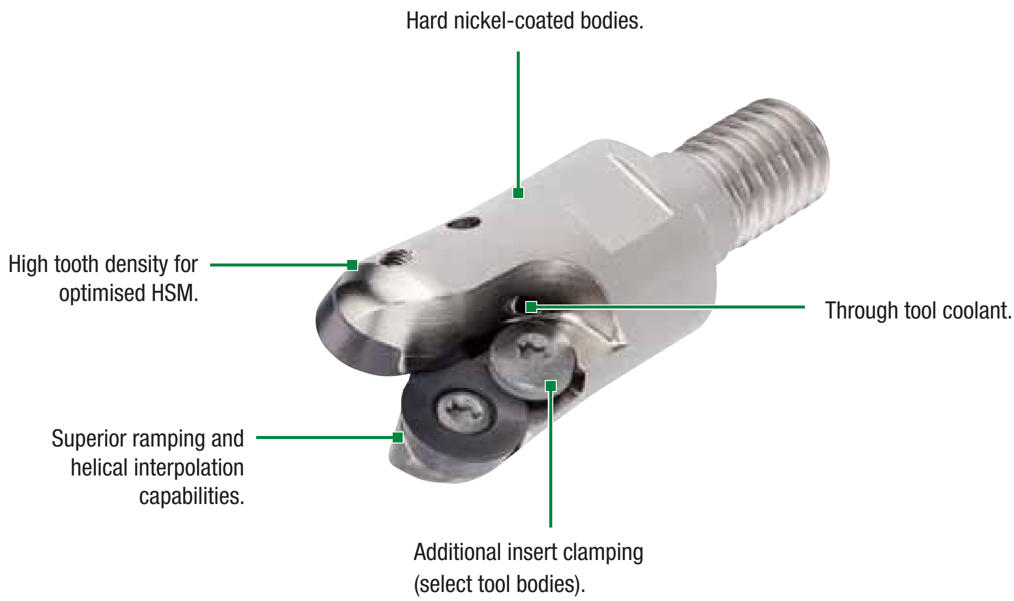
NOTE: Use “Light Machining” value as starting feed rate.

Ideal for Die and Mould Applications •
M170™ Series

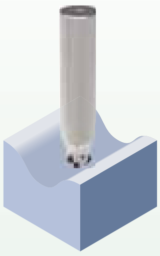
M170

Specially engineered with industry standard insert sizes, the M170 Series offers the highest performance rates for best-in-class cost efficiency, high-strength steel, and hard machining capability, and a strong, solid cutter body designed for maximum performance.

- Nickel-coated cutter bodies ensure improved tool life and chip flow.
- Screw-on end mills and shell mills.
- High tooth density for optimised HSM.
- High-accuracy PSTS inserts are ideal for die and mould manufacturing.



Copy Mills



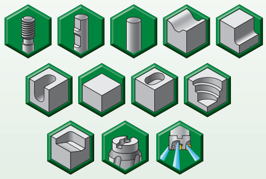
M170™

Max depth of cut: 8mm

Diameter: 12–125mm

Pages: M42–M70

P
M
K
S
H



Insert Offering

iC07

7mm iC insert RD.X
Up to 3,5mm Ap max.
Diameter range
12–35mm

iC10

10mm iC insert RDPX
Up to 5mm Ap max.
Diameter range
20–52mm

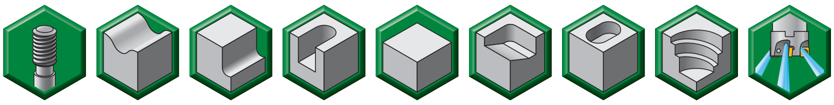
iC12

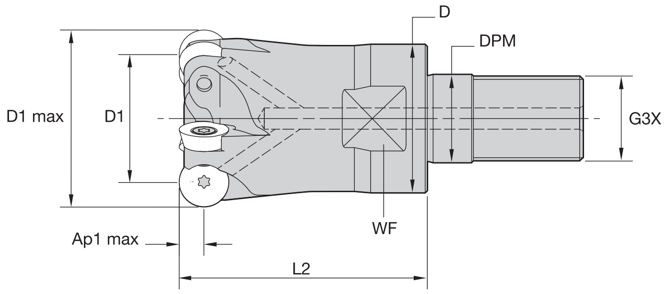
12mm iC insert RDPX
Up to 6mm Ap max.
Diameter range
24–100mm

iC16

16mm iC insert RDPX
Up to 8mm Ap max.
Diameter range
32–125mm

- Longer cutter tool life.
- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.

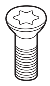


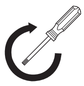


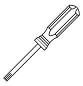
Screw-On End Mills

order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3935336	**M170D012Z02M06RD07T**	12	5	10	6,5	M6	18	7	3,5	2	22.0°	26200	Yes	0,02
3935337	**M170D012Z02M08RD07T**	12	5	13	8,5	M8	23	10	3,5	2	22.0°	26200	Yes	0,02
3935338	**M170D015Z03M08RD07T**	15	8	13	8,5	M8	18	10	3,5	3	11.0°	21200	Yes	0,02

Spare Parts



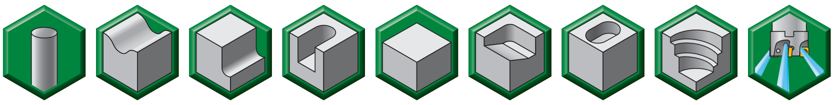


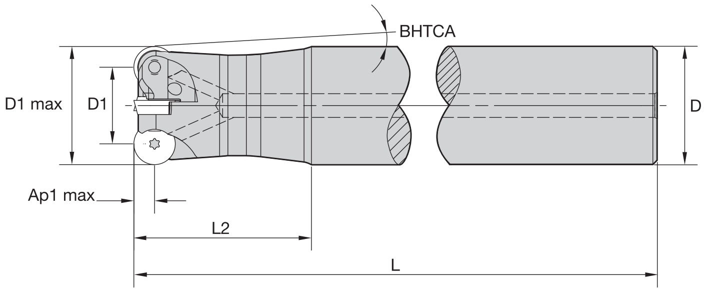


D1 max	insert screw	Nm	Torx driver
12	**193.364**	1,0	**12147549000**
15	**193.364**	1,0	**12147549000**

NOTE: All spare parts except the insert screws must be ordered separately.

- Longer cutter tool life.
- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.

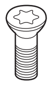


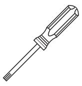


Cylindrical Shanks

order number	catalogue number	D1 max	D1	D	L	L2	BHTCA	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3935339	M170D012Z02A12RD07TL100	12	5	12	100	20	—	3,5	2	22.0°	26200	Yes	0,07
3935340	M170D012Z02A16RD07TL120	12	5	16	120	60	2.0°	3,5	2	22.0°	26200	Yes	0,14
3935341	M170D012Z02A16RD07TL140	12	5	16	140	80	1.5°	3,5	2	22.0°	26200	Yes	0,16
3935342	M170D015Z03A16RD07TL130	15	8	16	130	60	0.5°	3,5	3	11.0°	21200	Yes	0,13

Spare Parts





D1 max	insert screw	Nm	Torx driver
12	**193.364**	1,0	**12147549000**
15	**193.364**	1,0	**12147549000**

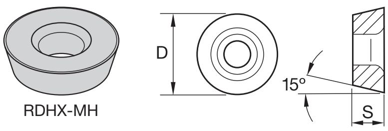
NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	–	–	–	–	–	–
P3–P4	MH	TN2505	**MH**	**TN6525**	MH	TN6540
P5–P6	MH	TN2505	**MH**	**TN6525**	MH	TN6540
M1–M2	–	–	–	–	–	–
M3	–	–	–	–	–	–
K1–K2	MH	TN2505	**MH**	**TN2505**	MH	TN6525
K3	MH	TN2505	**MH**	**TN2505**	MH	TN6525
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	MH	TN2505	**MH**	**TN2505**	–	–

Copy Mills

iC07 • Inserts



• -MH geometry is suitable for high-strength steels, cast iron, and hard machining.

● first choice
○ alternate choice

RDHX-MH

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDHX07T1M0SNMH	7,00	1,98	0,08	3960578	3960573	3960532

	TN2505	TN6525	TN6540
P	○	●	●
M		○	●
K	●	○	○
N			
S			●
H	●		

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	**–**	–	235	**170**	145	180	**130**	110
	5	–	**–**	–	310	**235**	200	240	**180**	150
	6	–	**–**	–	205	**160**	130	160	**120**	100
M	1	–	**–**	–	190	**120**	80	130	**80**	60
	2	–	**–**	–	120	**80**	50	80	**50**	40
	3	–	**–**	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	–	**–**	–	–	**–**	–
	2	175	**140**	95	–	**–**	–	–	**–**	–
	3	140	**115**	80	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Copy Mills

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 3,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,23	**0,46**	0,74	0,17	**0,33**	0,54	0,13	**0,25**	0,40	0,11	**0,22**	0,35	0,10	**0,20**	0,32	MH

At 1,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,28	**0,56**	0,91	0,20	**0,41**	0,65	0,15	**0,31**	0,49	0,13	**0,27**	0,43	0,12	**0,24**	0,39	MH

At 0,75 Axial Depth of Cut (ap)

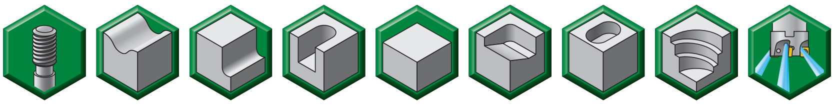
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,37	**0,75**	1,21	0,27	**0,54**	0,87	0,20	**0,40**	0,65	0,18	**0,35**	0,56	0,16	**0,32**	0,52	MH

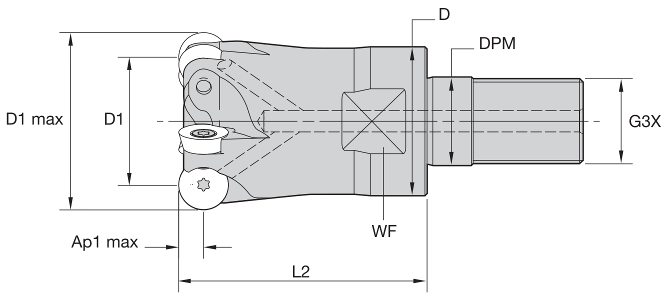
At 0,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,45	**0,91**	1,47	0,32	**0,65**	1,05	0,24	**0,49**	0,78	0,21	**0,42**	0,68	0,19	**0,39**	0,62	MH

NOTE: Use “Light Machining” value as starting feed rate.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.

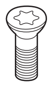
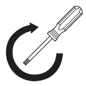
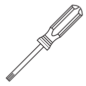




Screw-On End Mills

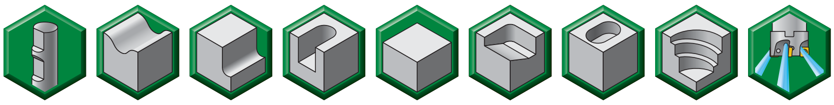
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3926607	**M170D015Z02M08RD07**	15	8	13	8,5	M8	23	10	3,5	2	18.0°	21200	Yes	0,03
3926608	**M170D016Z03M08RD07**	16	9	13	8,5	M8	23	10	3,5	3	9.0°	21200	Yes	0,03
3926609	**M170D020Z04M10RD07**	20	13	18	10,5	M10	30	14	3,5	4	12.5°	19600	Yes	0,06
3926610	**M170D025Z05M12RD07**	25	18	21	12,5	M12	35	19	3,5	5	8.5°	12700	Yes	0,10
3926611	**M170D030Z05M16RD07**	30	23	29	17,0	M16	43	22	3,5	5	6.5°	10600	Yes	0,20
3926612	**M170D035Z06M16RD07**	35	28	29	17,0	M16	43	22	3,5	6	4.8°	9900	Yes	0,23

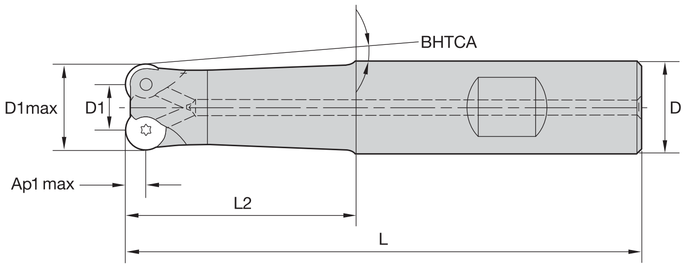
Spare Parts

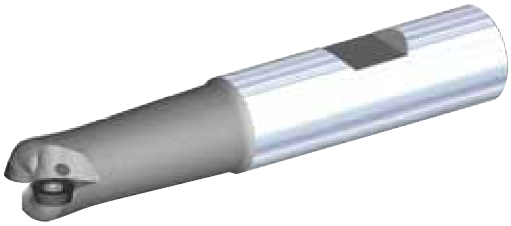
 insert screw	 Nm	 Torx
193.341	1,0	**12147549000**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.



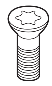


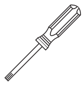


Weldon Shanks

order number	catalogue number	D1 max	D1	D	L	L2	BHTCA	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3929403	**M170D015Z02B16RD07**	15	8	16	90	40	1.0°	3,5	2	18.0°	21200	Yes	0,11

Spare Parts

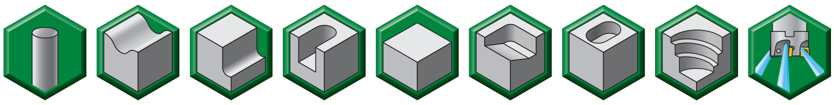


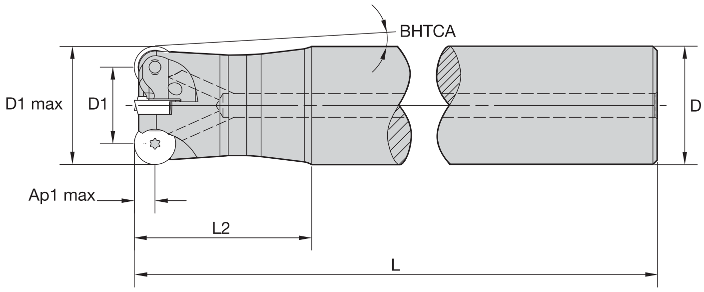


D1 max	insert screw	Nm	Torx driver
15	**193.341**	1,0	**12147549000**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.

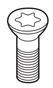
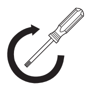
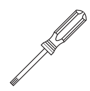




Cylindrical Shanks

order number	catalogue number	D1 max	D1	D	L	L2	BHTCA	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3929404	**M170D015Z02A16RD07L110**	15	8	16	110	60	0.5°	3,5	2	18.0°	21200	Yes	0,14
3929405	**M170D015Z02A16RD07L150**	15	8	16	150	60	0.5°	3,5	2	18.0°	21200	Yes	0,20
3929407	**M170D016Z02A16RD07L150**	16	9	16	150	30	—	3,5	2	9.0°	21200	Yes	0,21
3929406	**M170D016Z03A16RD07L110**	16	9	16	110	20	—	3,5	3	9.0°	21200	Yes	0,16
3929409	**M170D020Z03A20RD07L140**	20	13	20	140	40	—	3,5	3	12.0°	10600	Yes	0,29
3929408	**M170D020Z04A20RD07L115**	20	13	20	115	30	—	3,5	4	12.0°	10600	Yes	0,25

Spare Parts

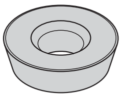
D1 max	 insert screw	 Nm	 Torx driver
15	**193.341**	1,0	**12147549000**
16	**193.341**	1,0	**12147549000**
20	**193.341**	1,0	**12147549000**

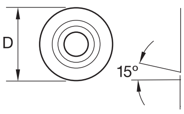
NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	–	–	–	–	–	–
P3–P4	MH	TN2505	**MH**	**TN6525**	MH	TN6540
P5–P6	MH	TN2505	**MH**	**TN6525**	MH	TN6540
M1–M2	–	–	–	–	–	–
M3	–	–	–	–	–	–
K1–K2	MH	TN2505	**MH**	**TN2505**	MH	TN6525
K3	MH	TN2505	**MH**	**TN2505**	MH	TN6525
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	MH	TN2505	**MH**	**TN2505**	–	–

iC07 • Inserts


RDPX-MH



- -MH geometry is suitable for high-strength steels, cast iron, and hard machining.

● first choice
○ alternate choice

	TN2505	TN6525	TN6540
P	○	●	●
M		○	●
K	●	○	○
N			
S			●
H	●		

RDPX-MH

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX0702M0SNMH	7,00	2,38	0,08	3959627	3959626	3959625

Copy Mills

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	–	–	235	**170**	145	180	**130**	110
	5	–	–	–	310	**235**	200	240	**180**	150
	6	–	–	–	205	**160**	130	160	**120**	100
M	1	–	–	–	190	**120**	80	130	**80**	60
	2	–	–	–	120	**80**	50	80	**50**	40
	3	–	–	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	50	**35**	30
	2	–	–	–	–	–	–	25	**20**	10
	3	–	–	–	–	–	–	70	**40**	30
	4	–	–	–	–	–	–	60	**30**	25
H	1	175	**140**	95	–	–	–	–	–	–
	2	175	**140**	95	–	–	–	–	–	–
	3	140	**115**	80	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 3,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,23	**0,46**	0,74	0,17	**0,33**	0,54	0,13	**0,25**	0,40	0,11	**0,22**	0,35	0,10	**0,20**	0,32	MH

At 1,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,28	**0,56**	0,91	0,20	**0,41**	0,65	0,15	**0,31**	0,49	0,13	**0,27**	0,43	0,12	**0,24**	0,39	MH

At 0,75 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,37	**0,75**	1,21	0,27	**0,54**	0,87	0,20	**0,40**	0,65	0,18	**0,35**	0,56	0,16	**0,32**	0,52	MH

At 0,50 Axial Depth of Cut (ap)

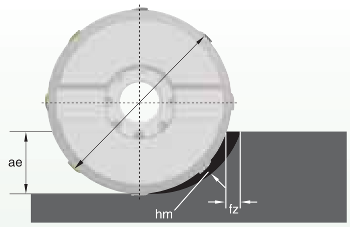
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,45	**0,91**	1,47	0,32	**0,65**	1,05	0,24	**0,49**	0,78	0,21	**0,42**	0,68	0,19	**0,39**	0,62	MH

NOTE: Use “Light Machining” value as starting feed rate.

Selecting the Correct Cutting Values

1. fz depends on the Ap1 and ae values

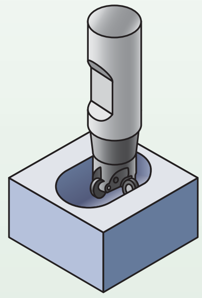
With round inserts, two factors can affect the hm: Ap1 and ae.
fz has to be adjusted accordingly.



Recommended Starting Feed Rate Values (fz) Related to the Ap1 and ae Values:

ae engagement	10%	20%	30%	40%	50%	100%
Ap1 = 0,5mm	0,59mm	0,42mm	0,34mm	0,30mm	0,26mm	0,19mm
Ap1 = 0,75mm	0,50mm	0,36mm	0,29mm	0,25mm	0,22mm	0,16mm
Ap1 = 1mm	0,42mm	0,30mm	0,24mm	0,21mm	0,19mm	0,13mm
Ap1 = 1,5mm	0,34mm	0,24mm	0,20mm	0,17mm	0,15mm	0,11mm
Ap1 = 3,5mm	0,22mm	0,16mm	0,13mm	0,11mm	0,10mm	0,08mm

Example application highlighted.



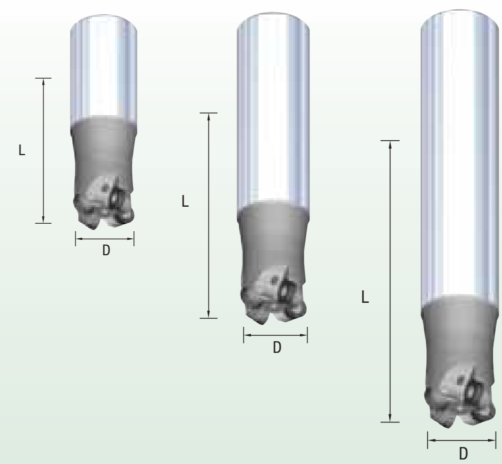
Example Cutting Conditions for RD..07... Insert in Pocketing, L/D ratio = 2 x D:

insert = RDPX0702M0SNMH		TN2505			TN6525			TN6540		
		feed per tooth fz (mm)/ae>50%								
		min	med	max	min	med	max	min	med	max
ae>50%	Recommended starting Ap1 = 0,5mm	0,19mm	0,22mm	0,30mm	0,19mm	0,30mm	0,35mm	0,19mm	0,30mm	0,40mm

2. Ap1 and vc corrections depend on L/D ratio

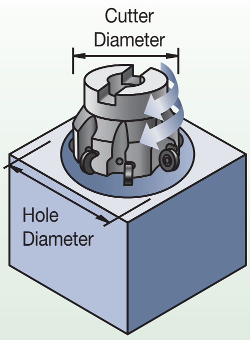
With increasing L/D ratios, or overhang, vibrations can occur due to reduced rigidity. To ensure successful application, it is recommended to adjust Ap1 and vc values according to the following table:

L/D ratio	% of Ap1 max to reduce	% of vc to reduce
<2	0%	0%
2<L/D<4	65–75%	10–15%
>4	80–95%	20–40%

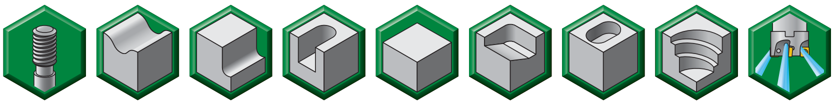


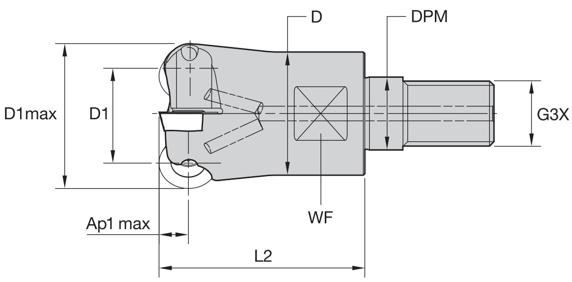
Recommended Cutting Conditions • Helical Interpolation from Solid

cutter diameter	min hole diameter	max hole diameter (flat bottom)	Ap1 max per revolution	max ramp angle	Ap1 max when plunging
12	17mm	17mm	3,5mm	22°	1mm
15	18mm	23mm	2,8mm	18°	2,2mm
16	20mm	25mm	1,9mm	9°	1,4mm
20	28mm	33mm	3,5mm	12°	1,5mm
25	36,5mm	43mm	3,5mm	8.5°	2,5mm
30	46,4mm	53mm	3,5mm	6.5°	2,5mm



- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.

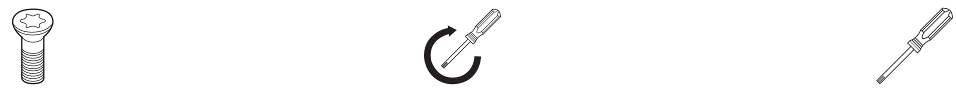




Screw-On End Mills

order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3934647	M170D020Z02M10RD10	20	10	18	10,5	M10	30	15	5,0	2	20.0°	15900	Yes	0,06
3934648	M170D025Z02M12RD10	25	15	21	12,5	M12	35	19	5,0	2	8.0°	12800	Yes	0,10
3934649	M170D025Z03M12RD10	25	15	21	12,5	M12	35	19	5,0	3	8.0°	12800	Yes	0,10
3934650	M170D030Z04M16RD10	30	20	29	17,0	M16	43	22	5,0	4	10.0°	10600	Yes	0,24
3934651	M170D035Z05M16RD10	35	25	29	17,0	M16	45	22	5,0	5	8.5°	9100	Yes	0,23
3934652	M170D042Z06M16RD10	42	32	29	17,0	M16	45	22	5,0	6	6.0°	7800	Yes	0,28

Spare Parts

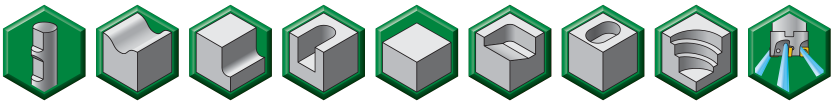


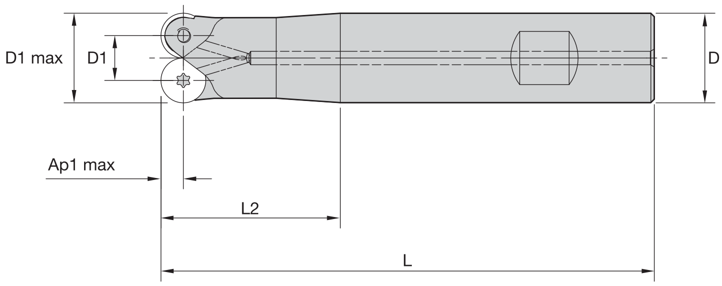
insert screw	Nm	Torx driver
193.342	3,5	12148082400

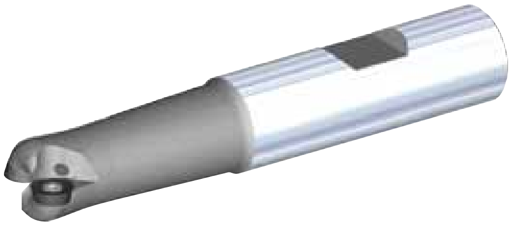
NOTE: All spare parts except the insert screws must be ordered separately.

Copy Mills

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Weldon Shanks

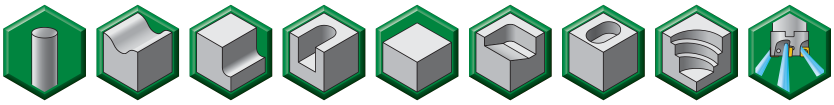
order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3940703	**M170D020Z02B20RD10**	20	10	20	110	40	5,0	2	20.0°	15900	Yes	0,24
3940708	**M170D025Z03B25RD10**	25	15	25	110	40	5,0	3	9.0°	12900	Yes	0,35

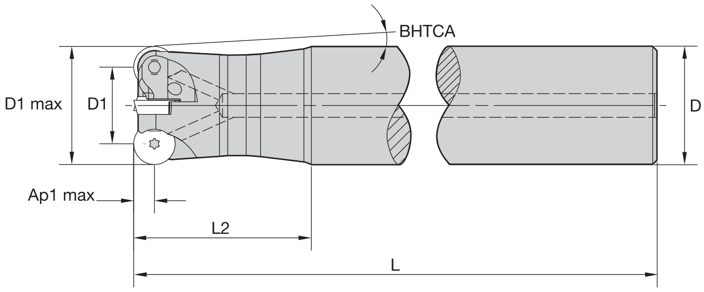
Spare Parts

D1 max	insert screw	Nm	Torx driver
20	**193.342**	3,5	**12148082400**
25	**193.342**	3,5	**12148082400**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.

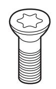


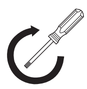


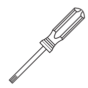
Cylindrical Shanks

order number	catalogue number	D1 max	D1	D	L	L2	BHTCA	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3940704	**M170D020Z02A20RD10L140**	20	10	20	140	60	–	5,0	2	20.0°	15900	Yes	0,30
3940705	**M170D020Z02A25RD10L160**	20	10	25	160	80	2.0°	5,0	2	20.0°	15900	Yes	0,48
3940706	**M170D020Z02A25RD10L180**	20	10	25	180	100	1.5°	5,0	2	20.0°	15900	Yes	0,53
3940707	**M170D022Z02A20RD10L160**	22	12	20	160	40	–	5,0	2	12.0°	14400	Yes	0,35
3940709	**M170D025Z02A25RD10L180**	25	15	25	180	70	–	5,0	2	9.0°	12800	Yes	0,61
3940710	**M170D025Z02A25RD10L220**	25	15	25	220	100	–	5,0	2	9.0°	12800	Yes	0,74
3940711	**M170D028Z02A25RD10L200**	28	18	25	200	40	–	5,0	2	15.0°	11300	Yes	0,74

Spare Parts



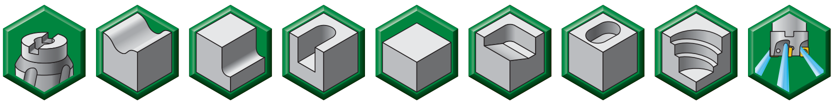


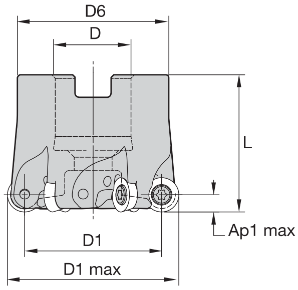


insert screw	Nm	Torx driver
193.342	3,5	**12148082400**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.

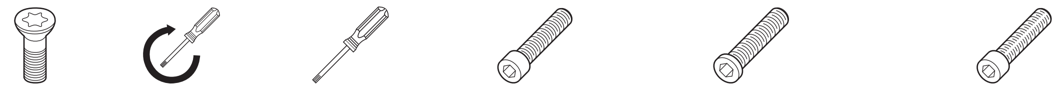




Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3940712	**M170D040Z05RD10**	40	30	16	37	40	5,0	5	7.2°	9950	Yes	0,28
3940723	**M170D042Z05RD10**	42	32	16	37	40	5,0	5	5.8°	9500	Yes	0,28
3940724	**M170D050Z06RD10**	50	40	22	44	40	5,0	6	5.2°	7950	Yes	0,35
3940725	**M170D052Z06RD10**	52	42	22	44	50	5,0	6	3.0°	7650	Yes	0,51

Spare Parts



D1 max	insert screw	Nm	Torx driver	socket-head cap screw	low-head cap screw	socket-head cap screw with coolant groove
40	**193.342**	3,5	**12148082400**	**MS1294**	**–**	**MS1294CG**
42	**193.342**	3,5	**12148082400**	**MS1294**	**–**	**MS1294CG**
50	**193.342**	3,5	**12148082400**	**–**	**129.025**	**MS2072CG**
52	**193.342**	3,5	**12148082400**	**–**	**129.025**	**MS2072CG**

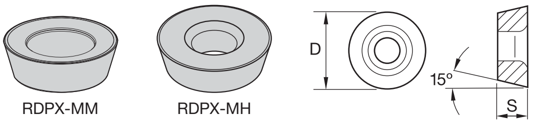
NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	MM	TN6525	**MM**	**TN6525**	MM	TN6540
P3–P4	MH	TN2505	**MH**	**TN6525**	MH	TN6540
P5–P6	MH	TN2505	**MH**	**TN6525**	MH	TN6540
M1–M2	–	–	**MM**	**TN6525**	MM	TN6540
M3	–	–	**MM**	**TN6525**	MM	TN6540
K1–K2	MH	TN2505	**MH**	**TN2505**	MH	TN6525
K3	MH	TN2505	**MH**	**TN2505**	MH	TN6525
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**MM**	**TN6540**	–	–
S3	–	–	**MM**	**TN6540**	–	–
S4	–	–	**MM**	**TN6540**	–	–
H1	MH	TN2505	**MH**	**TN2505**	–	–

Copy Mills

iC10 • Inserts



RDPX-MM RDPX-MH

- -MM geometry is the best option for general-purpose use, materials, and applications. Used for reduced cutting forces.

● first choice
○ alternate choice

		TN2505	TN6525	TN6540
P		○	●	●
M			○	●
K		●	○	○
N				
S				●
H		●		

RDPX-MM

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX1003M0SNMM	10,00	3,18	0,11	–	3959633	3959582

- -MH geometry is the first choice for heavy machining.
- Suitable for high-strength steels, cast iron, and hard machining.

RDPX-MH

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX1003M0SNMH	10,00	3,18	0,12	3959581	3959580	3959579

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	–	–	235	**170**	145	180	**130**	110
	5	–	–	–	310	**235**	200	240	**180**	150
	6	–	–	–	205	**160**	130	160	**120**	100
M	1	–	–	–	190	**120**	80	130	**80**	60
	2	–	–	–	120	**80**	50	80	**50**	40
	3	–	–	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	50	**35**	30
	2	–	–	–	–	–	–	25	**20**	10
	3	–	–	–	–	–	–	70	**40**	30
	4	–	–	–	–	–	–	60	**30**	25
H	1	175	**140**	95	–	–	–	–	–	–
	2	175	**140**	95	–	–	–	–	–	–
	3	140	**115**	80	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
MM	0,28	**0,41**	0,74	0,20	**0,29**	0,53	0,15	**0,22**	0,4	0,13	**0,19**	0,35	0,12	**0,18**	0,32	MM
MH	0,33	**0,58**	0,98	0,24	**0,42**	0,71	0,18	**0,32**	0,53	0,16	**0,28**	0,46	0,14	**0,25**	0,42	MH

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
MM	0,35	**0,51**	0,93	0,25	**0,37**	0,67	0,19	**0,28**	0,50	0,17	**0,24**	0,44	0,15	**0,22**	0,40	MM
MH	0,42	**0,73**	1,23	0,30	**0,53**	0,88	0,23	**0,39**	0,66	0,20	**0,34**	0,57	0,18	**0,32**	0,53	MH

At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
MM	0,47	**0,68**	1,25	0,34	**0,49**	0,89	0,25	**0,37**	0,67	0,22	**0,32**	0,58	0,20	**0,29**	0,53	MM
MH	0,56	**0,98**	1,66	0,40	**0,71**	1,18	0,30	**0,53**	0,88	0,26	**0,46**	0,76	0,24	**0,42**	0,70	MH

At 0,50 Axial Depth of Cut (ap)

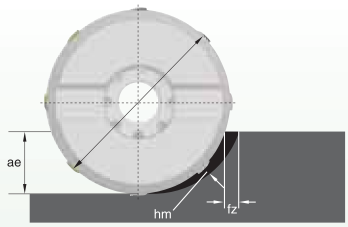
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
MM	0,64	**0,94**	1,73	0,46	**0,68**	1,24	0,35	**0,51**	0,92	0,30	**0,44**	0,80	0,28	**0,40**	0,73	MM
MH	0,77	**1,36**	2,31	0,55	**0,97**	1,63	0,41	**0,73**	1,21	0,36	**0,63**	1,05	0,33	**0,58**	0,96	MH

NOTE: Use “Light Machining” value as starting feed rate.

Selecting the Correct Cutting Values

1. fz depends on the Ap1 and ae values

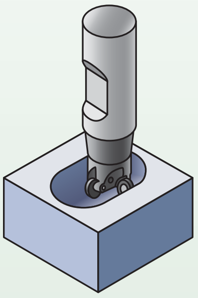
With round inserts, two factors can affect the hm: Ap1 and ae.
fz has to be adjusted accordingly.



Recommended Starting Feed Rate Values (fz) Related to the Ap1 and ae Values:

ae engagement	10%	20%	30%	40%	50%	100%
Ap1 = 0,5mm	1,18mm	0,70mm	0,63mm	0,56mm	0,50mm	0,35mm
Ap1 = 0,75mm	0,95mm	0,62mm	0,56mm	0,50mm	0,45mm	0,30mm
Ap1 = 1mm	0,80mm	0,57mm	0,46mm	0,40mm	0,36mm	0,25mm
Ap1 = 2mm	0,57mm	0,40mm	0,33mm	0,28mm	0,25mm	0,18mm
Ap1 = 3mm	0,46mm	0,33mm	0,27mm	0,23mm	0,21mm	0,15mm
Ap1 = 5mm	0,36mm	0,25mm	0,21mm	0,18mm	0,16mm	0,11mm

Example application highlighted.



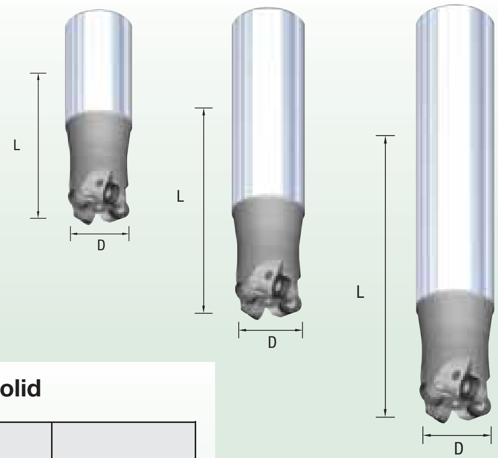
Example Cutting Conditions for RD..10... Insert in Pocketing, L/D ratio = 2 x D:

			TN2505			TN6525			TN6540		
			feed per tooth fz (mm)/ae>50%								
insert = RDPX1003M0SN			min	med	max	min	med	max	min	med	max
Edge Geometry MM	ae>50%	Recommended starting Ap1 = 1mm	–	–	–	0,25mm	0,30mm	0,40mm	0,25mm	0,32mm	0,45mm
Edge Geometry MH	ae>50%	Recommended starting Ap1 = 1mm	0,25mm	0,32mm	0,40mm	0,25mm	0,35mm	0,55mm	0,25mm	0,45mm	0,65mm

2. Ap1 and vc corrections depend on L/D ratio

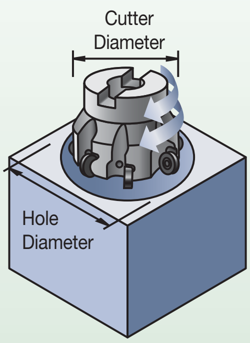
With increasing L/D ratios, or overhang, vibrations can occur due to reduced rigidity. To ensure successful application, it is recommended to adjust Ap1 and vc values according to the following table:

L/D ratio	% of Ap1 max to reduce	% of vc to reduce
<2	0%	0%
2<L/D<4	65–75%	10–15%
>4	80–95%	20–40%

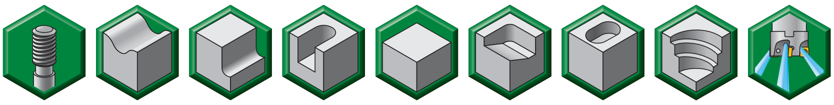


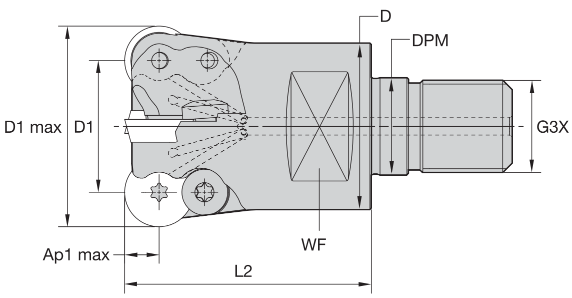
Recommended Cutting Conditions • Helical Interpolation from Solid

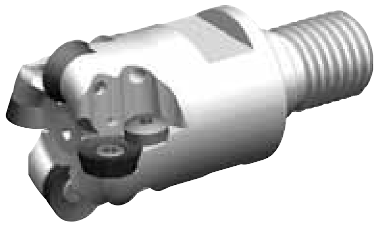
cutter diameter	min hole diameter	max hole diameter (flat bottom)	Ap1 max per revolution	max ramp angle	Ap1 max when plunging
20	22mm	30mm	2,1mm	20°	4mm
22	24mm	34mm	2,1mm	20°	2,4mm
25	33mm	40mm	3,2mm	8°	1,7mm
28	36mm	46mm	5mm	15°	3,8mm
30	40,6mm	50mm	5mm	10°	3,4mm
35	50,7mm	60mm	5mm	8,5°	3,4mm
40	60,5mm	70mm	5mm	7,2°	3,6mm
42	64,5mm	74mm	5mm	5,8°	3,6mm
50	80,3mm	90mm	5mm	5,2°	4mm
52	85,8mm	94mm	5mm	3°	2,2mm



- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Screw-On End Mills

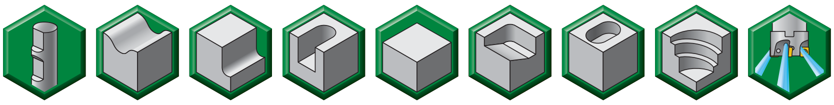
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3930950	**M170D024Z02M12RD12**	24	12	21	12,5	M12	35	19	6,0	2	15.0°	13200	Yes	0,08
3930954	**M170D035Z03M16RD12**	35	23	29	17,0	M16	43	22	6,0	3	11.0°	9900	Yes	0,22
3930956	**M170D035Z04M16RD12**	35	23	29	17,0	M16	43	22	6,0	4	10.5°	9900	Yes	0,21
3930958	**M170D042Z05M16RD12**	42	30	29	17,0	M16	43	22	6,0	5	7.2°	7500	Yes	0,26

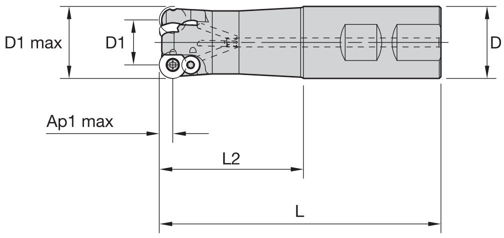
Spare Parts

D1 max	insert screw	Nm	clamp screw	Torx driver
24	**193.342**	3,5	**193.338**	**12148082400**
35	**193.342**	3,5	**193.338**	**12148082400**
42	**193.342**	3,5	**193.338**	**12148082400**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.





Weldon Shanks

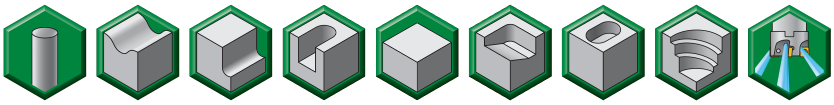
order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3930960	M170D032Z03B32RD12	32	20	32	125	64	6,0	3	12.0°	9500	Yes	0,63

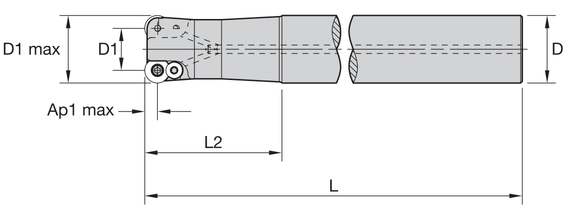
Spare Parts

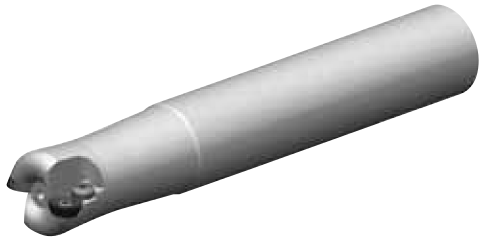
D1 max	insert screw	Nm	clamp screw	Torx driver
32	193.342	3,5	193.338	12148082400

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.



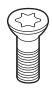
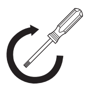
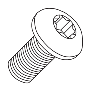
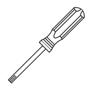




Cylindrical Shanks

order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3930962	**M170D032Z02A32RD12L200**	32	20	32	200	65	6,0	2	12.0°	9500	Yes	1,12
3930964	**M170D032Z02A32RD12L300**	32	20	32	300	65	6,0	2	12.0°	9500	Yes	1,74
3930966	**M170D035Z02A32RD12L300**	35	23	32	300	40	6,0	2	11.0°	9100	Yes	1,79

Spare Parts

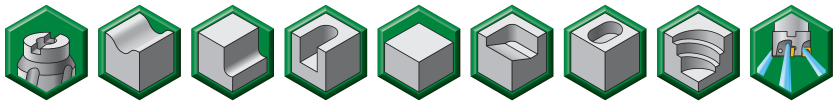
   

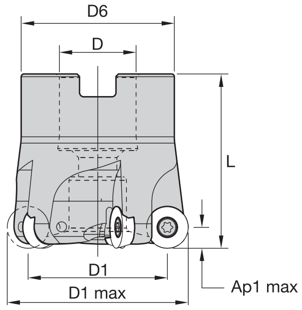
D1 max	insert screw	Nm	clamp screw	Torx driver
32	**193.342**	3,5	**193.338**	**12148082400**
35	**193.342**	3,5	**193.338**	**12148082400**

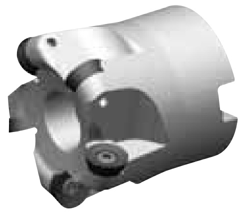
NOTE: All spare parts except the insert screws must be ordered separately.

Copy Mills

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3930968	**M170D040Z04RD12**	40	28	16	37	40	6,0	4	9.3°	7000	Yes	0,22
3930970	**M170D050Z05RD12**	50	38	22	44	40	6,0	5	6.1°	7950	Yes	0,32
3930972	**M170D052Z05RD12**	52	40	22	44	50	6,0	5	4.5°	7600	Yes	0,44
3930975	**M170D063Z06RD12**	63	51	22	44	40	6,0	6	4.5°	6300	Yes	0,45
3930976	**M170D066Z06RD12**	66	54	27	60	50	6,0	6	4.5°	6030	Yes	0,81
3930979	**M170D080Z07RD12**	80	68	27	60	50	6,0	7	3.5°	4900	Yes	0,97
3930981	**M170D100Z08RD12**	100	88	32	80	55	6,0	8	2.2°	3900	Yes	1,95

Spare Parts

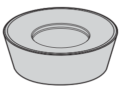
D1 max	insert screw	Nm	clamp screw	Torx driver	low-head cap screw	low-head cap screw with coolant groove	socket-head cap screw	socket-head cap screw with coolant groove
40	**193.342**	3,5	**193.338**	**12148082400**	–	–	**MS1294**	**MS1294CG**
50	**193.342**	3,5	**193.338**	**12148082400**	**129.025**	–	–	**MS2072CG**
52	**193.342**	3,5	**193.338**	**12148082400**	**129.025**	–	–	**MS2072CG**
63	**193.342**	3,5	**193.338**	**12148082400**	**129.025**	–	–	**MS2072CG**
66	**193.342**	3,5	**193.338**	**12148082400**	–	–	**MS2038**	**MS2038CG**
80	**193.342**	3,5	**193.338**	**12148082400**	–	–	**MS2038**	**MS2038CG**
100	**193.342**	3,5	**193.338**	**12148082400**	**MS1254**	**MS1254CG**	–	–

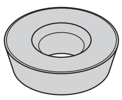
NOTE: Socket-head cap screw, socket-head cap screw with coolant groove, low-head cap screw with coolant groove, and Torx driver must be ordered separately.

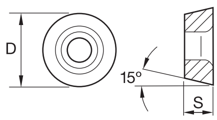
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	MM	TN6525	**MM**	**TN6525**	MM	TN6540
P3–P4	MH	TN2505	**MH**	**TN6525**	MH	TN6540
P5–P6	MH	TN2505	**MH**	**TN6525**	MH	TN6540
M1–M2	–	–	**MM**	**TN6525**	MM	TN6540
M3	–	–	**MM**	**TN6525**	MM	TN6540
K1–K2	MH	TN2505	**MH**	**TN2505**	MH	TN6525
K3	MH	TN2505	**MH**	**TN2505**	MH	TN6525
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**MM**	**TN6540**	–	–
S3	–	–	**MM**	**TN6540**	–	–
S4	–	–	**MM**	**TN6540**	–	–
H1	MH	TN2505	**MH**	**TN2505**	–	–

iC12 • Inserts


RDPX-MM


RDHX-MH



- -MM geometry is the best option for general-purpose use, materials, and applications. Used for reduced cutting forces.

● first choice
○ alternate choice

		TN2505	TN6525	TN6540
P		○	●	●
M			○	●
K		●	○	○
N				
S				●
H		●		

RDPX-MM

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX12T3M0SNMM	12,00	3,97	0,13	-	3959624	3959623

- -MH geometry is the first choice for heavy machining.
- Suitable for high-strength steels, cast iron, and hard machining.

RDPX-MH

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX12T3M0SNMH	12,00	3,97	0,17	3959622	3959621	3959620

WIDIA

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	**–**	–	235	**170**	145	180	**130**	110
	5	–	**–**	–	310	**235**	200	240	**180**	150
	6	–	**–**	–	205	**160**	130	160	**120**	100
M	1	–	**–**	–	190	**120**	80	130	**80**	60
	2	–	**–**	–	120	**80**	50	80	**50**	40
	3	–	**–**	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	–	**–**	–	–	**–**	–
	2	175	**140**	95	–	**–**	–	–	**–**	–
	3	140	**115**	80	–	**–**	–	–	**–**	–

NOTE: FIRST choice starting speeds are in ***bold*** *type.*
As the average chip thickness increases, the speed should be decreased.

Copy Mills

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 6,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,33	**0,48**	0,76	0,24	**0,35**	0,54	0,18	**0,26**	0,41	0,16	**0,23**	0,35	0,14	**0,21**	0,33	MM
MH	0,35	**0,70**	1,17	0,25	**0,50**	0,84	0,19	**0,38**	0,63	0,16	**0,33**	0,55	0,15	**0,30**	0,50	MH

At 3,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,38	**0,56**	0,88	0,28	**0,40**	0,63	0,21	**0,30**	0,47	0,18	**0,26**	0,41	0,17	**0,24**	0,38	MM
MH	0,40	**0,81**	1,36	0,29	**0,58**	0,97	0,22	**0,43**	0,72	0,19	**0,38**	0,63	0,17	**0,35**	0,58	MH

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,44	**0,65**	1,02	0,32	**0,47**	0,73	0,24	**0,35**	0,55	0,21	**0,30**	0,48	0,19	**0,28**	0,44	MM
MH	0,47	**0,94**	1,59	0,34	**0,68**	1,13	0,25	**0,50**	0,84	0,22	**0,44**	0,73	0,20	**0,40**	0,67	MH

At 1,00 Axial Depth of Cut (ap)

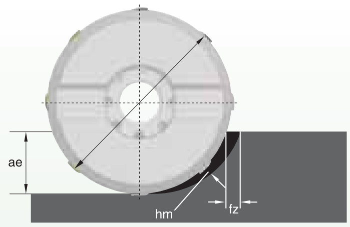
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,60	**0,88**	1,38	0,43	**0,63**	0,99	0,32	**0,47**	0,74	0,28	**0,41**	0,64	0,26	**0,38**	0,59	MM
MH	0,63	**1,28**	2,16	0,45	**0,91**	1,53	0,34	**0,68**	1,14	0,30	**0,59**	0,99	0,27	**0,54**	0,90	MH

NOTE: Use "Light Machining" value as starting feed rate.

Selecting the Correct Cutting Values

1. fz depends on the Ap1 and ae values

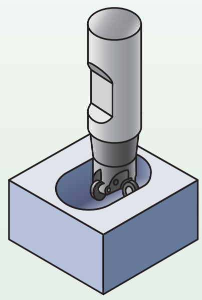
With round inserts, two factors can affect the hm: Ap1 and ae.
fz has to be adjusted accordingly.



Recommended Starting Feed Rate Values (fz) Related to the Ap1 and ae Values:

ae engagement	10%	20%	30%	40%	50%	100%
Ap1 = 1mm	1,01mm	0,77mm	0,63mm	0,55mm	0,49mm	0,35mm
Ap1 = 2mm	0,77mm	0,55mm	0,45mm	0,39mm	0,35mm	0,24mm
Ap1 = 3mm	0,63mm	0,45mm	0,37mm	0,32mm	0,28mm	0,20mm
Ap1 = 4mm	0,55mm	0,39mm	0,32mm	0,27mm	0,24mm	0,17mm
Ap1 = 5mm	0,49mm	0,35mm	0,28mm	0,24mm	0,22mm	0,15mm
Ap1 = 6mm	0,45mm	0,32mm	0,26mm	0,22mm	0,20mm	0,14mm

Example application highlighted.



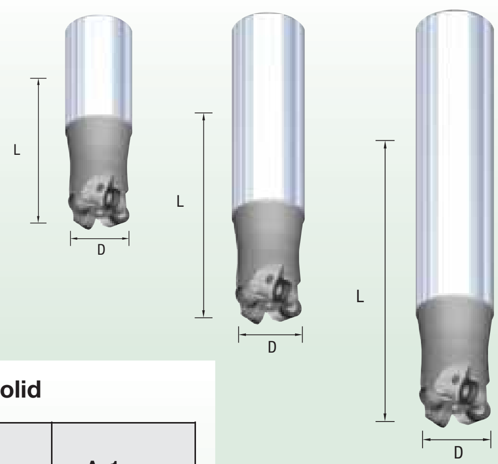
Example Cutting Conditions for RD..10... Insert in Pocketing, L/D ratio = 2 x D:

			TN2505			**TN6525**			**TN6540**		
			feed per tooth fz (mm)/ae>50%								
insert = RDPX12T3M0SN			**min**	**med**	**max**	**min**	**med**	**max**	**min**	**med**	**max**
Edge Geometry MM	ae>50%	Recommended starting Ap1 = 2mm	–	–	–	0,24mm	0,30mm	0,50mm	0,24mm	0,40mm	0,60mm
Edge Geometry MH	ae>50%	Recommended starting Ap1 = 2mm	0,24mm	0,30mm	0,50mm	0,24mm	0,40mm	0,65mm	0,24mm	0,50mm	0,70mm

2. Ap1 and vc corrections depend on L/D ratio

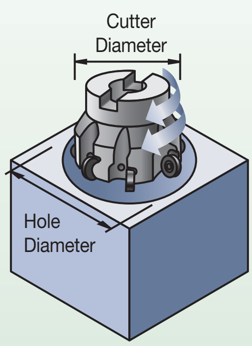
With increasing L/D ratios, or overhang, vibrations can occur due to reduced rigidity. To ensure successful application, it is recommended to adjust Ap1 and vc values according to the following table:

L/D ratio	% of Ap1 max to reduce	% of vc to reduce
<2	0%	0%
2<L/D<4	65–75%	10–15%
>4	80–95%	20–40%

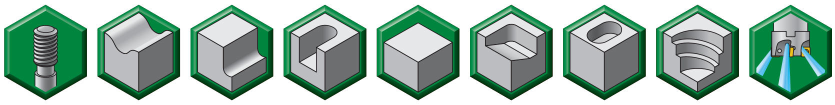


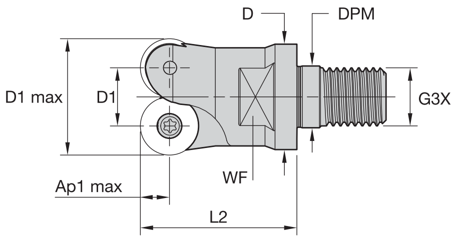
Recommended Cutting Conditions • Helical Interpolation from Solid

cutter diameter	min hole diameter	max hole diameter (flat bottom)	Ap1 max per revolution	max ramp angle	Ap1 max when plunging
24	25,6mm	36mm	1,3mm	15°	3mm
32	40,6mm	52mm	5,3mm	12°	4,4mm
35	46,9mm	58mm	6mm	11°	3,9mm
40	57,4mm	68mm	6mm	9.3°	3,3mm
42	61,2mm	72mm	6mm	7.2°	3,5mm
50	77,4mm	88mm	6mm	6.1°	3,5mm
52	81,3mm	92mm	6mm	4.5°	3,2mm
63	102,4mm	114mm	6mm	4.5°	4,6mm
66	108,5mm	120mm	6mm	4.5°	4,4mm
80	136,5mm	148mm	6mm	3.5°	4,2mm
100	176,5mm	188mm	6mm	2.2°	4,2mm



- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.

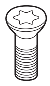
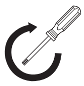
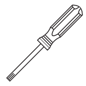




Screw-On End Mills

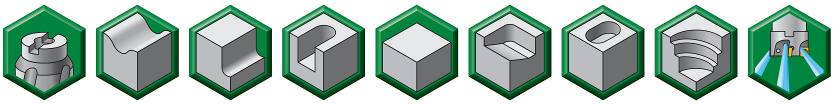
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3926601	**M170D032Z02M16RD16**	32	16	29	17,0	M16	43	22	8,0	2	20.0°	9950	Yes	0,17

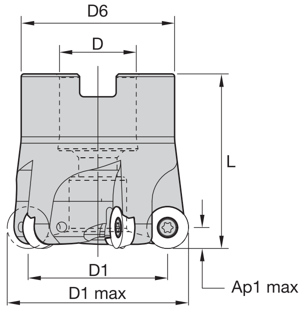
Spare Parts

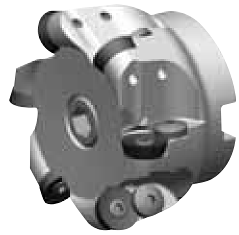
D1 max	 insert screw	 Nm	 Torx driver
32	**193.343**	6,0	**12148099400**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.



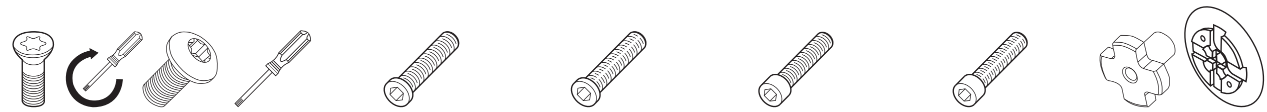




Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3926602	**M170D050Z04RD16**	50	34	22	44	40	8,0	4	8.5°	7900	Yes	0,28
3934623	**M170D052Z04RD16**	52	36	22	44	50	8,0	4	8.2°	7650	Yes	0,36
3934624	**M170D063Z05RD16**	63	47	22	44	40	8,0	5	5.5°	5300	Yes	0,39
3934625	**M170D066Z05RD16**	66	50	27	60	50	8,0	5	4.0°	6000	Yes	0,74
3934626	**M170D080Z06RD16**	80	64	27	60	50	8,0	6	3.0°	4900	Yes	1,06
3934628	**M170D100Z07RD16**	100	84	32	80	55	8,0	7	2.4°	3950	Yes	1,94
3934629	**M170D125Z08RD16**	125	109	40	90	60	8,0	8	2.2°	3200	Yes	2,90

Spare Parts



D1 max	insert screw	Nm	clamp screw	Torx driver	low-head cap screw	low-head cap screw with coolant groove	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw	coolant cap
50	**193.343**	6,0	**193.383**	**12148099400**	**129.025**	–	–	**MS2072CG**	–	–
52	**193.343**	6,0	**193.383**	**12148099400**	**129.025**	–	–	**MS2072CG**	–	–
63	**193.343**	6,0	**193.383**	**12148099400**	**129.025**	–	–	**MS2072CG**	–	–
66	**193.343**	6,0	**193.383**	**12148099400**	–	–	**MS2038**	**MS2038CG**	–	–
80	**193.343**	6,0	**193.383**	**12148099400**	–	–	**MS2038**	**MS2038CG**	–	–
100	**193.343**	6,0	**193.383**	**12148099400**	**MS1254**	**MS1254CG**	–	–	–	–
125	**193.343**	6,0	**193.383**	**12148099400**	**129.512**	–	–	–	**420.200**	**470.232**

NOTE: All spare parts except the insert screws and clamp screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	MM	TN6525	**MM**	**TN6525**	MM	TN6540
P3–P4	MH	TN2505	**MH**	**TN6525**	MH	TN6540
P5–P6	MH	TN2505	**MH**	**TN6525**	MH	TN6540
M1–M2	–	–	**MM**	**TN6525**	MM	TN6540
M3	–	–	**MM**	**TN6525**	MM	TN6540
K1–K2	MH	TN2505	**MH**	**TN2505**	MH	TN6525
K3	MH	TN2505	**MH**	**TN2505**	MH	TN6525
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	**MM**	**TN6540**	–	–
S3	–	–	**MM**	**TN6540**	–	–
S4	–	–	**MM**	**TN6540**	–	–
H1	MH	TN2505	**MH**	**TN2505**	–	–

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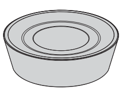
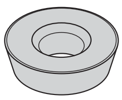
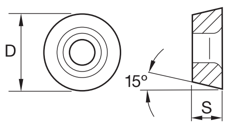
iC16 • Inserts


RDPX-MM


RDPX-MH



● first choice
○ alternate choice

	TN2505	TN6525	TN6540
P	○	●	●
M		○	●
K	●	○	○
N			
S			●
H	●		

- -MM geometry is the best option for general-purpose use, materials, and applications. Used for reduced cutting forces.

RDPX-MM

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX1604M0SNMM	16,00	4,76	0,14	-	3960516	3960515

- -MH geometry is the first choice for heavy machining.
- Suitable for high-strength steels, cast iron, and hard machining.

RDPX-MH

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX1604M0SNMH	16,00	4,76	0,22	3960514	3960513	3960462

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	**–**	–	235	**170**	145	180	**130**	110
	5	–	**–**	–	310	**235**	200	240	**180**	150
	6	–	**–**	–	205	**160**	130	160	**120**	100
M	1	–	**–**	–	190	**120**	80	130	**80**	60
	2	–	**–**	–	120	**80**	50	80	**50**	40
	3	–	**–**	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	–	**–**	–	–	**–**	–
	2	175	**140**	95	–	**–**	–	–	**–**	–
	3	140	**115**	80	–	**–**	–	–	**–**	–

NOTE: FIRST choice starting speeds are in ***bold*** *type.*
As the average chip thickness increases, the speed should be decreased.

Copy Mills

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,39	**0,52**	0,82	0,28	**0,37**	0,59	0,21	**0,28**	0,44	0,18	**0,24**	0,38	0,17	**0,22**	0,35	MM
MH	0,51	**0,70**	1,17	0,37	**0,50**	0,84	0,28	**0,38**	0,63	0,24	**0,33**	0,55	0,22	**0,30**	0,50	MH

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,45	**0,60**	0,94	0,32	**0,43**	0,68	0,24	**0,32**	0,51	0,21	**0,28**	0,44	0,19	**0,26**	0,40	MM
MH	0,59	**0,81**	1,36	0,43	**0,58**	0,97	0,32	**0,43**	0,72	0,28	**0,38**	0,63	0,25	**0,35**	0,58	MH

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,59	**0,79**	1,24	0,43	**0,57**	0,89	0,32	**0,42**	0,66	0,28	**0,37**	0,58	0,25	**0,34**	0,53	MM
MH	0,77	**1,06**	1,79	0,56	**0,76**	1,28	0,42	**0,57**	0,95	0,36	**0,50**	0,83	0,33	**0,45**	0,76	MH

At 1,00 Axial Depth of Cut (ap)

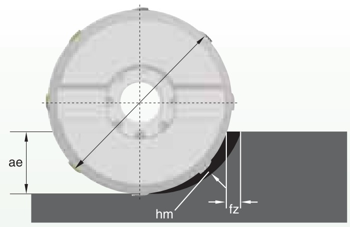
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,81	**1,08**	1,71	0,58	**0,78**	1,22	0,43	**0,58**	0,91	0,38	**0,51**	0,79	0,35	**0,46**	0,72	MM
MH	1,06	**1,46**	2,48	0,76	**1,04**	1,75	0,57	**0,78**	1,30	0,50	**0,68**	1,13	0,45	**0,62**	1,03	MH

NOTE: Use "Light Machining" value as starting feed rate.

Selecting the Correct Cutting Values

1. fz depends on the Ap1 and ae values

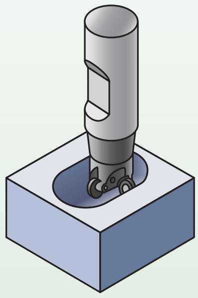
With round inserts, two factors can affect the hm: Ap1 and ae.
fz has to be adjusted accordingly.



Recommended Starting Feed Rate Values (fz) Related to the Ap1 and ae Values:

ae engagement	10%	20%	30%	40%	50%	100%
Ap1 = 1mm	1,52mm	1,07mm	0,88mm	0,76mm	0,68mm	0,48mm
Ap1 = 2mm	1,07mm	0,76mm	0,62mm	0,54mm	0,48mm	0,34mm
Ap1 = 3mm	0,88mm	0,62mm	0,51mm	0,44mm	0,39mm	0,28mm
Ap1 = 4mm	0,76mm	0,54mm	0,44mm	0,38mm	0,34mm	0,24mm
Ap1 = 5mm	0,62mm	0,44mm	0,36mm	0,31mm	0,26mm	0,20mm
Ap1 = 6mm	0,54mm	0,38mm	0,31mm	0,27mm	0,24mm	0,17mm

Example application highlighted.



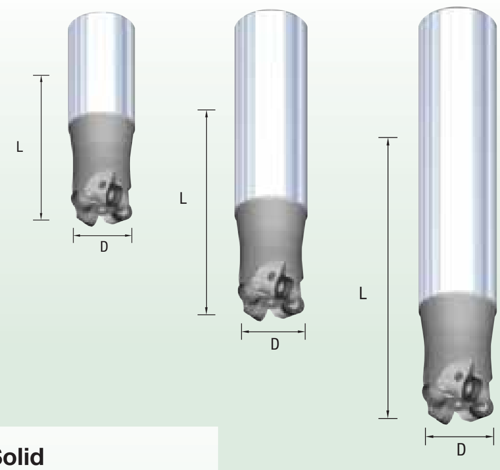
Example Cutting Conditions for iC16mm... Insert in Pocketing, up to 3 L/D approximately:

			TN2505			TN6525			TN6540		
			feed per tooth fz (mm)/ae>50%								
insert = RDPX1604M0SN			min	med	max	min	med	max	min	med	max
Edge Geometry MM	ae>50%	Recommended starting Ap1 = 3mm	–	–	–	0,28mm	0,45mm	0,65mm	0,28mm	0,50mm	0,70mm
Edge Geometry MH	ae>50%	Recommended starting Ap1 = 3mm	0,28mm	0,35mm	0,50mm	0,28mm	0,50mm	0,75mm	0,28mm	0,60mm	0,80mm

2. Ap1 and vc corrections depend on L/D ratio

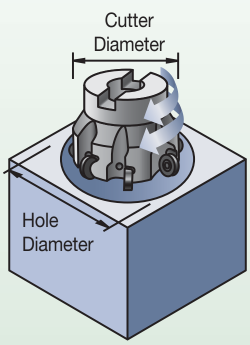
With increasing L/D ratios, or overhang, vibrations can occur due to reduced rigidity. To ensure successful application, it is recommended to adjust Ap1 and vc values according to the following table:

L/D ratio	% of Ap1 max to reduce	% of vc to reduce
<2	0%	0%
2<L/D<4	65–75%	10–15%
>4	80–95%	20–40%



Recommended Cutting Conditions • Helical Interpolation from Solid

cutter diameter	min hole diameter	max hole diameter (flat bottom)	Ap1 max per revolution	max ramp angle	Ap1 max when plunging
32	36mm	48mm	3mm	20°	3mm
50	69mm	84mm	8mm	9,5°	4,8mm
52	73mm	88mm	8mm	8,2°	5mm
63	95mm	110mm	8mm	5,5°	4,7mm
66	101mm	120mm	8mm	4°	4,2mm
80	129mm	144mm	8mm	3°	4,1mm
100	169mm	184mm	8mm	2,4°	4,6mm
125	219mm	234mm	8mm	2,2°	4,4mm



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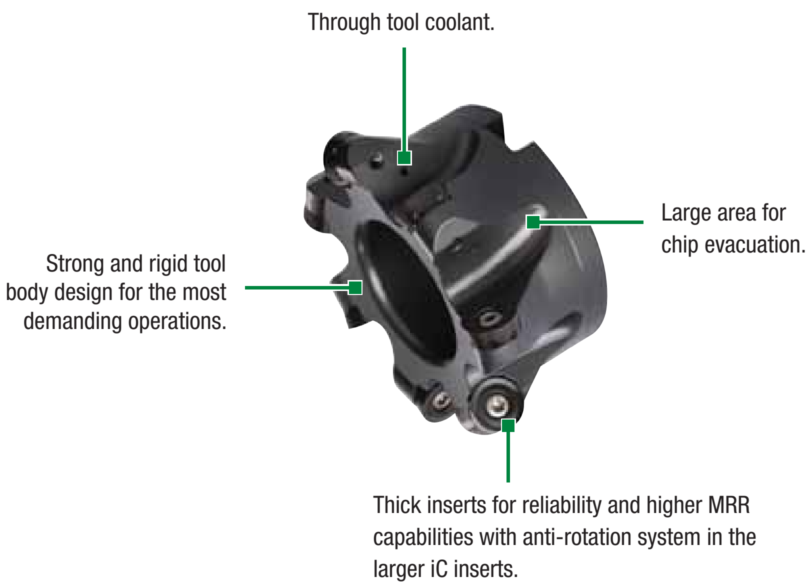

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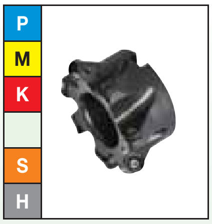
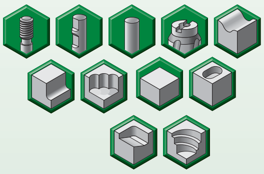
M100™

Max depth of cut: 6mm

Diameter: 24–125mm

Pages: M74–M99

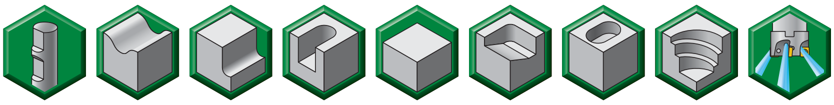


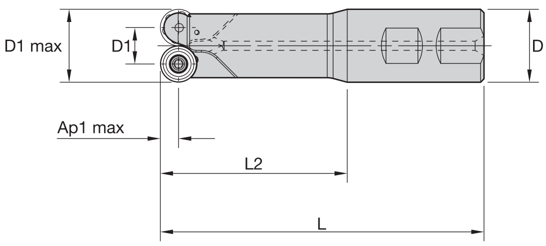


Insert Offering

08mm iC	10mm iC	12mm iC	16mm iC	16mm iC
RD Insert Type	RD Insert Type	RD Insert Type	RD Insert Type	RC Insert Type
Ground and PSTS	Ground and PSTS	Anti-rotation Feature	Anti-rotation Feature	Anti-rotation Feature
		Ground and PSTS	Ground and PSTS	Ground and PSTS

- General purpose face and copy milling.

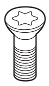
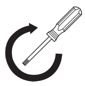
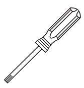




Weldon Shanks

order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021331	**12391010000**	12	4	16	90	42	4,0	1	2.0°	33000	Yes	0,10
2021332	**12391010400**	12	4	16	130	82	4,0	1	2.0°	33000	Yes	0,10
2021333	**12391010600**	16	8	16	90	42	4,0	2	7.5°	28000	Yes	0,10
2021334	**12391011000**	16	8	20	132	82	4,0	2	7.5°	28000	Yes	0,20
2021335	**12391011400**	16	8	25	183	127	4,0	2	7.5°	28000	Yes	0,40

Spare Parts

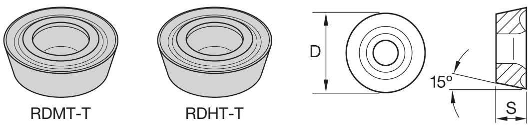
D1 max	insert screw	Nm	Torx driver
12	**12148001300**	3,0	**12148086600**
16	**12148001300**	3,0	**12148086600**

NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	RDMT-T	TN7525	**RDMT-T**	**TN7525**	RDMT-T	TN7535
P3–P4	RDMT-T	TN7525	**RDMW-T**	**TN6540**	RDMW-T	TN6540
P5–P6	RDMT-T	TN7525	**RDMT-T**	**TN7535**	RDMT-T	TN7535
M1–M2	RDHT-T	TN7525	**RDHT-T**	**TN7525**	RDMT-T	TN7535
M3	RDHT-T	TN7525	**RDHT-T**	**TN7525**	RDMT-T	TN7535
K1–K2	–	–	**RDMW-T**	**TN7535**	RDMW-T	TN7535
K3	–	–	**RDMW-T**	**TN7535**	RDMW-T	TN7535
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	–	–	–	–	–	–

iC08 • Inserts



● first choice
○ alternate choice

	TN2510	TN6540	TN7525	TN7535
P	○	●	●	●
M		●	○	○
K	●	○		○
N				
S		●		
H	●			

- Precision ground insert; first choice for light machining.

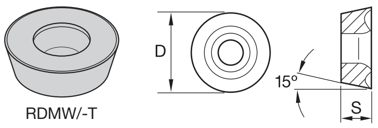
RDHT-T

catalogue number	D	S	hm	TN2510	TN6540	TN7525	TN7535
RDHT0802M0T	8,00	2,38	0,09	–	–	2012426	–

- Precision pressed insert; positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

RDMT-T

catalogue number	D	S	hm	TN2510	TN6540	TN7525	TN7535
RDMT0802M0T	8,00	2,38	0,09	–	–	2012518	2020757



- Precision pressed insert.
- First choice for roughing operations, especially for steel and cast iron.

● first choice
○ alternate choice

	TN2510	TN6540	TN7525	TN7535
P	○	●	●	●
M		●	○	○
K	●	○		○
N				
S		●		
H	●			

RDMW/-T

catalogue number	D	S	hm	TN2510	TN6540	TN7525	TN7535
RDMW0802M0	8,00	2,38	0,09	2012564	–	–	–
RDMW0802M0T	8,00	2,38	0,09	–	3353278	–	2020727

Recommended Starting Speeds

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6540			TN7525			TN7535		
P	1	660	**580**	540	360	**280**	240	410	**310**	280	545	**475**	445
	2	410	**370**	330	250	**190**	170	310	**250**	215	335	**305**	275
	3	370	**330**	305	215	**170**	140	280	**215**	185	305	**275**	245
	4	275	**260**	230	180	**130**	110	235	**170**	145	230	**210**	190
	5	330	**300**	275	240	**180**	150	310	**235**	200	310	**275**	250
	6	230	**205**	175	160	**120**	100	205	**160**	130	190	**160**	130
M	1	270	**240**	210	130	**80**	60	245	**220**	185	245	**220**	185
	2	245	**210**	190	80	**50**	40	220	**190**	170	220	**190**	170
	3	190	**175**	150	85	**50**	40	175	**155**	140	175	**155**	140
K	1	420	**360**	300	220	**205**	180	380	**280**	240	355	**320**	290
	2	360	**300**	250	175	**155**	140	325	**240**	200	280	**250**	230
	3	300	**250**	200	155	**145**	125	240	**200**	170	235	**210**	190
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–
	2	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–
	3	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–
	4	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDMW-	0,19	**0,29**	0,42	0,14	**0,21**	0,30	0,10	**0,16**	0,23	0,09	**0,14**	0,20	0,08	**0,13**	0,18	RDMW-
RDHT-T	0,23	**0,31**	0,63	0,17	**0,23**	0,45	0,13	**0,17**	0,34	0,11	**0,15**	0,29	0,10	**0,14**	0,27	RDHT-T
RDMT-T	0,23	**0,31**	0,63	0,17	**0,23**	0,45	0,13	**0,17**	0,34	0,11	**0,15**	0,29	0,10	**0,14**	0,27	RDMT-T
RDMW-T	0,23	**0,42**	0,73	0,17	**0,30**	0,53	0,13	**0,23**	0,39	0,11	**0,20**	0,34	0,10	**0,18**	0,32	RDMW-T

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDMW-	0,22	**0,34**	0,48	0,16	**0,24**	0,35	0,12	**0,18**	0,26	0,10	**0,16**	0,23	0,09	**0,15**	0,21	RDMW-
RDHT-T	0,27	**0,36**	0,72	0,19	**0,26**	0,52	0,14	**0,20**	0,39	0,13	**0,17**	0,34	0,12	**0,16**	0,31	RDHT-T
RDMT-T	0,27	**0,36**	0,72	0,19	**0,26**	0,52	0,14	**0,20**	0,39	0,13	**0,17**	0,34	0,12	**0,16**	0,31	RDMT-T
RDMW-T	0,27	**0,48**	0,85	0,19	**0,35**	0,61	0,14	**0,26**	0,46	0,13	**0,23**	0,40	0,12	**0,21**	0,36	RDMW-T

At 1,00 Axial Depth of Cut (ap)

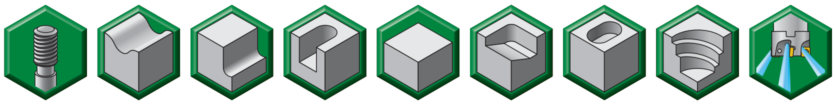
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDMW-	0,28	**0,44**	0,63	0,20	**0,32**	0,46	0,15	**0,24**	0,34	0,13	**0,21**	0,30	0,12	**0,19**	0,27	RDMW-
RDHT-T	0,35	**0,47**	0,95	0,25	**0,34**	0,69	0,19	**0,26**	0,51	0,17	**0,22**	0,45	0,15	**0,20**	0,41	RDHT-T
RDMT-T	0,35	**0,47**	0,95	0,25	**0,34**	0,69	0,19	**0,26**	0,51	0,17	**0,22**	0,45	0,15	**0,20**	0,41	RDMT-T
RDMW-T	0,35	**0,63**	1,12	0,25	**0,46**	0,80	0,19	**0,34**	0,60	0,17	**0,30**	0,52	0,15	**0,27**	0,48	RDMW-T

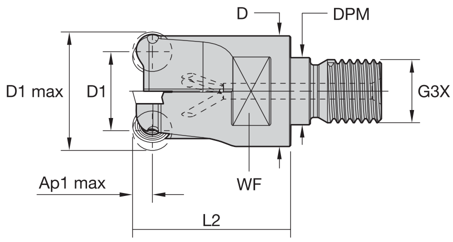
At 0,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDMW-	0,39	**0,60**	0,87	0,28	**0,44**	0,62	0,21	**0,33**	0,47	0,18	**0,28**	0,41	0,17	**0,26**	0,37	RDMW-
RDHT-T	0,48	**0,65**	1,31	0,35	**0,47**	0,94	0,26	**0,35**	0,70	0,23	**0,30**	0,61	0,21	**0,28**	0,56	RDHT-T
RDMT-T	0,48	**0,65**	1,31	0,35	**0,47**	0,94	0,26	**0,35**	0,70	0,23	**0,30**	0,61	0,21	**0,28**	0,56	RDMT-T
RDMW-T	0,48	**0,87**	1,54	0,35	**0,62**	1,10	0,26	**0,47**	0,82	0,23	**0,41**	0,71	0,21	**0,37**	0,65	RDMW-T

NOTE: Use "Light Machining" value as starting feed rate.

- General purpose face and copy milling.

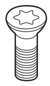
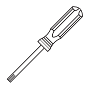




Screw-On End Mills

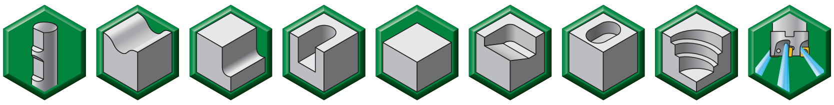
order number	catalogue number	D1 max	D1	D	DPM	G3X	L	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021375	**12391050400**	25	15	22	12,5	M12	52	30	19	5,0	2	15.8°	22000	Yes	0,10
2021376	**12391050600**	30	20	28	17,0	M16	63	40	22	5,0	3	10.3°	20000	Yes	0,20

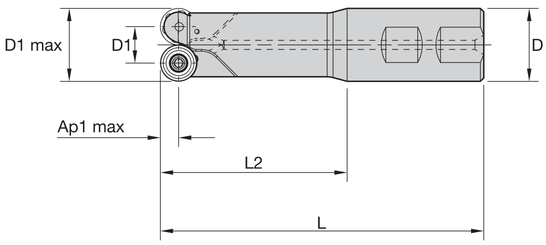
Spare Parts

 insert screw	 Nm	 Torx wrench
12148036700	3,0	**12148000600**

NOTE: All spare parts except the insert screws must be ordered separately.

- General purpose face and copy milling.

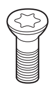
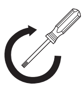
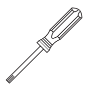




Weldon Shanks

order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021336	**12391011600**	20	10	20	92	42	5,0	2	7.8°	25000	Yes	0,20
2021337	**12391012000**	20	10	25	138	82	5,0	2	8.8°	25000	Yes	0,40
2021338	**12391012400**	20	10	25	183	127	5,0	2	7.5°	25000	Yes	0,50
2021339	**12391012800**	26	16	32	142	82	5,0	2	13.5°	22000	Yes	0,60
2021340	**12391013200**	26	16	32	187	127	5,0	2	14.3°	22000	Yes	0,90

Spare Parts

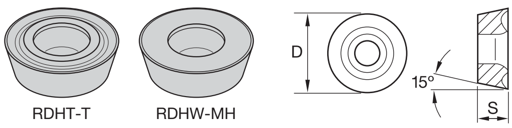
insert screw	Nm	Torx driver
12148036700	3,0	**12148000600**

NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	RDMT-T	TN6525	**RDMT-T**	**TN6540**	RDMT-T	TN6540
P3–P4	RDMT-T	TN6525	**RDMW-T**	**TN6540**	RDMW-T	TN6540
P5–P6	RDMT-T	TN7525	**RDMT-T**	**TN7535**	RDMW-T	TN7535
M1–M2	RDHT-T	TN7525	**RDHT-T**	**TN7525**	RDMT-T	TN6540
M3	RDHT-T	TN7525	**RDMT-T**	**TN6540**	RDMT-T	TN6540
K1–K2	RDHW-MH	TN2510	**RDHW-MH**	**TN2510**	RDMW-T	TN7535
K3	RDHW-MH	TN2510	**RDHW-MH**	**TN2510**	RDMW-T	TN7535
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**RDMT-T**	**TN6540**	–	–
S3	–	–	**RDMT-T**	**TN6540**	–	–
S4	–	–	**RDMT-T**	**TN6540**	RDMT-T	TN6540
H1	RDHW-MH	TN2510	**RDHW-MH**	**TN2510**	–	–

iC10 • Inserts



RDHT-T RDHW-MH

	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
P	○	●	●	●	●	●
M		○	●	○	○	○
K	●	○	○		○	
N						
S			●			
H	●					

● first choice
○ alternate choice

- Precision ground insert; first choice for light machining.

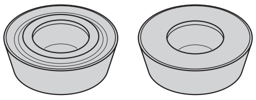
RDHT-T

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDHT1003M0T	10,00	3,18	0,14	–	–	–	**2012446**	–	–

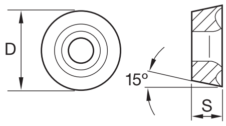
- Precision ground flat top geometry.

RDHW-MH

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDHW1003M0MH	10,00	3,18	0,14	**2012480**	–	–	–	–	–



RDMT-T RDMW/-T



		TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
P		○	●	●	●	●	●
M			○	●	○	○	○
K		●	○	○		○	
N							
S				●			
H		●					

● first choice
○ alternate choice

- Precision pressed insert; positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

RDMT-T

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDMT1003M0T	10,00	3,18	0,14	-	2957429	2957428	2012534	2276618	-

- Precision pressed insert with flat top geometry.
- First choice for cast iron and high-strength steel.

RDMW/-T

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDMW1003M0	10,00	3,18	0,09	2012572	-	-	-	-	-
RDMW1003M0T	10,00	3,18	0,14	-	-	3353279	2109381	2020735	2012578

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6525			TN6540			TN7525			TN7535			TTI25		
P	1	660	**580**	540	410	**320**	280	360	**280**	240	410	**310**	280	545	**475**	445	430	**360**	300
	2	410	**370**	330	320	**250**	215	250	**190**	170	310	**250**	215	335	**305**	275	310	**250**	215
	3	370	**330**	305	280	**215**	185	215	**170**	140	280	**215**	185	305	**275**	245	310	**250**	215
	4	275	**260**	230	235	**170**	145	180	**130**	110	235	**170**	145	230	**210**	190	265	**215**	180
	5	330	**300**	275	310	**235**	200	240	**180**	150	310	**235**	200	310	**275**	250	320	**235**	200
	6	230	**205**	175	205	**160**	130	160	**120**	100	205	**160**	130	190	**160**	130	145	**110**	90
M	1	270	**240**	210	190	**120**	80	130	**80**	60	245	**220**	185	245	**220**	185	480	**310**	215
	2	245	**210**	190	120	**80**	50	80	**50**	40	220	**190**	170	220	**190**	170	325	**205**	145
	3	190	**175**	150	125	**80**	55	85	**50**	40	175	**155**	140	175	**155**	140	320	**210**	145
K	1	420	**360**	300	275	**245**	220	220	**205**	180	380	**280**	240	355	**320**	290	220	**185**	155
	2	360	**300**	250	215	**190**	180	175	**155**	140	325	**240**	200	280	**250**	230	180	**145**	125
	3	300	**250**	200	180	**160**	145	155	**145**	125	240	**200**	170	235	**210**	190	145	**125**	100
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-T	0,23	**0,39**	0,65	0,17	**0,28**	0,47	0,13	**0,21**	0,35	0,11	**0,18**	0,31	0,10	**0,17**	0,28	RDHT-T
RDHW-MH	0,23	**0,42**	0,88	0,17	**0,30**	0,63	0,13	**0,23**	0,47	0,11	**0,20**	0,41	0,10	**0,18**	0,38	RDHW-MH
RDMT-T	0,23	**0,39**	0,65	0,17	**0,28**	0,47	0,13	**0,21**	0,35	0,11	**0,18**	0,31	0,10	**0,17**	0,28	RDMT-T
RDMW	0,23	**0,21**	0,61	0,17	**0,15**	0,44	0,13	**0,11**	0,33	0,11	**0,10**	0,28	0,10	**0,09**	0,26	RDMW
RDMW-T	0,23	**0,57**	0,88	0,17	**0,41**	0,63	0,13	**0,31**	0,47	0,11	**0,27**	0,41	0,10	**0,25**	0,38	RDMW-T

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-T	0,29	**0,49**	0,82	0,21	**0,35**	0,59	0,16	**0,26**	0,44	0,14	**0,23**	0,38	0,13	**0,21**	0,35	RDHT-T
RDHW-MH	0,29	**0,53**	1,11	0,21	**0,38**	0,79	0,16	**0,28**	0,59	0,14	**0,25**	0,52	0,13	**0,23**	0,47	RDHW-MH
RDMT-T	0,29	**0,49**	0,82	0,21	**0,35**	0,59	0,16	**0,26**	0,44	0,14	**0,23**	0,38	0,13	**0,21**	0,35	RDMT-T
RDMW	0,29	**0,26**	0,76	0,21	**0,19**	0,55	0,16	**0,14**	0,41	0,14	**0,12**	0,36	0,13	**0,11**	0,33	RDMW
RDMW-T	0,29	**0,71**	1,11	0,21	**0,51**	0,79	0,16	**0,38**	0,59	0,14	**0,33**	0,52	0,13	**0,31**	0,47	RDMW-T

At 1,00 Axial Depth of Cut (ap)

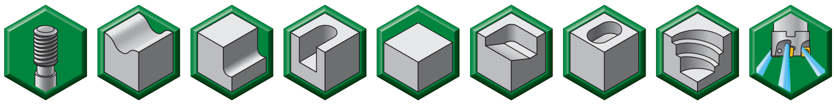
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-T	0,39	**0,65**	1,09	0,28	**0,47**	0,78	0,21	**0,35**	0,58	0,18	**0,31**	0,51	0,17	**0,28**	0,47	RDHT-T
RDHW-MH	0,39	**0,71**	1,49	0,28	**0,51**	1,06	0,21	**0,38**	0,79	0,18	**0,33**	0,69	0,17	**0,30**	0,63	RDHW-MH
RDMT-T	0,39	**0,65**	1,09	0,28	**0,47**	0,78	0,21	**0,35**	0,58	0,18	**0,31**	0,51	0,17	**0,28**	0,47	RDMT-T
RDMW	0,39	**0,35**	1,02	0,28	**0,25**	0,73	0,21	**0,19**	0,55	0,18	**0,16**	0,48	0,17	**0,15**	0,44	RDMW
RDMW-T	0,39	**0,95**	1,49	0,28	**0,69**	1,06	0,21	**0,51**	0,79	0,18	**0,45**	0,69	0,17	**0,41**	0,63	RDMW-T

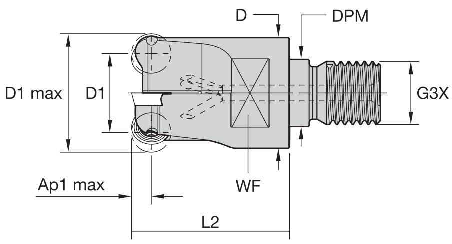
At 0,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-T	0,53	**0,90**	1,52	0,38	**0,65**	1,08	0,29	**0,48**	0,81	0,25	**0,42**	0,70	0,23	**0,39**	0,64	RDHT-T
RDHW-MH	0,53	**0,98**	2,07	0,38	**0,70**	1,47	0,29	**0,52**	1,09	0,25	**0,46**	0,95	0,23	**0,42**	0,87	RDHW-MH
RDMT-T	0,53	**0,90**	1,52	0,38	**0,65**	1,08	0,29	**0,48**	0,81	0,25	**0,42**	0,70	0,23	**0,39**	0,64	RDMT-T
RDMW	0,53	**0,48**	1,41	0,38	**0,35**	1,01	0,29	**0,26**	0,75	0,25	**0,23**	0,65	0,23	**0,21**	0,60	RDMW
RDMW-T	0,53	**1,32**	2,07	0,38	**0,95**	1,47	0,29	**0,70**	1,09	0,25	**0,61**	0,95	0,23	**0,56**	0,87	RDMW-T

NOTE: Use "Light Machining" value as starting feed rate.

- General purpose face and copy milling.
- Anti-rotation feature for top security.

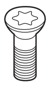
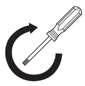
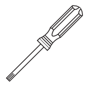




Screw-On End Mills

order number	catalogue number	D1 max	D1	D	DPM	G3X	L	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021374	**12391050200**	24	12	22	12,5	M12	52	30	19	6,0	2	10.0°	23000	Yes	0,10
2021378	**12391051000**	35	23	28	17,0	M16	63	40	22	6,0	3	10.8°	19000	Yes	0,20
2021379	**12391051200**	40	28	28	17,0	M16	63	40	22	6,0	4	8.3°	17000	Yes	0,30

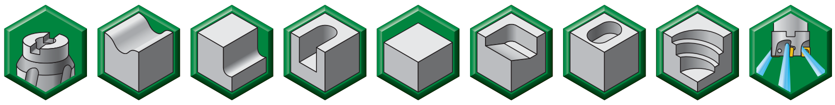
Spare Parts

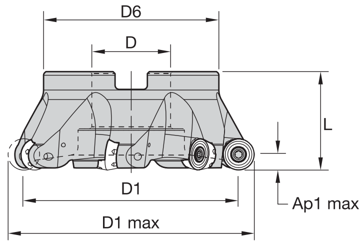




D1 max	insert screw	Nm	Torx wrench
24	**12148038800**	3,0	**12148000600**
35	**12148038800**	3,0	**12148000600**
40	**12148038800**	3,0	**12148000600**

NOTE: All spare parts except the insert screws must be ordered separately.

- General purpose face and copy milling.
- Anti-rotation feature for top security.

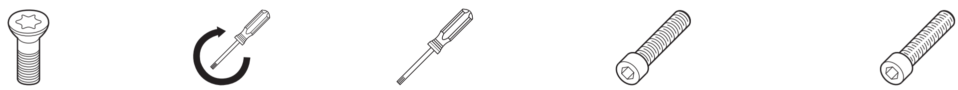




Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021342	**12391020000**	50	38	22	40	40	6,0	4	6.8°	15000	Yes	0,20
2021361	**12391024000**	52	40	22	40	40	6,0	4	6.5°	15000	Yes	0,20
2021343	**12391020200**	63	51	27	48	40	6,0	5	4.5°	14000	Yes	0,30
2021344	**12391020400**	80	68	27	60	50	6,0	6	3.5°	12000	Yes	0,90
2021345	**12391020600**	100	88	32	78	50	6,0	6	2.5°	11000	No	1,20
2021346	**12391020800**	125	113	40	89	50	6,0	7	2.0°	10000	No	1,70

Spare Parts



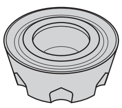
D1 max	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove
50	**12148038800**	3,0	**12148000600**	**125.025**	**MS1234CG**
52	**12148038800**	3,0	**12148000600**	**125.025**	**MS1234CG**
63	**12148038800**	3,0	**12148000600**	**125.230**	**MS2038CG**
80	**12148038800**	3,0	**12148000600**	**125.230**	**MS2038CG**
100	**12148038800**	3,0	**12148000600**	**–**	**–**
125	**12148038800**	3,0	**12148000600**	**–**	**–**

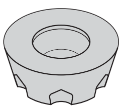
NOTE: All spare parts except the insert screws must be ordered separately.

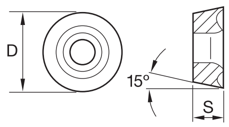
Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	RDMT-TX	TN7525	**RDMT-TX**	**TN6540**	RDMT-TX	TN6540
P3–P4	RDMT-TX	TN7525	**RDMW-TX**	**TN6540**	RDMW-TX	TN6540
P5–P6	RDMT-TX	TN7525	**RDPT-MMX**	**TN7535**	RDPT-MMX	TN7535
M1–M2	RDHT-TX	TN7525	**RDMT-TX**	**TN6540**	RDPT-MMX	TN6540
M3	RDHT-TX	TN7525	**RDMT-TX**	**TN6540**	RDPT-MMX	TN6540
K1–K2	RDMW-TX	WK15CM	**RDMW-TX**	**WK15CM**	RDMW-TX	TN7535
K3	RDHW-MH	TN2510	**RDMW-TX**	**WK15CM**	RDMW-TX	WK15CM
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	**RDMT-TX**	**TN6540**	–	–
S3	–	–	**RDMT-TX**	**TN6540**	–	–
S4	–	–	**RDMT-TX**	**TN6540**	RDPT-MMX	TN6540
H1	RDHW-MH	TN2510	**RDHW-MH**	**TN2510**	–	–

iC12 • Inserts


RDHT-TX


RDHW-MH



		TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
P		○	●	●	●	●		
M			○	●	○	○		○
K		●	○	○		○	●	
N								
S				●				●
H		●						

- Precision ground positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys.

● first choice
○ alternate choice

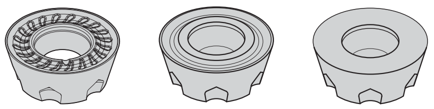
RDHT-TX

catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDHT1204M0TX	6	12,00	4,76	0,12	–	–	–	**2020775**	–	–	–

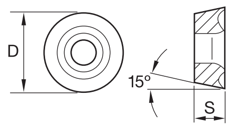
- Precision ground flat top insert.
- Alternative choice for stable milling operations in high-strength steel and hardened materials.

RDHW-MH

catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDHW1204M0MH	6	12,00	4,76	0,14	**2012484**	–	–	–	–	–	–



RDPT-MMX RDMT-TX RDMW-TX



● first choice
○ alternate choice

		TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
P		○	●	●	●	●		
M			○	●	○	○		○
K		●	○	○		○	●	
N								
S				●				●
H		●						

- Precision pressed insert.
- Improved performance in stainless steel and high-temp alloys.

RDPT-MMX

catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDPT1204M0SMMX	6	12,00	4,76	0,18	-	-	5176974	-	5176975	-	-

- Precision pressed positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

RDMT-TX

catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDMT1204M0TX	6	12,00	4,76	0,15	2109552	2957430	2957432	2020763	2109542	-	5520247

- Precision pressed insert.
- First choice for roughing operations, especially for steel and cast iron.

RDMW-TX

catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDMW1204M0TX	6	12,00	4,76	0,15	2012594	-	3353281	2109440	2020741	5427441	-

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6525			TN6540			TN7525		
P	1	660	**580**	540	410	**320**	280	360	**280**	240	410	**310**	280
	2	410	**370**	330	320	**250**	215	250	**190**	170	310	**250**	215
	3	370	**330**	305	280	**215**	185	215	**170**	140	280	**215**	185
	4	275	**260**	230	235	**170**	145	180	**130**	110	235	**170**	145
	5	330	**300**	275	310	**235**	200	240	**180**	150	310	**235**	200
	6	230	**205**	175	205	**160**	130	160	**120**	100	205	**160**	130
M	1	270	**240**	210	190	**120**	80	130	**80**	60	245	**220**	185
	2	245	**210**	190	120	**80**	50	80	**50**	40	220	**190**	170
	3	190	**175**	150	125	**80**	55	85	**50**	40	175	**155**	140
K	1	420	**360**	300	275	**245**	220	220	**205**	180	380	**280**	240
	2	360	**300**	250	215	**190**	180	175	**155**	140	325	**240**	200
	3	300	**250**	200	180	**160**	145	155	**145**	125	240	**200**	170
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–
	2	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–
	3	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–
	4	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–

Material Group		TN7535			WK15CM			WS30PM			TTI25		
P	1	545	**475**	445	–	**–**	–	–	**–**	–	430	**360**	300
	2	335	**305**	275	–	**–**	–	–	**–**	–	310	**250**	215
	3	305	**275**	245	–	**–**	–	–	**–**	–	310	**250**	215
	4	230	**210**	190	–	**–**	–	–	**–**	–	265	**215**	180
	5	310	**275**	250	–	**–**	–	–	**–**	–	320	**235**	200
	6	190	**160**	130	–	**–**	–	–	**–**	–	145	**110**	90
M	1	245	**220**	185	–	**–**	–	270	**240**	220	480	**310**	215
	2	220	**190**	170	–	**–**	–	245	**215**	175	325	**205**	145
	3	175	**155**	140	–	**–**	–	185	**160**	125	320	**210**	145
K	1	355	**320**	290	505	**460**	410	–	**–**	–	220	**185**	155
	2	280	**250**	230	400	**355**	330	–	**–**	–	180	**145**	125
	3	235	**210**	190	335	**300**	275	–	**–**	–	145	**125**	100
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	55	**50**	35	–	**–**	–
	2	–	**–**	–	–	**–**	–	55	**50**	35	–	**–**	–
	3	–	**–**	–	–	**–**	–	65	**55**	35	–	**–**	–
	4	–	**–**	–	–	**–**	–	100	**70**	50	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 6,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
RDHT-TX	0,35	**0,33**	0,56	0,25	**0,24**	0,40	0,19	**0,18**	0,30	0,16	**0,16**	0,26	0,15	**0,14**	0,24	RDHT-TX
RDMT-TX	0,35	**0,42**	0,70	0,25	**0,30**	0,50	0,19	**0,23**	0,38	0,16	**0,20**	0,33	0,15	**0,18**	0,30	RDMT-TX
RDPT-MMX	0,35	**0,57**	0,93	0,25	**0,41**	0,67	0,19	**0,31**	0,50	0,16	**0,27**	0,43	0,15	**0,25**	0,40	RDPT-MMX
RDHW-MH	0,35	**0,70**	1,08	0,25	**0,50**	0,78	0,19	**0,38**	0,58	0,16	**0,33**	0,50	0,15	**0,30**	0,46	RDHW-MH
RDMW-TX	0,35	**0,70**	1,16	0,25	**0,50**	0,83	0,19	**0,38**	0,62	0,16	**0,33**	0,54	0,15	**0,30**	0,50	RDMW-TX

At 3,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
RDHT-TX	0,40	**0,38**	0,64	0,29	**0,28**	0,46	0,22	**0,21**	0,35	0,19	**0,18**	0,30	0,17	**0,17**	0,28	RDHT-TX
RDMT-TX	0,40	**0,48**	0,81	0,29	**0,35**	0,58	0,22	**0,26**	0,43	0,19	**0,23**	0,38	0,17	**0,21**	0,35	RDMT-TX
RDPT-MMX	0,40	**0,66**	1,08	0,29	**0,48**	0,77	0,22	**0,36**	0,58	0,19	**0,31**	0,50	0,17	**0,29**	0,46	RDPT-MMX
RDHW-MH	0,40	**0,81**	1,25	0,29	**0,58**	0,90	0,22	**0,43**	0,67	0,19	**0,38**	0,58	0,17	**0,35**	0,53	RDHW-MH
RDMW-TX	0,40	**0,81**	1,34	0,29	**0,58**	0,96	0,22	**0,43**	0,72	0,19	**0,38**	0,62	0,17	**0,35**	0,57	RDMW-TX

At 1,50 Axial Depth of Cut (ap)

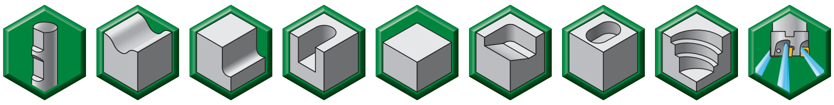
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
RDHT-TX	0,53	**0,50**	0,85	0,38	**0,36**	0,61	0,28	**0,27**	0,45	0,25	**0,24**	0,40	0,23	**0,22**	0,36	RDHT-TX
RDMT-TX	0,53	**0,63**	1,06	0,38	**0,46**	0,76	0,28	**0,34**	0,57	0,25	**0,30**	0,50	0,23	**0,27**	0,45	RDMT-TX
RDPT-MMX	0,53	**0,87**	1,42	0,38	**0,63**	1,01	0,28	**0,47**	0,76	0,25	**0,41**	0,66	0,23	**0,37**	0,60	RDPT-MMX
RDHW-MH	0,53	**1,06**	1,65	0,38	**0,76**	1,18	0,28	**0,57**	0,88	0,25	**0,50**	0,76	0,23	**0,45**	0,70	RDHW-MH
RDMW-TX	0,53	**1,06**	1,78	0,38	**0,76**	1,26	0,28	**0,57**	0,94	0,25	**0,50**	0,82	0,23	**0,45**	0,75	RDMW-TX

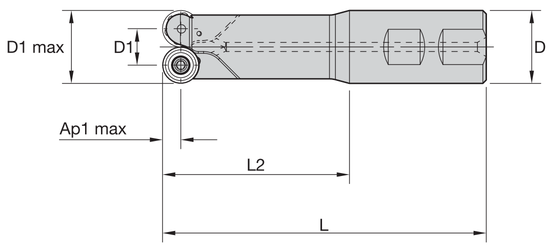
At 0,75 Axial Depth of Cut (ap)

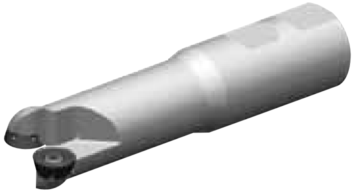
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
RDHT-TX	0,72	**0,69**	1,16	0,52	**0,50**	0,83	0,39	**0,37**	0,62	0,34	**0,32**	0,54	0,31	**0,30**	0,50	RDHT-TX
RDMT-TX	0,72	**0,87**	1,46	0,52	**0,62**	1,04	0,39	**0,47**	0,78	0,34	**0,41**	0,68	0,31	**0,37**	0,62	RDMT-TX
RDPT-MMX	0,72	**1,20**	1,96	0,52	**0,86**	1,39	0,39	**0,64**	1,03	0,34	**0,56**	0,90	0,31	**0,51**	0,82	RDPT-MMX
RDHW-MH	0,72	**1,46**	2,29	0,52	**1,04**	1,62	0,39	**0,78**	1,20	0,34	**0,68**	1,04	0,31	**0,62**	0,95	RDHW-MH
RDMW-TX	0,72	**1,46**	2,46	0,52	**1,04**	1,74	0,39	**0,78**	1,29	0,34	**0,68**	1,12	0,31	**0,62**	1,02	RDMW-TX

NOTE: Use "Light Machining" value as starting feed rate.

- General purpose face and copy milling.
- Anti-rotation feature for top security.



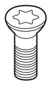


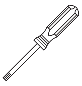


Weldon Shanks

order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021341	**12391013800**	32	16	32	142	82	8,0	2	7.8°	19000	Yes	1,10

Spare Parts



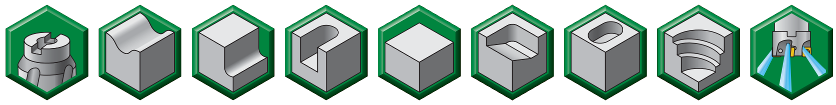


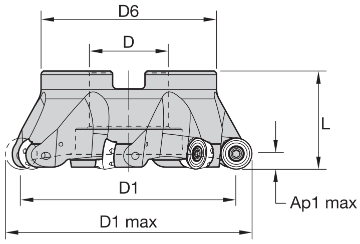
D1 max	insert screw	Nm	Torx driver
32	**12148007200**	4,0	**12148007500**

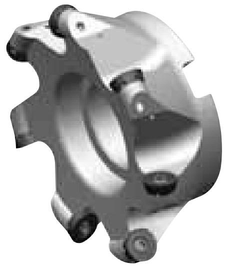
NOTE: All spare parts except the insert screws must be ordered separately.

Copy Mills

- General purpose face and copy milling.
- Anti-rotation feature for top security.



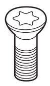
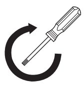
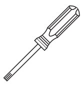
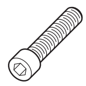
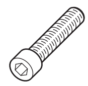




■ Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021347	**12391021000**	50	34	22	40	40	8,0	4	10.3°	13000	Yes	0,20
2021348	**12391021200**	63	47	27	48	40	8,0	4	7.0°	12000	Yes	0,30
2021349	**12391021400**	80	64	27	60	50	8,0	5	4.8°	10000	Yes	0,90
2021350	**12391021600**	100	84	32	78	50	8,0	6	3.8°	9000	No	1,20
2021351	**12391021800**	125	109	40	89	50	8,0	7	2.8°	8000	No	1,70

■ Spare Parts

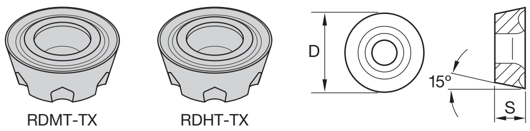
D1 max	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove
50	**12148007200**	4,0	**12148007500**	**125.025**	**MS1234CG**
63	**12148007200**	4,0	**12148007500**	**125.230**	**MS2038CG**
80	**12148007200**	4,0	**12148007500**	**125.230**	**MS2038CG**
100	**12148007200**	4,0	**12148007500**	–	–
125	**12148007200**	4,0	**12148007500**	–	–

NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	RDMT-TX	TN6525	**RDMT-TX**	**TN6540**	RDMT-TX	TN6540
P3–P4	RDMT-TX	TN6525	**RDMW-TX**	**TN6540**	RDMW-TX	TN6540
P5–P6	RDMT-TX	TN7525	**RDMT-TX**	**TN7535**	RDMT-TX	TN7535
M1–M2	RDMT-TX	TN6525	**RDMT-TX**	**TN6540**	RDMT-TX	TN6540
M3	RDMT-TX	TN6525	**RDMT-TX**	**TN6540**	RDMT-TX	TN6540
K1–K2	RDMW-TX	TN2510	**RDMW-TX**	**TN7535**	RDMW-TX	TN7535
K3	RDMW-TX	TN2510	**RDMW-TX**	**TN7535**	RDMW-TX	TN7535
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**RDMT-TX**	**TN6540**	–	–
S3	–	–	**RDMT-TX**	**TN6540**	–	–
S4	–	–	**RDMT-TX**	**TN6540**	RDMT-TX	TN6540
H1	RDMW-TX	TN2510	**RDMW-TX**	**TN2510**	–	–

iC16 • Inserts



		TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
P		○	●	●	●	●	●
M			○	●	○	○	○
K		●	○	○		○	
N							
S				●			
H		●					

● first choice
○ alternate choice

- Precision ground positive geometry for lower cutting forces
- First choice for general machining, stainless steel, and high-temp alloys.

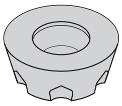
RDHT-TX

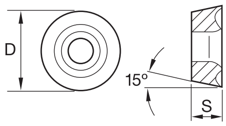
catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDHT1605M0TX	16,00	5,56	0,12	–	–	–	–	–	**2012462**

- Precision pressed positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

RDMT-TX

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDMT1605M0TX	16,00	5,56	0,18	–	**2957536**	**2957533**	**2020767**	**2207645**	–


RDMW-TX



- Precision pressed insert.
- First choice for roughing operations, especially for steel and cast iron.

● first choice
○ alternate choice

		TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
P		○	●	●	●	●	●
M			○	●	○	○	○
K		●	○	○		○	
N							
S				●			
H		●					

RDMW-TX

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDMW1605M0TX	16,00	5,56	0,15	-	-	3523083	2109476	2020749	-

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6525			TN6540			TN7525			TN7535			TI25		
P	1	660	**580**	540	410	**320**	280	360	**280**	240	410	**310**	280	545	**475**	445	430	**360**	300
	2	410	**370**	330	320	**250**	215	250	**190**	170	310	**250**	215	335	**305**	275	310	**250**	215
	3	370	**330**	305	280	**215**	185	215	**170**	140	280	**215**	185	305	**275**	245	310	**250**	215
	4	275	**260**	230	235	**170**	145	180	**130**	110	235	**170**	145	230	**210**	190	265	**215**	180
	5	330	**300**	275	310	**235**	200	240	**180**	150	310	**235**	200	310	**275**	250	320	**235**	200
	6	230	**205**	175	205	**160**	130	160	**120**	100	205	**160**	130	190	**160**	130	145	**110**	90
M	1	270	**240**	210	190	**120**	80	130	**80**	60	245	**220**	185	245	**220**	185	480	**310**	215
	2	245	**210**	190	120	**80**	50	80	**50**	40	220	**190**	170	220	**190**	170	325	**205**	145
	3	190	**175**	150	125	**80**	55	85	**50**	40	175	**155**	140	175	**155**	140	320	**210**	145
K	1	420	**360**	300	275	**245**	220	220	**205**	180	380	**280**	240	355	**320**	290	220	**185**	155
	2	360	**300**	250	215	**190**	180	175	**155**	140	325	**240**	200	280	**250**	230	180	**145**	125
	3	300	**250**	200	180	**160**	145	155	**145**	125	240	**200**	170	235	**210**	190	145	**125**	100
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHX-TX	0,11	**0,35**	0,70	0,08	**0,25**	0,50	0,06	**0,19**	0,38	0,05	**0,16**	0,33	0,05	**0,15**	0,30	RDHX-TX
RDMT-TX	0,23	**0,42**	0,84	0,17	**0,30**	0,60	0,13	**0,23**	0,45	0,11	**0,20**	0,39	0,10	**0,18**	0,36	RDMT-TX
RDMW-TX	0,23	**0,52**	1,05	0,17	**0,38**	0,76	0,13	**0,28**	0,56	0,11	**0,25**	0,49	0,10	**0,23**	0,45	RDMW-TX

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHX-TX	0,13	**0,40**	0,81	0,10	**0,29**	0,58	0,07	**0,22**	0,43	0,06	**0,19**	0,38	0,06	**0,17**	0,35	RDHX-TX
RDMT-TX	0,27	**0,48**	0,97	0,19	**0,35**	0,70	0,14	**0,26**	0,52	0,13	**0,23**	0,45	0,12	**0,21**	0,42	RDMT-TX
RDMW-TX	0,27	**0,60**	1,22	0,19	**0,44**	0,87	0,14	**0,33**	0,65	0,13	**0,28**	0,57	0,12	**0,26**	0,52	RDMW-TX

At 2,00 Axial Depth of Cut (ap)

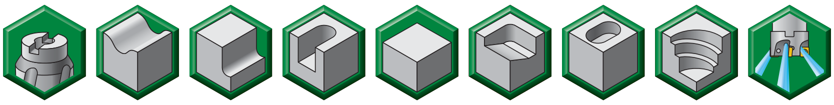
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHX-TX	0,17	**0,53**	1,06	0,13	**0,38**	0,76	0,09	**0,28**	0,57	0,08	**0,25**	0,50	0,08	**0,23**	0,45	RDHX-TX
RDMT-TX	0,35	**0,63**	1,28	0,25	**0,46**	0,92	0,19	**0,34**	0,68	0,17	**0,30**	0,59	0,15	**0,27**	0,54	RDMT-TX
RDMW-TX	0,35	**0,79**	1,61	0,25	**0,57**	1,15	0,19	**0,43**	0,85	0,17	**0,37**	0,74	0,15	**0,34**	0,68	RDMW-TX

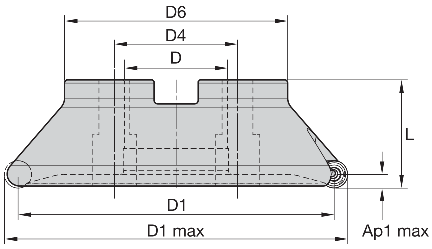
At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHX-TX	0,24	**0,72**	1,46	0,17	**0,52**	1,04	0,13	**0,39**	0,78	0,11	**0,34**	0,68	0,10	**0,31**	0,62	RDHX-TX
RDMT-TX	0,48	**0,87**	1,76	0,35	**0,62**	1,26	0,26	**0,47**	0,93	0,23	**0,41**	0,81	0,21	**0,37**	0,74	RDMT-TX
RDMW-TX	0,48	**1,09**	2,22	0,35	**0,78**	1,58	0,26	**0,58**	1,17	0,23	**0,51**	1,02	0,21	**0,46**	0,93	RDMW-TX

NOTE: Use "Light Machining" value as starting feed rate.

- General purpose face and copy milling.
- Anti-rotation feature for top security.

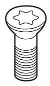


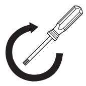


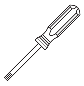
Shell Mills

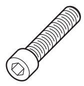
order number	catalogue number	D1 max	D1	D	D4	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021358	**12391023400**	50	34	22	–	40	40	8,0	4	6.0°	13000	Yes	0,20
2021359	**12391023600**	52	36	22	–	40	40	8,0	4	5.8°	13000	Yes	0,30
2021357	**12391023200**	63	47	27	–	48	40	8,0	5	4.0°	12000	Yes	0,20
2021360	**12391023800**	66	50	27	–	48	40	8,0	5	3.8°	12000	Yes	0,30
2021352	**12391022000**	80	64	27	–	60	50	8,0	6	2.8°	10000	Yes	0,90
2021353	**12391022200**	100	84	32	–	78	50	8,0	7	2.3°	9000	No	1,20
2021354	**12391022400**	125	109	40	–	89	50	8,0	8	1.8°	8000	No	1,80
2021355	**12391022600**	160	144	40	67	90	63	8,0	9	1.3°	7000	No	2,90
2021356	**12391022800**	200	184	60	102	130	63	8,0	11	0.8°	6000	No	0,30

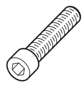
Spare Parts











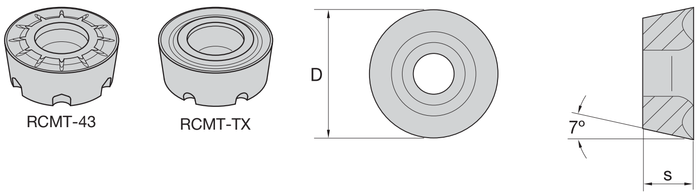
D1 max	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove
50	**12148007200**	4,0	**12148007500**	**125.025**	**MS1234CG**
52	**12148007200**	4,0	**12148007500**	**125.025**	**MS1234CG**
63	**12148007200**	4,0	**12148007500**	**125.230**	**MS2038CG**
66	**12148007200**	4,0	**12148007500**	**125.230**	**MS2038CG**
80	**12148007200**	4,0	**12148007500**	**125.230**	**MS2038CG**
100	**12148007200**	4,0	**12148007500**	–	–
125	**12148007200**	4,0	**12148007500**	–	–
160	**12148007200**	4,0	**12148007500**	–	–
200	**12148007200**	4,0	**12148007500**	–	–

NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining Geometry	Light Machining Grade	General Purpose Geometry	General Purpose Grade	Heavy Machining Geometry	Heavy Machining Grade
P1–P2	...TX	TN6525	**...43**	**TN6540**	...43	TN6540
P3–P4	...TX	TN6525	**...TX**	**TN6540**	...43	TN6540
P5–P6	...TX	TN6525	**...TX**	**TN7535**	...TX	TN7535
M1–M2	...TX	TN6525	**...TX**	**TN6540**	...TX	TN6540
M3	...TX	TN6525	**...TX**	**TN6540**	...TX	TN6540
K1–K2	...43	TN2510	**...TX**	**WK15CM**	...TX	WK15CM
K3	...TX	TN6525	**...TX**	**WK15CM**	...TX	WK15CM
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	...43	TN6540	**...TX**	**TN6540**	...TX	TN6540
H1	–	–	**...TX**	**TN2510**	–	–

iC16 • Inserts



● first choice
○ alternate choice

		TN2510	TN6525	TN6540	TN7525	TN7535
P		○	●	●	●	●
M			○	●	○	○
K		●	○	○		○
N						
S				●		
H		●				

- Optimised geometry providing excellent chip control, even at lower depth of cut.

RCMT-43

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535
RCMT1606M043M	16,00	6,35	0,20	–	–	2957537	2020771	2067140

- Precision pressed positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

RCMT-TX

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535
RCMT1606M0TX	16,00	6,35	0,24	2012416	2957535	2957427	2012418	2020781

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6525			TN6540			TN7525			TN7535			WK15CM		
P	1	660	**580**	540	410	**320**	280	360	**280**	240	410	**310**	280	545	**475**	445	–	–	–
	2	410	**370**	330	320	**250**	215	250	**190**	170	310	**250**	215	335	**305**	275	–	–	–
	3	370	**330**	305	280	**215**	185	215	**170**	140	280	**215**	185	305	**275**	245	–	–	–
	4	275	**260**	230	235	**170**	145	180	**130**	110	235	**170**	145	230	**210**	190	–	–	–
	5	330	**300**	275	310	**235**	200	240	**180**	150	310	**235**	200	310	**275**	250	–	–	–
	6	230	**205**	175	205	**160**	130	160	**120**	100	205	**160**	130	190	**160**	130	–	–	–
M	1	270	**240**	210	190	**120**	80	130	**80**	60	245	**220**	185	245	**220**	185	–	–	–
	2	245	**210**	190	120	**80**	50	80	**50**	40	220	**190**	170	220	**190**	170	–	–	–
	3	190	**175**	150	125	**80**	55	85	**50**	40	175	**155**	140	175	**155**	140	–	–	–
K	1	420	**360**	300	275	**245**	220	220	**205**	180	380	**280**	240	355	**320**	290	505	**460**	410
	2	360	**300**	250	215	**190**	180	175	**155**	140	325	**240**	200	280	**250**	230	400	**355**	330
	3	300	**250**	200	180	**160**	145	155	**145**	125	240	**200**	170	235	**210**	190	335	**300**	275
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	50	**35**	30	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	25	**20**	10	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	70	**40**	30	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	60	**30**	25	–	–	–	–	–	–	–	–	–
H	1	145	**110**	70	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	145	**110**	70	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	115	**80**	45	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
...43	0,46	**0,60**	0,93	0,33	**0,44**	0,67	0,25	**0,33**	0,50	0,22	**0,28**	0,44	0,20	**0,26**	0,40	...43
...TX	0,46	**0,70**	1,12	0,33	**0,50**	0,81	0,25	**0,38**	0,60	0,22	**0,33**	0,52	0,20	**0,30**	0,48	...TX

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
...43	0,54	**0,70**	1,08	0,39	**0,50**	0,78	0,29	**0,38**	0,58	0,25	**0,33**	0,50	0,23	**0,30**	0,46	...43
...TX	0,54	**0,81**	1,30	0,39	**0,58**	0,93	0,29	**0,43**	0,69	0,25	**0,38**	0,61	0,23	**0,35**	0,55	...TX

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
...43	0,70	**0,92**	1,42	0,51	**0,66**	1,02	0,38	**0,49**	0,76	0,33	**0,43**	0,66	0,30	**0,39**	0,60	...43
...TX	0,70	**1,06**	1,72	0,51	**0,76**	1,23	0,38	**0,57**	0,91	0,33	**0,50**	0,79	0,30	**0,45**	0,73	...TX

At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
...43	0,96	**1,26**	1,97	0,69	**0,90**	1,40	0,52	**0,67**	1,04	0,45	**0,59**	0,90	0,41	**0,54**	0,83	...43
...TX	0,96	**1,46**	2,38	0,69	**1,04**	1,68	0,52	**0,78**	1,25	0,45	**0,68**	1,08	0,41	**0,62**	0,99	...TX

NOTE: Use “Light Machining” value as starting feed rate.

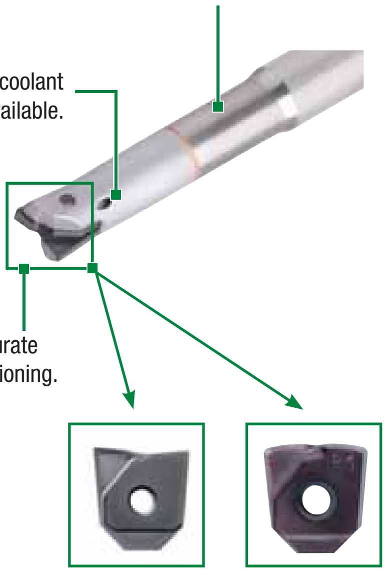
For Secure and Rigid Insert Clamping •

M270™ Series

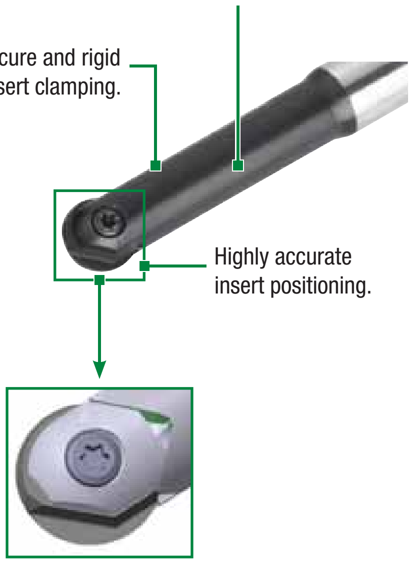
M270

With precision-engineered ball nose, toroidal, and new high-feed inserts, the M270 Series provides the highest accuracy and insert stability for exceptional reliability and performance.

- Ball nose and toroidal tools for semi-finishing through finishing.
- Performance-boosting High-Feed (HF) inserts offered standard.
- V-shaped contact faces enable maximum stability and accuracy.

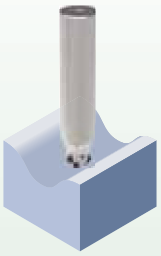


Toroidal and high-feed inserts use the same holder.



Two contact faces in V-shape provide more insert rigidity and accuracy.

Copy Mills

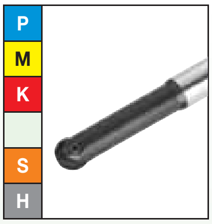


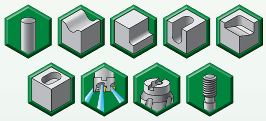
M270™ Ball Nose

Max depth of cut: 5–16mm

Diameter: 10–32mm

Pages: M102–M117



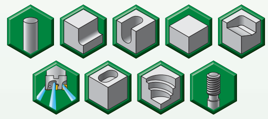


M270 Toroidal

Max depth of cut: 0,3–4mm

Diameter: 10–20mm

Pages: M118–M123

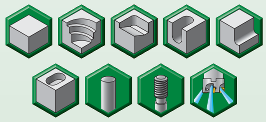


M270 High Feed

Max depth of cut: 0,6–1,1mm

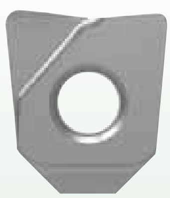
Diameter: 10–20mm

Pages: M124–M130



Insert Offering

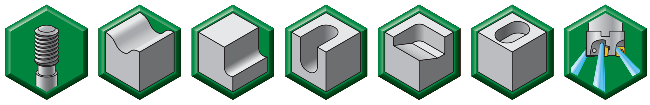
Ball nose inserts BF/BR

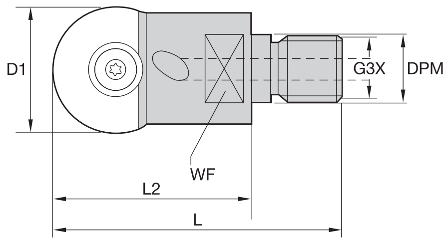


Toroidal inserts TF

High-Feed inserts HF

- Rough, semi-finishing, and finishing with one system.
- Through tool coolant.
- Secure and rigid insert clamping.



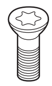


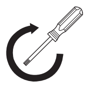
Ball Nose • Screw-On End Mills

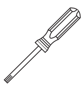
order number	catalogue number	D1	DPM	G3X	L	L2	WF	Z	Z U	inserts	max RPM	coolant supply	kg
2243624	**M270BD010M08**	10	8,5	M8	42	25	10,0	1	2	M270B.10	57000	Yes	0,05
2243625	**M270BD012M08**	12	8,5	M8	42	25	10,0	1	2	M270B.12	55000	Yes	0,05
2243626	**M270BD016M08**	16	8,5	M8	47	30	10,0	1	2	M270B.16	53000	Yes	0,05
2243627	**M270BD020M10**	20	10,5	M10	59	40	14,0	1	2	M270B.20	52000	Yes	0,10
2243628	**M270BD025M12**	25	12,5	M12	72	50	19,0	1	2	M270B.25	50000	Yes	0,10
2243629	**M270BD032M16**	32	17,0	M16	73	50	22,0	1	2	M270B.32	46000	Yes	0,20

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

Spare Parts



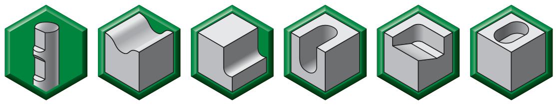


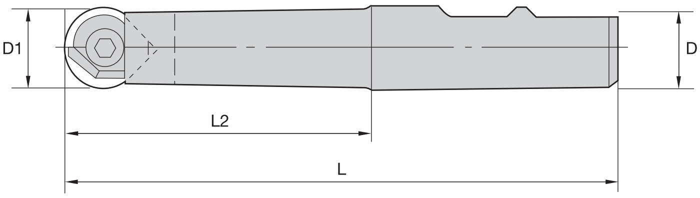


D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**
25	**12748610900**	7,0	**12148086800**
32	**12748611000**	7,0	**12146006300**

NOTE: All spare parts except the insert screws must be ordered separately.

- Rough, semi-finishing, and finishing with one system.
- Secure and rigid insert clamping.



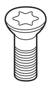


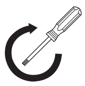
Ball Nose • Weldon® Shanks

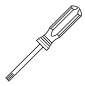
order number	catalogue number	D1	D	L	L2	Z	Z U	inserts	max RPM	coolant supply	kg
2243618	**M270BD010B12L90**	10	12	90	45	1	2	M270B.10	57000	No	0,10
2243619	**M270BD012B12L95**	12	12	95	50	1	2	M270B.12	55000	No	0,10
2243620	**M270BD016B16L105**	16	16	105	57	1	2	M270B.16	53000	No	0,10
2243621	**M270BD020B20L120**	20	20	120	70	1	2	M270B.20	52000	No	0,20
2243622	**M270BD025B25L145**	25	25	145	89	1	2	M270B.25	50000	No	0,40
2243623	**M270BD032B32L155**	32	32	155	95	1	2	M270B.32	46000	No	0,80

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

Spare Parts



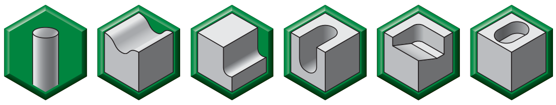


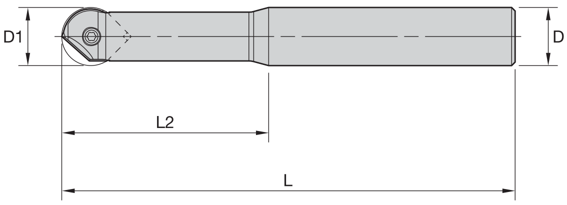


D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**
25	**12748610900**	7,0	**12148086800**
32	**12748611000**	7,0	**12146006300**

NOTE: All spare parts except the insert screws must be ordered separately.

- Rough, semi-finishing, and finishing with one system.
- Secure and rigid insert clamping.



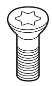


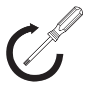
Ball Nose • Cylindrical Shanks

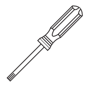
order number	catalogue number	D1	D	L	L2	Z	Z U	inserts	max RPM	coolant supply	kg
2243613	**M270BD010A12L140**	10	12	140	45	1	2	M270B.10	57000	No	0,10
2243614	**M270BD012A12L145**	12	12	145	50	1	2	M270B.12	55000	No	0,10
2067470	**M270BD016A16L155**	16	16	155	57	1	2	M270B.16	53000	No	0,20
2243615	**M270BD020A20L170**	20	20	170	70	1	2	M270B.20	52000	No	0,40
2243616	**M270BD025A25L195**	25	25	195	89	1	2	M270B.25	50000	No	0,60
2243617	**M270BD032A32L205**	32	32	205	95	1	2	M270B.32	46000	No	1,10

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

Spare Parts





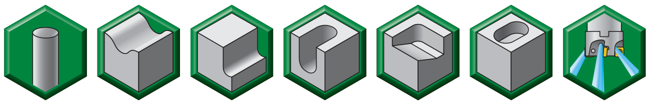


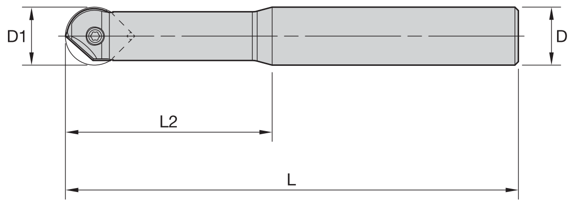
D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**
25	**12748610900**	7,0	**12148086800**
32	**12748611000**	7,0	**12146006300**

NOTE: All spare parts except the insert screws must be ordered separately.

Copy Mills

- Rough, semi-finishing, and finishing with one system.
- Through tool coolant.
- Carbide shank to improve rigidity.



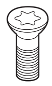


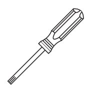
■ Ball Nose • Carbide Cylindrical Shanks

order number	catalogue number	D1	D	L	L2	Z	Z U	inserts	max RPM	coolant supply	kg
2424550	**M270BD010A12L140C**	10	12	140	45	1	2	M270B.10	57000	Yes	0,20
2424587	**M270BD012A12L145C**	12	12	145	50	1	2	M270B.12	55000	Yes	0,20
2424634	**M270BD016A16L155C**	16	16	155	57	1	2	M270B.16	53000	Yes	0,40
2639257	**M270BD020A20L170C**	20	20	170	70	1	2	M270B.20	52000	Yes	0,65

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

■ Spare Parts





D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide • .B..10

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN2505	**BR**	**TN7535**	BR	TN7535
P3–P4	BF	TN2505	**BR**	**TN7535**	BR	TN7535
P5–P6	BF	TN2505	**BR**	**TN7535**	BR	TN7535
M1–M2	BR	TN7535	**BR**	**TN7535**	BR	TN7535
M3	BR	TN7535	**BR**	**TN7535**	BR	TN7535
K1–K2	BF	TN2505	**BR**	**TN7535**	BR	TN7535
K3	BF	TN2505	**BR**	**TN7535**	BR	TN7535
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**–**	**–**	–	–
S3	–	–	**–**	**–**	–	–
S4	–	–	**–**	**–**	–	–
H1	BF	TN2505	**BF**	**TN2505**	–	TN2510

Insert Selection Guide • .B..12

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN2505	**BR**	**TN7535**	BR	TN7535
P3–P4	BF	TN2505	**BR**	**TN7535**	BR	TN7535
P5–P6	BF	TN2505	**BR**	**TN7535**	BR	TN7535
M1–M2	BR	TN7535	**BR**	**TN7535**	BR	TN7535
M3	BR	TN7535	**BR**	**TN7535**	BR	TN7535
K1–K2	BF	TN2505	**BR**	**TN2510**	BR	TN7535
K3	BF	TN2505	**BR**	**TN2510**	BR	TN7535
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**–**	**–**	–	–
S3	–	–	**–**	**–**	–	–
S4	–	–	**–**	**–**	–	–
H1	BF	TN2505	**BF**	**TN2505**	BR	TN2510

Insert Selection Guide • .B..16

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN6525	**BR**	**TN7535**	BR	TN7535
P3–P4	BF	TN6525	**BR**	**TN7535**	BR	TN7535
P5–P6	BF	TN6525	**BR**	**TN7535**	BR	TN7535
M1–M2	BF	TN6525	**BF**	**TN6525**	BR	TN7535
M3	BF	TN6525	**BF**	**TN6525**	BR	TN7535
K1–K2	BF	TN2505	**BR**	**TN7535**	BR	TN7535
K3	BF	TN2505	**BR**	**TN7535**	BR	TN7535
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**–**	**–**	–	–
S3	–	–	**–**	**–**	–	–
S4	BF	TN2505	**–**	**–**	–	–
H1	BF	TN2505	**BF**	**TN2505**	BR	TN2510

Insert Selection Guide • .B..20

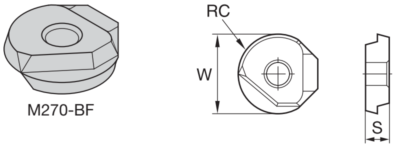
Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN6540	**BF**	**TN6540**	BF	TN6540
P3–P4	BF	TN6540	**BF**	**TN6540**	BF	TN7535
P5–P6	BF	TN6540	**BF**	**TN7535**	BF	TN7535
M1–M2	BF	TN6540	**BF**	**TN6540**	BF	TN7535
M3	BF	TN6540	**BF**	**TN6540**	BF	TN7535
K1–K2	BR	TN2505	**BR**	**TN2505**	–	–
K3	BR	TN2505	**BR**	**TN2505**	–	–
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**BF**	**TN6540**	–	–
S3	–	–	**BF**	**TN6540**	–	–
S4	–	–	**BF**	**TN6540**	–	–
H1	–	–	**BR**	**TN2505**	–	TN2510

Insert Selection Guide • .B..25

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN2510	**BR**	**TN7525**	BR	TN7535
P3–P4	BF	TN2510	**BR**	**TN7525**	BR	TN7535
P5–P6	BF	TN2510	**BR**	**TN7525**	BR	TN7535
M1–M2	BF	TN2510	**BF**	**TN2510**	BR	TN7535
M3	BF	TN2510	**BF**	**TN2510**	BR	TN7535
K1–K2	BF	TN2510	**BF**	**TN2510**	BR	TN7535
K3	BF	TN2505	**BF**	**TN2510**	BR	TN7535
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	BF	TN2510	**–**	**–**	–	–
S3	BF	TN2510	**–**	**–**	–	–
S4	BF	TN2505	**BR**	**TN7535**	–	–
H1	BF	TN2505	**BF**	**TN2510**	BR	TN2510

Insert Selection Guide • .B..32

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN2510	**BR**	**TN7525**	BR	TN7535
P3–P4	BF	TN2510	**BR**	**TN7525**	BR	TN7535
P5–P6	BF	TN2510	**BR**	**TN7525**	BR	TN7535
M1–M2	BF	TN2510	**BF**	**TN2510**	BR	TN7535
M3	BF	TN2510	**BF**	**TN2510**	BR	TN7535
K1–K2	BF	TN2510	**BF**	**TN2510**	BR	TN7535
K3	BF	TN2505	**BF**	**TN2510**	BR	TN7535
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	BF	TN2510	**–**	**–**	–	–
S3	BF	TN2510	**–**	**–**	–	–
S4	BF	TN2505	**BR**	**TN7535**	–	–
H1	BF	TN2505	**BF**	**TN2510**	BR	TN2510



M270-BF

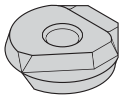
● first choice
○ alternate choice

		TN2505	TN2510	TN6525	TN6540	TN7525	TN7535
P		○	○	●	●	●	●
M				○	●	○	○
K		●	●	○	○		○
N							
S					●		
H		●	●				

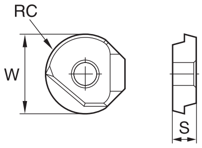
- -BF geometry is the first choice for all finishing and light operations.

■ M270 BF

catalogue number	W	S	RC	hm	TN2505	TN2510	TN6525	TN6540	TN7525	TN7535
M270BF10	10,00	2,38	5,00	0,08	2012698	2012700	–	–	–	–
M270BF12	12,00	3,18	6,00	0,08	2012718	2012720	2957538	–	–	–
M270BF16	16,00	4,76	8,00	0,08	2012728	2012730	2957541	–	–	–
M270BF20	20,00	4,76	10,00	0,10	2012748	2012750	2957542	–	–	–
M270BF25	25,00	4,76	12,50	0,10	2012758	2012760	–	–	–	–
M270BF32	32,00	4,76	16,00	0,10	2012778	2012780	–	–	–	–



M270-BR



- -BR geometry is the first choice for all semi-finishing and medium-duty applications.

● first choice
○ alternate choice

	TN2505	TN2510	TN6525	TN6540	TN7525	TN7535
P	○	○	●	●	●	●
M			○	●	○	○
K	●	●	○	○		○
N						
S				●		
H	●	●				

■ M270 BR

catalogue number	W	S	RC	hm	TN2505	TN2510	TN6525	TN6540	TN7525	TN7535
M270BR10	10,00	2,38	5,00	0,08	-	2012610	-	-	2012612	2012624
M270BR12	12,00	3,18	6,00	0,08	-	2012630	-	2957539	2012632	2012634
M270BR16	16,00	4,76	8,00	0,08	-	2012640	-	2957540	2012642	2113506
M270BR20	20,00	4,76	10,00	0,10	-	2012658	-	2957543	2012660	2012662
M270BR25	25,00	4,76	12,50	0,10	-	2012668	-	-	2012670	2012672
M270BR32	32,00	4,76	16,00	0,10	-	2012688	-	-	2012690	2012692

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN2510			TN6525			TN6540		
P	1	550	**420**	360	660	**580**	540	410	**320**	280	360	**280**	240
	2	320	**240**	205	410	**370**	330	320	**250**	215	250	**190**	170
	3	320	**240**	205	370	**330**	305	280	**215**	185	215	**170**	140
	4	–	**–**	–	275	**260**	230	235	**170**	145	180	**130**	110
	5	–	**–**	–	330	**300**	275	310	**235**	200	240	**180**	150
	6	–	**–**	–	230	**205**	175	205	**160**	130	160	**120**	100
M	1	–	**–**	–	270	**240**	210	190	**120**	80	130	**80**	60
	2	–	**–**	–	245	**210**	190	120	**80**	50	80	**50**	40
	3	–	**–**	–	190	**175**	150	125	**80**	55	85	**50**	40
K	1	400	**300**	250	420	**360**	300	275	**245**	220	220	**205**	180
	2	540	**365**	280	360	**300**	250	215	**190**	180	175	**155**	140
	3	310	**190**	155	300	**250**	200	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	145	**110**	70	–	**–**	–	–	**–**	–
	2	175	**140**	95	145	**110**	70	–	**–**	–	–	**–**	–
	3	140	**115**	80	115	**80**	45	–	**–**	–	–	**–**	–

Material Group		TN7525			TN7535			TTI25		
P	1	410	**310**	280	545	**475**	445	430	**360**	300
	2	310	**250**	215	335	**305**	275	310	**250**	215
	3	280	**215**	185	305	**275**	245	310	**250**	215
	4	235	**170**	145	230	**210**	190	265	**215**	180
	5	310	**235**	200	310	**275**	250	320	**235**	200
	6	205	**160**	130	190	**160**	130	145	**110**	90
M	1	245	**220**	185	245	**220**	185	480	**310**	215
	2	220	**190**	170	220	**190**	170	325	**205**	145
	3	175	**155**	140	175	**155**	140	320	**210**	145
K	1	380	**280**	240	355	**320**	290	220	**185**	155
	2	325	**240**	200	280	**250**	230	180	**145**	125
	3	240	**200**	170	235	**210**	190	145	**125**	100
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

NOTE: FIRST choice starting speeds are in ***bold*** *type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm] • .B..10

Light Machining	General Purpose	Heavy Machining

At 4,76 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,12	**0,23**	0,42	0,08	**0,16**	0,29	0,06	**0,12**	0,21	0,05	**0,10**	0,18	0,05	**0,10**	0,17	BF
BR	0,19	**0,29**	0,51	0,14	**0,20**	0,35	0,10	**0,15**	0,25	0,09	**0,13**	0,22	0,08	**0,12**	0,20	BR

At 2,38 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,14	**0,27**	0,49	0,10	**0,19**	0,34	0,07	**0,14**	0,25	0,06	**0,12**	0,21	0,06	**0,11**	0,19	BF
BR	0,22	**0,34**	0,61	0,16	**0,24**	0,40	0,12	**0,17**	0,29	0,10	**0,15**	0,25	0,09	**0,14**	0,23	BR

At 1,19 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,18	**0,36**	0,68	0,13	**0,25**	0,45	0,09	**0,18**	0,32	0,08	**0,16**	0,28	0,08	**0,15**	0,25	BF
BR	0,29	**0,46**	0,84	0,21	**0,31**	0,54	0,15	**0,23**	0,39	0,13	**0,20**	0,33	0,12	**0,18**	0,30	BR

At 0,60 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,25	**0,51**	1,02	0,18	**0,34**	0,63	0,13	**0,25**	0,44	0,11	**0,22**	0,38	0,10	**0,20**	0,35	BF
BR	0,41	**0,66**	1,34	0,28	**0,44**	0,76	0,21	**0,31**	0,53	0,18	**0,27**	0,45	0,17	**0,25**	0,41	BR

NOTE: Use "Light Machining" value as starting feed rate.

WIDIA

Recommended Starting Feeds [mm] • .B..12

Light Machining	General Purpose	Heavy Machining

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BR	0,13	**0,29**	0,43	0,09	**0,20**	0,30	0,07	**0,15**	0,22	0,06	**0,13**	0,19	0,06	**0,12**	0,18	BR
BF	0,21	**0,39**	0,58	0,15	**0,27**	0,40	0,11	**0,20**	0,29	0,10	**0,18**	0,25	0,09	**0,16**	0,23	BF

At 2,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BR	0,15	**0,33**	0,50	0,11	**0,24**	0,35	0,08	**0,17**	0,26	0,07	**0,15**	0,22	0,06	**0,14**	0,20	BR
BF	0,24	**0,46**	0,69	0,17	**0,32**	0,47	0,13	**0,23**	0,34	0,11	**0,20**	0,29	0,10	**0,18**	0,27	BF

At 1,25 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BR	0,20	**0,45**	0,68	0,14	**0,31**	0,46	0,11	**0,23**	0,34	0,09	**0,20**	0,29	0,08	**0,18**	0,27	BR
BF	0,32	**0,61**	0,94	0,23	**0,42**	0,62	0,17	**0,31**	0,45	0,15	**0,26**	0,38	0,13	**0,24**	0,35	BF

At 0,63 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BR	0,28	**0,63**	0,99	0,20	**0,43**	0,64	0,15	**0,31**	0,46	0,13	**0,27**	0,40	0,12	**0,25**	0,36	BR
BF	0,45	**0,89**	1,42	0,31	**0,58**	0,87	0,23	**0,42**	0,61	0,20	**0,36**	0,53	0,18	**0,33**	0,48	BF

NOTE: Use "Light Machining" value as starting feed rate.

Recommended Starting Feeds [mm] • .B..16

Light Machining	General Purpose	Heavy Machining

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BF	0,14	**0,28**	0,45	0,10	**0,20**	0,31	0,08	**0,15**	0,23	0,07	**0,13**	0,20	0,06	**0,12**	0,18	BF
BR	0,21	**0,38**	0,59	0,15	**0,27**	0,41	0,11	**0,20**	0,30	0,10	**0,17**	0,26	0,09	**0,16**	0,24	BR

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BF	0,16	**0,33**	0,52	0,12	**0,23**	0,36	0,09	**0,17**	0,27	0,08	**0,15**	0,23	0,07	**0,14**	0,21	BF
BR	0,24	**0,45**	0,69	0,17	**0,31**	0,48	0,13	**0,23**	0,35	0,11	**0,20**	0,30	0,10	**0,18**	0,28	BR

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BF	0,21	**0,44**	0,70	0,15	**0,31**	0,48	0,11	**0,23**	0,35	0,10	**0,20**	0,30	0,09	**0,18**	0,28	BF
BR	0,32	**0,60**	0,94	0,23	**0,42**	0,63	0,17	**0,31**	0,46	0,15	**0,26**	0,40	0,13	**0,24**	0,36	BR

At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BF	0,29	**0,61**	0,99	0,21	**0,43**	0,66	0,16	**0,31**	0,48	0,14	**0,27**	0,42	0,12	**0,25**	0,38	BF
BR	0,44	**0,85**	1,38	0,31	**0,57**	0,88	0,23	**0,42**	0,63	0,20	**0,36**	0,54	0,18	**0,33**	0,50	BR

NOTE: Use "Light Machining" value as starting feed rate.

Recommended Starting Feeds [mm] • .B..20

Light Machining	General Purpose	Heavy Machining

At 10,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BF	0,19	**0,24**	0,40	0,13	**0,17**	0,28	0,10	**0,13**	0,21	0,09	**0,11**	0,18	0,08	**0,10**	0,17	BF
BR	0,24	**0,38**	0,65	0,17	**0,27**	0,46	0,13	**0,20**	0,34	0,11	**0,17**	0,30	0,10	**0,16**	0,27	BR

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BF	0,22	**0,28**	0,46	0,15	**0,20**	0,33	0,12	**0,15**	0,24	0,10	**0,13**	0,21	0,09	**0,12**	0,19	BF
BR	0,27	**0,44**	0,76	0,20	**0,31**	0,53	0,15	**0,23**	0,39	0,13	**0,20**	0,34	0,12	**0,18**	0,31	BR

At 2,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BF	0,28	**0,37**	0,61	0,20	**0,27**	0,43	0,15	**0,20**	0,32	0,13	**0,17**	0,28	0,12	**0,16**	0,25	BF
BR	0,36	**0,58**	1,01	0,26	**0,41**	0,70	0,19	**0,30**	0,52	0,17	**0,26**	0,45	0,15	**0,24**	0,41	BR

At 1,25 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
BF	0,39	**0,51**	0,85	0,28	**0,36**	0,59	0,21	**0,27**	0,44	0,18	**0,23**	0,38	0,17	**0,21**	0,35	BF
BR	0,50	**0,81**	1,44	0,36	**0,56**	0,97	0,26	**0,42**	0,71	0,23	**0,36**	0,61	0,21	**0,33**	0,56	BR

NOTE: Use "Light Machining" value as starting feed rate.

Recommended Starting Feeds [mm] • .B..25

Light Machining	General Purpose	Heavy Machining

At 12,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,17	**0,31**	0,50	0,13	**0,22**	0,36	0,09	**0,16**	0,26	0,08	**0,14**	0,23	0,08	**0,13**	0,21	BF
BR	0,24	**0,38**	0,65	0,17	**0,27**	0,46	0,13	**0,20**	0,34	0,11	**0,17**	0,30	0,10	**0,16**	0,27	BR

At 6,25 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,20	**0,35**	0,58	0,15	**0,25**	0,41	0,11	**0,19**	0,30	0,09	**0,16**	0,27	0,09	**0,15**	0,24	BF
BR	0,27	**0,44**	0,76	0,20	**0,31**	0,53	0,15	**0,23**	0,39	0,13	**0,20**	0,34	0,12	**0,18**	0,31	BR

At 3,13 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,27	**0,47**	0,77	0,19	**0,33**	0,54	0,14	**0,25**	0,40	0,12	**0,21**	0,35	0,11	**0,20**	0,32	BF
BR	0,36	**0,58**	1,02	0,26	**0,41**	0,70	0,19	**0,30**	0,52	0,17	**0,26**	0,45	0,15	**0,24**	0,41	BR

At 1,56 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,37	**0,65**	1,09	0,26	**0,46**	0,75	0,19	**0,34**	0,55	0,17	**0,29**	0,47	0,15	**0,27**	0,43	BF
BR	0,50	**0,81**	1,44	0,36	**0,56**	0,97	0,26	**0,42**	0,71	0,23	**0,36**	0,61	0,21	**0,33**	0,56	BR

NOTE: Use "Light Machining" value as starting feed rate.

Recommended Starting Feeds [mm] • .B..32

Light Machining	General Purpose	Heavy Machining

At 16,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,17	**0,30**	0,47	0,13	**0,22**	0,34	0,09	**0,16**	0,25	0,08	**0,14**	0,22	0,08	**0,13**	0,20	BF
BR	0,23	**0,38**	0,59	0,17	**0,27**	0,42	0,13	**0,20**	0,31	0,11	**0,17**	0,27	0,10	**0,16**	0,25	BR

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,20	**0,35**	0,55	0,15	**0,25**	0,39	0,11	**0,19**	0,29	0,09	**0,16**	0,25	0,09	**0,15**	0,23	BF
BR	0,27	**0,43**	0,69	0,19	**0,31**	0,49	0,14	**0,23**	0,36	0,13	**0,20**	0,32	0,12	**0,18**	0,29	BR

At 4,00 Axial Depth of Cut (ap)

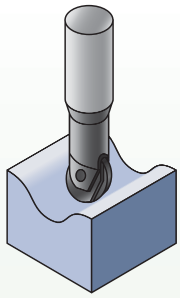
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,26	**0,46**	0,72	0,19	**0,33**	0,51	0,14	**0,25**	0,38	0,12	**0,21**	0,33	0,11	**0,20**	0,30	BF
BR	0,35	**0,57**	0,92	0,25	**0,41**	0,64	0,19	**0,30**	0,48	0,17	**0,26**	0,41	0,15	**0,24**	0,38	BR

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,36	**0,64**	1,01	0,26	**0,45**	0,71	0,19	**0,34**	0,52	0,17	**0,29**	0,45	0,15	**0,27**	0,41	BF
BR	0,49	**0,80**	1,28	0,35	**0,56**	0,89	0,26	**0,42**	0,65	0,23	**0,36**	0,57	0,21	**0,33**	0,52	BR

NOTE: Use "Light Machining" value as starting feed rate.

Selecting the Correct Insert and Cutting Conditions for Your Application

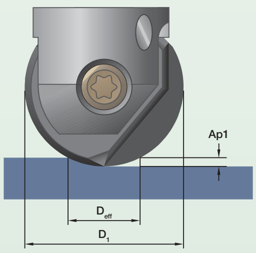


1. Insert Style: Considerations for Selecting the Correct Insert

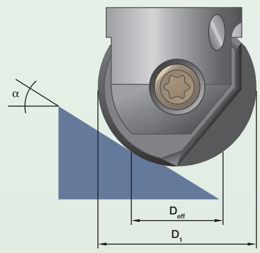
Best Choices for Insert and Grade Selection ● First choice ○ Alternate choice	BR Geometry		BF Geometry
			
Grade	TN7535	TN2510	TN2505
Roughing Operation	●	○	
Finishing Operation		○	●
Low RPM Machine	●	○	
Flat Areas or Face Milling (≤10° inclination)	●	○	
Hard Machining		○	●
Unstable and/or Long Overhangs	●	○	
HSM or 5-Axis Machining (smaller ap/ae values)	●	○	

2. Calculating effective diameter and resulting surface speed

It is important to consider the effective diameter (Deff) when using light depths of cut in order to properly calculate RPM values. Use the following formula when machining flat surfaces or inclinations of 10° or less to find the Deff value, and then use this for RPM calculations as opposed to using the overall insert diameter (D1).



When machining inclinations between 11° and 55°, further modification of vc is required. Apply factor "k" from the given formula to calculate the correct vc (vceff). This corrected value is then used to calculate the proper RPM for the tool.



$$\text{Deff} = \sqrt{D1^2-(D1-2Ap1)^2}$$

$$k = \frac{1}{\sin\left[\alpha + \arccos\left(1-\left(2\left(Ap1/D1\right)\right)\right)\right]}$$

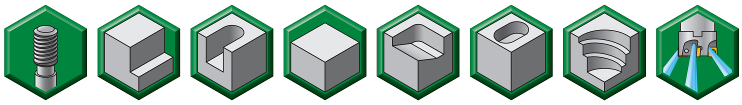
$$v_c\text{eff} = v_c \text{ X } k$$

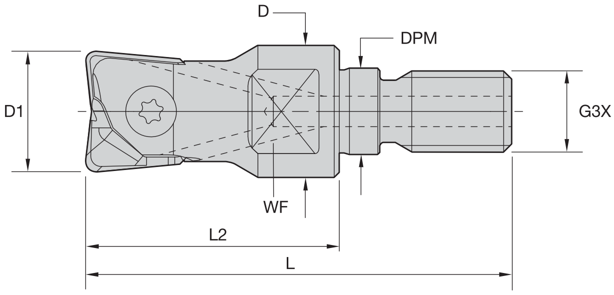
Starting Values for Semi-Finishing in Common Material Types (L/D ratio <3 x D1)

M270 is usually applied for semi-finishing and finishing operations; Ap1/ae conditions depend on the operation. As a general rule: Ap1/ae ≤0,05D.

Material	Tool Diameter																	
	Ø10			Ø12			Ø16			Ø20			Ø25			Ø32		
	max rec. (mm)		fz (mm/ tooth)	max rec. (mm)		fz (mm/ tooth)	max rec. (mm)		fz (mm/ tooth)	max rec. (mm)		fz (mm/ tooth)	max rec. (mm)		fz (mm/ tooth)	max rec. (mm)		fz (mm/ tooth)
	Ap1	ae		Ap1	ae		Ap1	ae		Ap1	ae		Ap1	ae		Ap1	ae	
Soft Steel <250 HB	0,7	0,7	0,2	0,8	0,8	0,2	1,1	1,1	0,27	1,3	1,3	0,27	1,7	1,7	0,3	2,1	2,1	0,3
High-Strength Steel 33–44 HRC	0,5	0,5	0,15	0,6	0,6	0,2	0,8	0,8	0,25	1	1	0,25	1,3	1,3	0,25	1,6	1,6	0,25
Hardened Steel 44–55 HRC	0,3	0,3	0,15	0,4	0,4	0,2	0,5	0,5	0,22	0,7	0,7	0,22	0,8	0,8	0,25	1,1	1,1	0,25
Grey Cast Iron GG25...	1	1	0,2	1,2	1,2	0,25	1,6	1,6	0,25	2	2	0,25	2,5	2,5	0,3	3,2	3,2	0,3
Nodular Cast Iron GGG60...	0,7	0,7	0,2	0,8	0,8	0,25	1,1	1,1	0,25	1,3	1,3	0,25	1,7	1,7	0,3	2,1	2,1	0,3

- Semi-finishing and finishing applications.
- Through tool coolant.
- Secure and rigid insert clamping.



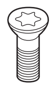


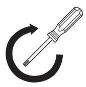
Toroidal • Screw-On End Mills

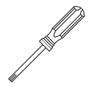
order number	catalogue number	D1	D	DPM	G3X	L	L2	WF	Z	Z U	inserts	max RPM	coolant supply	kg
3926546	**M270TD012M08**	12	13	8,5	M8	42	25	10	1	2	M270TF12R..	55000	Yes	0,02
3926547	**M270TD016M08**	16	13	8,5	M8	47	30	10	1	2	M270TF16R..	53000	Yes	0,09
3926548	**M270TD020M10**	20	18	10,5	M10	59	40	14	1	2	M270TF20R..	52000	Yes	0,07

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

Spare Parts



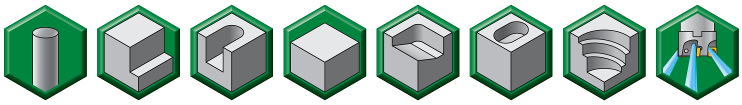


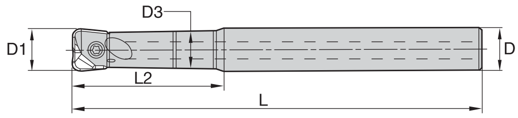


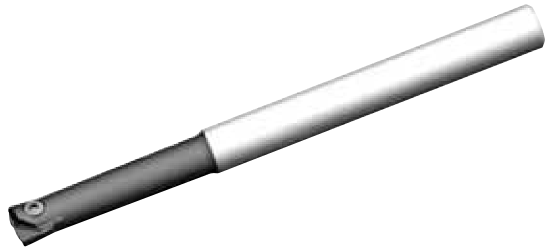
D1	insert screw	Nm	Torx driver
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

- Semi-finishing and finishing applications.
- Through tool coolant.
- Secure and rigid insert clamping.





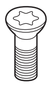


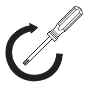
Toroidal • Cylindrical Shanks

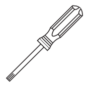
order number	catalogue number	D1	D	D3	L	L2	Z	Z U	inserts	max RPM	coolant supply	kg
3926514	**M270TD010A10L120**	10	10	9	120	45	1	2	M270TF10R..	57000	Yes	0,06
3926515	**M270TD012A12L140**	12	12	11	140	50	1	2	M270TF12R..	55000	Yes	0,09
3926516	**M270TD016A16L160**	16	16	14	160	57	1	2	M270TF16R..	53000	Yes	0,19
3926517	**M270TD020A20L180**	20	20	18	180	70	1	2	M270TF20R..	52000	Yes	0,35

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

Spare Parts



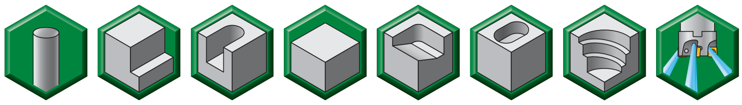


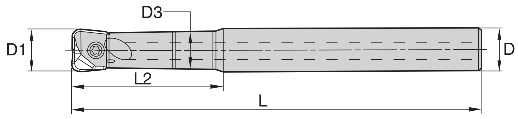


D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

- Semi-finishing and finishing applications.
- Through tool coolant.
- Carbide shank for higher rigidity.



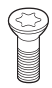


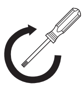
Toroidal • Carbide Cylindrical Shanks

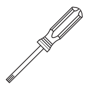
order number	catalogue number	D1	D	D3	L	L2	Z	Z U	inserts	max RPM	coolant supply	kg
3926518	**M270TD010A10L120C**	10	10	9	120	45	1	2	M270TF10R..	57000	Yes	0,11
3926519	**M270TD010A10L150C**	10	10	9	150	45	1	2	M270TF10R..	57000	Yes	0,14
3926520	**M270TD012A12L120C**	12	12	11	120	50	1	2	M270TF12R..	55000	Yes	0,15
3926521	**M270TD012A12L160C**	12	12	11	160	50	1	2	M270TF12R..	55000	Yes	0,22
3926522	**M270TD016A16L140C**	16	16	14	140	57	1	2	M270TF16R..	53000	Yes	0,32
3926543	**M270TD016A16L180C**	16	16	14	180	57	1	2	M270TF16R..	53000	Yes	0,44
3926544	**M270TD020A20L150C**	20	20	18	150	70	1	2	M270TF20R..	52000	Yes	0,52
3926545	**M270TD020A20L200C**	20	20	18	200	70	1	2	M270TF20R..	52000	Yes	0,74

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

Spare Parts





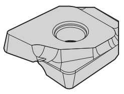


D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

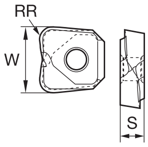
NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	TF	TN2510	**TF**	**TN2525**	TF	TN2525
P3–P4	TF	TN2510	**TF**	**TN2525**	TF	TN2525
P5–P6	TF	TN2510	**TF**	**TN2525**	–	–
M1–M2	TF	TN2510	–	–	–	–
M3	TF	TN2510	–	–	–	–
K1–K2	TF	TN2510	**TF**	**TN2525**	–	–
K3	TF	TN2510	**TF**	**TN2525**	–	–
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	TF	TN2510	–	–	–	–
S3	TF	TN2510	–	–	–	–
S4	TF	TN2510	–	–	–	–
H1	TF	TN2505	**TF**	**TN2510**	–	–



M270-TF



● first choice
○ alternate choice

		TN2505	TN2510	TN2525
P		○	○	●
M				
K		●	●	○
N				
S				
H		●	●	●

- Precision insert for finishing and semi-finishing applications.
- Back draft design to minimise vibration and improve surface finishes.

M270 Toroidal

catalogue number	W	S	RR	hm	TN2505	TN2510	TN2525
M270TF10R05	10,00	2,38	0,50	0,08	-	3374385	3384424
M270TF10R1	10,00	2,38	1,00	0,08	2095682	-	2638760
M270TF12R05	12,00	3,18	0,50	0,08	-	3374387	3384426
M270TF12R1	12,00	3,18	1,01	0,08	-	3374388	3384427
M270TF12R2	12,00	3,18	2,01	0,08	2095640	-	2638761
M270TF16R03	16,00	4,76	0,30	0,08	-	3374389	3384428
M270TF16R05	16,00	4,76	0,50	0,08	-	3374390	3384429
M270TF16R1	16,00	4,76	1,01	0,08	-	3374391	3384430
M270TF16R2	16,00	4,76	2,02	0,08	-	3374392	3384431
M270TF16R3	16,00	4,76	3,04	0,08	-	-	2638762
M270TF20R03	20,00	4,76	0,30	0,08	-	3375713	-
M270TF20R05	20,00	4,76	0,50	0,08	-	3375714	3384453
M270TF20R1	20,00	4,76	1,01	0,08	-	-	3384454
M270TF20R2	20,00	4,76	2,01	0,08	-	3375716	3384455
M270TF20R4	20,00	4,76	4,02	0,08	-	-	2639023

NOTE: Ap1 max is equal to RR.

Copy Mills

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN2510			TN2525		
P	1	550	**420**	360	660	**580**	540	550	**420**	360
	2	320	**240**	205	410	**370**	330	320	**240**	205
	3	320	**240**	205	370	**330**	305	320	**240**	205
	4	–	**–**	–	275	**260**	230	–	**–**	–
	5	–	**–**	–	330	**300**	275	–	**–**	–
	6	–	**–**	–	230	**205**	175	–	**–**	–
M	1	–	**–**	–	270	**240**	210	–	**–**	–
	2	–	**–**	–	245	**210**	190	–	**–**	–
	3	–	**–**	–	190	**175**	150	–	**–**	–
K	1	400	**300**	250	420	**360**	300	–	**–**	–
	2	540	**365**	280	360	**300**	250	–	**–**	–
	3	310	**190**	155	300	**250**	200	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–
H	1	175	**140**	95	145	**110**	70	130	**90**	60
	2	175	**140**	95	145	**110**	70	130	**90**	60
	3	140	**115**	80	115	**80**	45	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

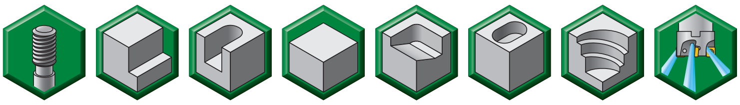
Light Machining	General Purpose	Heavy Machining

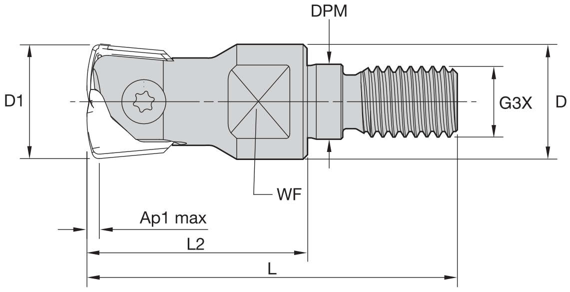
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae) 5%			10%			20%			30%			40–100%			Insert Geometry
TF	0,12	**0,37**	0,62	0,09	**0,26**	0,43	0,06	**0,19**	0,31	0,06	**0,17**	0,27	0,05	**0,15**	0,25	TF

NOTE: Use "Light Machining" value as starting feed rate.

Copy Mills

- High metal removal rates.
- Excellent in long reach applications.
- Rough and semi-finishing applications.



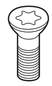


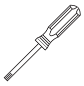
High-Feed • Screw-On End Mills

order number	catalogue number	D1	D	DPM	G3X	L	L2	WF	Ap1 max	Z	ZU	insert 1	insert 2*	max RPM	coolant supply	kg
3926546	**M270TD012M08**	12	13	8,5	M8	42	25	10	0,6	1	2	M270HF12	M270HF13	55000	Yes	0,02
3926547	**M270TD016M08**	16	13	8,5	M8	47	30	10	0,9	1	2	M270HF16	M270HF17	53000	Yes	0,09
3926548	**M270TD020M10**	20	18	10,5	M10	59	40	14	1,1	1	2	M270HF20	—	52000	Yes	0,07

NOTE: ZU = Effective teeth.
Z = number of pocket seats.
**D1 = 13mm when using M270HF13; D1 = 17mm when using M270HF17.*

Spare Parts

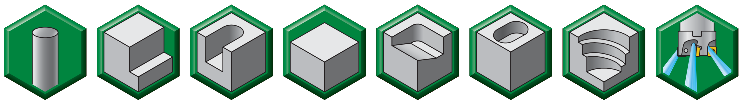


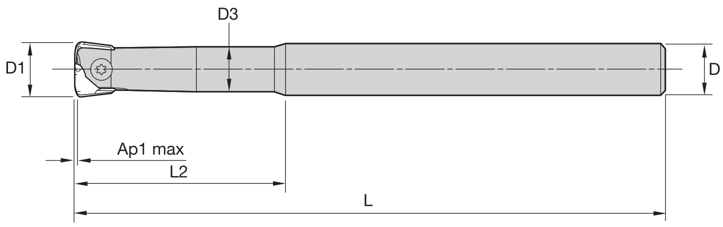


D1	insert screw	Nm	Torx driver
12	**12748610600**	2	**12148788900**
16	**12748610700**	5	**12148099300**
20	**12748610800**	5	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

- High metal removal rates.
- Excellent in long reach applications.
- Rough and semi-finishing applications.



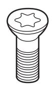


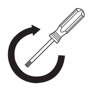
High-Feed • Cylindrical Shanks

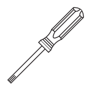
order number	catalogue number	D1	D	D3	L	L2	Ap1 max	Z	Z U	insert 1	insert 2*	max RPM	coolant supply	kg
3926514	**M270TD010A10L120**	10	10	9	120	45	0,6	1	2	M270HF10	—	57000	Yes	0,06
3926515	**M270TD012A12L140**	12	12	11	140	50	0,6	1	2	M270HF12	M270HF13	55000	Yes	0,09
3926516	**M270TD016A16L160**	16	16	14	160	57	0,9	1	2	M270HF16	M270HF17	53000	Yes	0,19
3926517	**M270TD020A20L180**	20	20	18	180	70	1,1	1	2	M270HF20	—	52000	Yes	0,35

NOTE: ZU = Effective teeth.
Z = number of pocket seats.
**D1 = 13mm when using M270HF13; D1 = 17mm when using M270HF17.*

Spare Parts



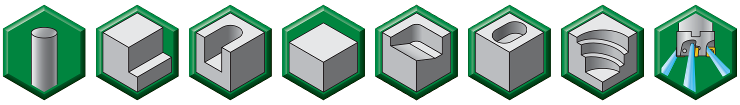


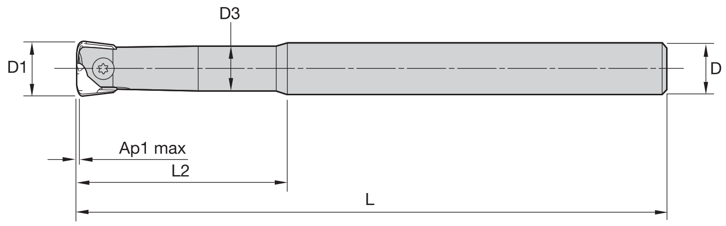


D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

- High metal removal rates.
- Excellent in long reach applications.
- Carbide shank for higher rigidity.



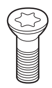


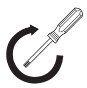
■ High-Feed • Carbide Cylindrical Shanks

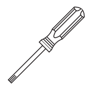
order number	catalogue number	D1	D	D3	L	L2	Ap1 max	Z	Z U	insert 1	insert 2*	max RPM	coolant supply	kg
3926518	**M270TD010A10L120C**	10	10	9	120	45	0,6	1	2	M270HF10	—	57000	Yes	0,11
3926519	**M270TD010A10L150C**	10	10	9	150	45	0,6	1	2	M270HF10	—	57000	Yes	0,14
3926520	**M270TD012A12L120C**	12	12	11	120	50	0,6	1	2	M270HF12	M270HF13	55000	Yes	0,15
3926521	**M270TD012A12L160C**	12	12	11	160	50	0,6	1	2	M270HF12	M270HF13	55000	Yes	0,22
3926522	**M270TD016A16L140C**	16	16	14	140	57	0,9	1	2	M270HF16	M270HF17	53000	Yes	0,32
3926543	**M270TD016A16L180C**	16	16	14	180	57	0,9	1	2	M270HF16	M270HF17	53000	Yes	0,44
3926544	**M270TD020A20L150C**	20	20	18	150	70	1,1	1	2	M270HF20	—	52000	Yes	0,52
3926545	**M270TD020A20L200C**	20	20	18	200	70	1,1	1	2	M270HF20	—	52000	Yes	0,74

NOTE: ZU = Effective teeth.
Z = number of pocket seats.
**D1 = 13mm when using M270HF13; D1 = 17mm when using M270HF17.*

■ Spare Parts







D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

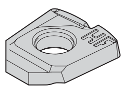
NOTE: All spare parts except the insert screws must be ordered separately.

Copy Mills

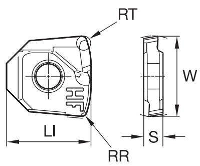
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	HF	TN6525	**HF**	**TN6540**	HF	TN6540
P3–P4	HF	TN6525	**HF**	**TN6540**	HF	TN6540
P5–P6	HF	TN6525	**HF**	**TN6540**	HF	TN6540
M1–M2	HF	TN6525	**HF**	**TN6540**	HF	TN6540
M3	HF	TN6525	**HF**	**TN6540**	HF	TN6540
K1–K2	HF	TN2505	**HF**	**TN6525**	–	–
K3	HF	TN2505	**HF**	**TN6525**	–	–
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	HF	TN6525	**HF**	**TN6540**	–	–
S3	HF	TN6525	**HF**	**TN6540**	–	–
S4	HF	TN6525	**HF**	**TN6540**	HF	TN6540
H1	HF	TN2505	**HF**	**TN2505**	HF	TN6525

High-Feed Inserts



M270-HF



- High-Feed geometry for roughing and semi-finishing applications at maximum feed rates.
- Exceptional stability, even when long overhang is required.

● first choice
○ alternate choice

	TN2505	TN6525	TN6540
P	○	●	●
M		○	●
K	●	○	○
N			
S			●
H	●	○	

High-Feed

catalogue number	W	LI	S	RR	RT	hm	TN2505	TN6525	TN6540
M270HF10	10,00	10,50	2,38	0,63	1,15	0,08	3903944	4145110	3903943
M270HF12	12,00	12,40	3,18	0,75	1,40	0,08	3903946	4145111	3903945
M270HF13	13,00	12,40	3,18	0,75	1,40	0,08	3903948	4145112	3903947
M270HF16	16,00	16,70	4,76	1,00	1,90	0,08	3903950	4145123	3903949
M270HF20	20,00	20,70	4,76	1,25	2,30	0,08	3903954	4145125	3903953

NOTE: RT = Programming radius.

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	–	–	235	**170**	145	180	**130**	110
	5	–	–	–	310	**235**	200	240	**180**	150
	6	–	–	–	205	**160**	130	160	**120**	100
M	1	–	–	–	190	**120**	80	130	**80**	60
	2	–	–	–	120	**80**	50	80	**50**	40
	3	–	–	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	50	**35**	30
	2	–	–	–	–	–	–	25	**20**	10
	3	–	–	–	–	–	–	70	**40**	30
	4	–	–	–	–	–	–	60	**30**	25
H	1	175	**140**	95	–	–	–	–	–	–
	2	175	**140**	95	–	–	–	–	–	–
	3	140	**115**	80	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 0,60 Axial Depth of Cut (ap) • HF10

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	1,01	**1,57**	–	0,67	**0,97**	1,41	0,48	**0,69**	0,97	0,42	**0,59**	0,83	0,38	**0,54**	0,75	HF

At 0,60 Axial Depth of Cut (ap) • HF12

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	0,91	**1,53**	2,81	0,61	**0,96**	1,43	0,45	**0,69**	0,99	0,39	**0,59**	0,85	0,35	**0,54**	0,77	HF

At 0,60 Axial Depth of Cut (ap) • HF13

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	0,94	**1,58**	2,82	0,64	**1,00**	1,49	0,46	**0,71**	1,03	0,40	**0,61**	0,88	0,37	**0,56**	0,80	HF

NOTE: Use "Light Machining" value as starting feed rate.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 0,90 Axial Depth of Cut (ap) • HF16

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	1,03	**1,60**	3,34	0,69	**1,00**	1,50	0,50	**0,71**	1,03	0,43	**0,61**	0,88	0,39	**0,56**	0,80	HF

At 0,90 Axial Depth of Cut (ap) • HF17

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	1,06	**1,63**	3,00	0,71	**1,03**	1,52	0,51	**0,73**	1,05	0,44	**0,63**	0,90	0,40	**0,57**	0,82	HF

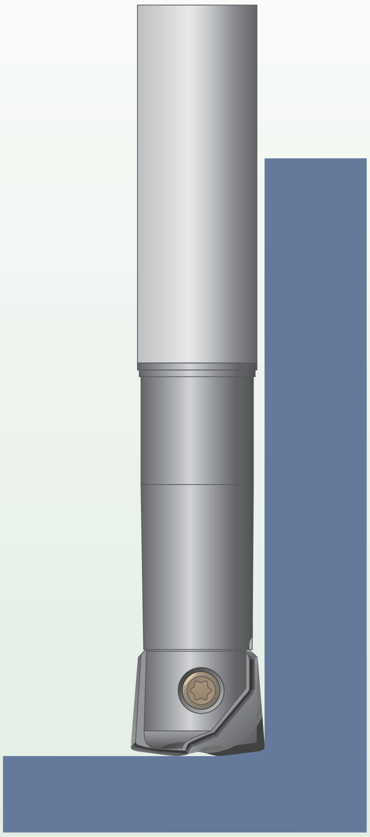
At 1,10 Axial Depth of Cut (ap) • HF20

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	1,01	**1,69**	2,74	0,69	**1,09**	1,57	0,50	**0,78**	1,10	0,44	**0,67**	0,94	0,40	**0,61**	0,86	HF

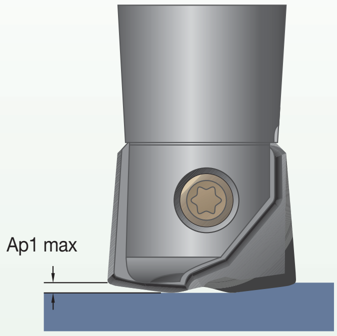
NOTE: Use "Light Machining" value as starting feed rate.

Applying High-Feed Tools

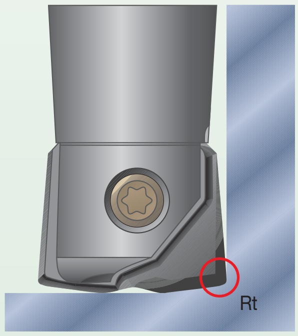
The high-feed concept bases its strategy in small depth of cut and high fz values, which results in a higher MRR and productivity with low radial forces.



Recommended when long overhang is necessary due to lower radial forces. Maximum L/D ratio of 10 x D.



Small Ap1 values and higher feed rate generate lower cutting forces versus traditional milling strategies.



For CAM programming, the tools can be programmed as a toroidal tool type by using the Rt value as the insert radius.

L/D ratio	% of Ap1 max to reduce	% of vc to reduce
<4	0%	0%
4<L/D<7	55–65%	10–15%
>8	65–75%	20–30%

General Programming Information for Applying M270 High-Feed

tool diameter	Ø10	Ø12	Ø13	Ø16	Ø17	Ø20
recommended starting Ap1 (mm)	0,40	0,40	0,40	0,60	0,60	0,75
Rt CAM programming	1,15	1,40	1,40	1,90	1,90	2,30
fz recommended for general purpose	0,45	0,55	0,55	0,60	0,60	0,70
fz recommended for 45 HRC (approx.)	0,40	0,45	0,45	0,55	0,55	0,65
fz recommended for 55 HRC (approx.)	0,30	0,35	0,35	0,45	0,45	0,50

NOTE: Use two effective teeth for feed calculations.
For materials above 45 HRC, we recommend adjusting the ae max to 55% of cutting diameter and using no more than 50% of Ap1 max.
While centre cutting is possible, we recommend using a ramp angle of 0.5°–1.0° to ensure smooth operation.

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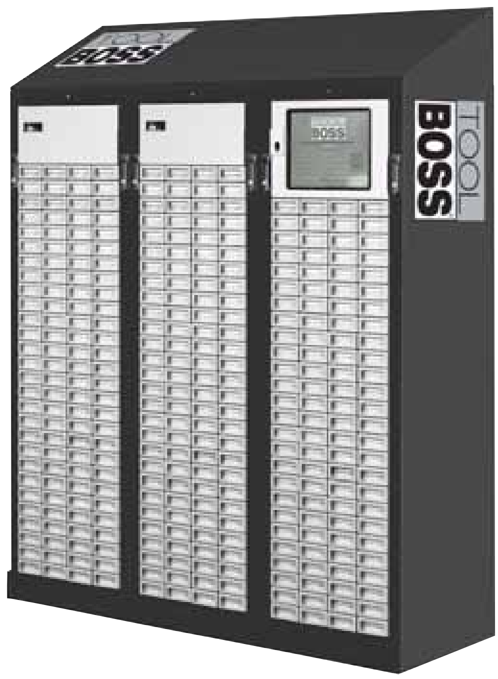

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Solid End Milling

End Mills	Fine Finishing	Finishing	Roughing	Slot Milling	Plunging	Contour Milling	Peel Milling	Trochoidal Milling
Z = number of teeth								
end mill Z = 1	○	○	●	●	●	○	○	○
end mill Z = 2	○	○	◐	●	●	○	○	○
end mill Z = 3	○	◐	◐	●	◐	○	○	○
end mill Z = 4/5	◐	●	●	●*	○	○	●	●
multi-flute cutter Z = 6-8	●	●	○	○	○	○	●	●
Ball Nose and Torus End Mills								
ball nose end mill Z = 2				●		●		
ball nose end mill Z = 4				◐		●		

**VariMill™/VariMill™ GP Only*

● first choice

◐ suitable with limitations

○ not recommended

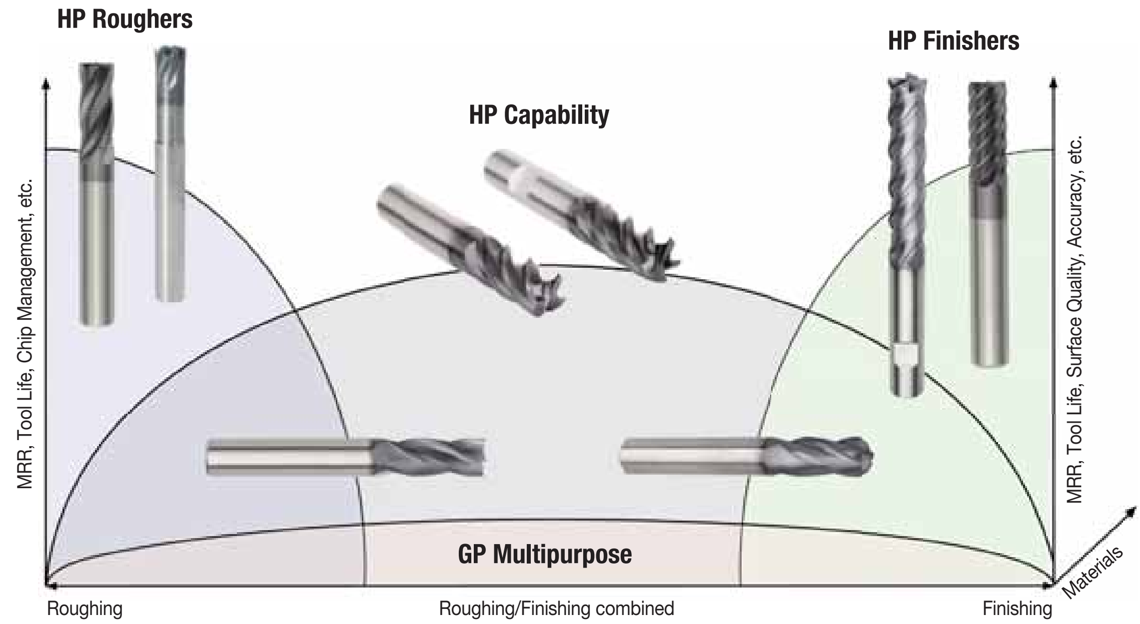
Always select a tool with the shortest possible flute length whenever possible.
This will increase the stability of the tool and give the best results.

When selecting an end mill, the following machining factors will affect your selection of the correct end mill for your application:

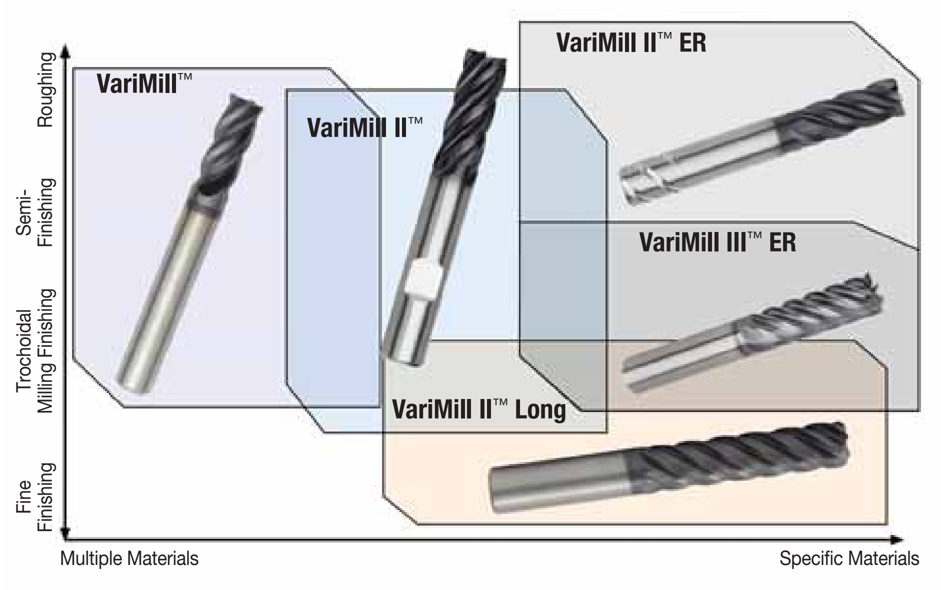
1. Tool overhang.
2. Coolant flow.
3. Machine and setup stability.
4. Machine power and torque.
5. Material to be machined.
6. Machine adaptor size (CV40, CV50, HSK63, etc.).
7. See Tool Reference Guides on pages N6–N15.

Type of Cut / Materials	P 0	P 1	P 2	P 3	P 4	P 5	P 6	M 1	M 2	M 3	K 1	K 2	K 3	N 1	N 2	N 3	N 4	N 5	N 6	S 1	S 2	S 3	S 4	H 1	H 2	H 3	H 4	Page Reference
Recommended Series	Steels & Alloyed Steels							Stainless Steel			Cast Iron			Non-Ferrous						High-Temp Alloys & Titanium				Hardened Materials				
Roughing																												
DQ13	■	■	■	■	■	■	■	■	■	■	■	■	■															O54
4U40, 4U70						■	■	■	■	■										■	■	■	■	■	■	■	■	O59–O60
X-Feed™ 70N6				■	■																			■	■			O152
X-Feed 70N7																										■	■	O153
4909, 4979														■	■	■	■	■	■									O140–O141
Semi-Finishing																												
VariMill I™ — 4777	■	■	■	■	■			■	■	■	■	■	■															O4–O5
VariMill II™ — 577C		■	■	■	■	■	■	■	■	■	■	■																O24
VariMill II ER — 577E						■	■	■	■	■										■	■	■	■	■				O32
VariMill III™ ER — 771E, 772E						■	■	■	■	■										■	■	■	■	■				O45
Vision Plus™ — 7505				■	■																			■	■	■	■	O180–O181
AluSurf™ 5102, 5103														■	■	■	■	■	■									O126–O127
Finishing																												
D507, D517, D518	■	■	■	■	■	■	■	■	■	■	■	■								■	■	■	■	■				O92, O95
7515, 7525				■	■																			■	■	■	■	O180–O181
VariMill III ER — 77NE, 771E, 772E						■	■	■	■	■										■	■	■	■	■				O44–O45
AluSurf 5102, 5103														■	■	■	■	■	■									O126–O127
Finishing Pockets																												
VariMill I — 4777	■	■	■	■	■			■	■	■	■	■	■							■	■	■	■	■				O4–O5
VariMill II — 57NC				■	■	■	■	■	■	■	■									■	■	■	■					O25–O26
VariMill II ER — 57NE						■	■	■	■	■										■	■	■	■	■				O33
VariMill III ER — 77NE						■	■	■	■	■										■	■	■	■	■				O44
75N5, 75N8				■	■																			■	■	■	■	O184–O186
AluSurf 51N3														■	■	■	■	■	■									O128
Long Wall Milling																												
VariMill II Long — 5718	■	■	■	■	■	■		■	■	■	■	■	■							■	■	■	■	■	■			O38–O39
VariMill III ER — 772E						■	■	■	■	■										■	■	■	■	■				O45
3D Ball Nose																												
VariMill I — 47N0	■	■	■	■	■	■		■	■	■	■	■	■							■	■	■	■	■				O12
7050, 7060				■	■																			■	■	■	■	O189
HPC/Peel Milling																												
VariMill I — 4777, 4778	■	■	■	■	■			■	■	■	■	■	■							■	■	■	■					O4–O6
VariMill II — 577C			■	■	■	■	■	■	■	■	■													■				O24
VariMill II ER — 577E						■	■	■	■	■										■	■	■	■	■				O32
VariMill II Long — 5718	■	■	■	■	■	■		■	■	■	■	■	■							■	■	■	■	■				O38–O39
VariMill III ER — 77NE, 771E, 772E						■	■	■	■	■										■	■	■	■	■				O44–O45
AluSurf 5102, 5103														■	■	■	■	■	■					■				O126–O127
Trochoidal Milling																												
VariMill I — 4777, 4778	■	■	■	■	■			■	■	■	■	■	■															O4–O6
VariMill II — 577C			■	■	■	■		■	■	■	■	■								■	■	■	■	■	■	■		O24
VariMill II ER — 577E						■	■	■	■	■										■	■	■	■	■	■	■		O32
VariMill III ER — 771E, 772E						■	■	■	■	■										■	■	■	■	■	■	■		O45
AluSurf 5102, 5103														■	■	■	■	■	■									O126–O127

Best Selection Per Application



Best Selection For Trochoidal/High-Speed Machining Concepts



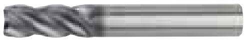
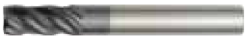
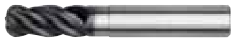
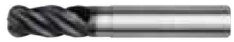
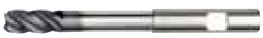
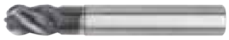
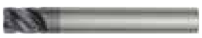
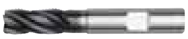
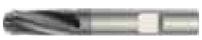
Recommended Adaptors per End Mill Platform

SCEM Platform	Recommended Adaptors	
	First Choice	Alternate Choice
VariMill I™	HydroForce™	Shrink Fit
VariMill II™/VariMill II™ ER	HydroForce	Shrink Fit
VariMill III™ ER	HydroForce	Shrink Fit
VariMill II™ Long	HydroForce	Shrink Fit
High-Performance Finishers	HydroForce	Shrink Fit
High-Performance Roughers	HydroForce	Weldon Adaptor
AluSurf™/Arcut™/Aluminium Tools	HydroForce	Shrink Fit
VisionPlus™/VisionPlus X-Feed™	HydroForce	Shrink Fit
VariMill GP	Shrink Fit	Weldon Adaptor
HSS/WavCut™	Weldon Adaptor	–

Select Adaptor per Technical Data/Characteristics

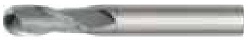
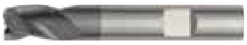
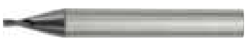
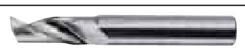
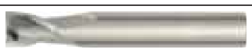
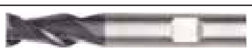
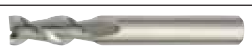
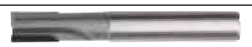
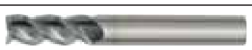
Technical data/characteristics	Toolholders				
	HydroForce high torque	Shrink Fit	Milling chuck	ER collet chuck	Weldon® adaptor
torque transmission	★★★★★	★★★★	★★★★★	★★	★★★★★
radial runout (T.I.R.)[1]	★★★★★	★★★★★	★★★★	★★★	★
radial rigidity[2]	★★★★	★★★★★	★★★	★★★	★★★
tool length adjustment	★★★★★	★★★★	★	★★★★	★★
tool shank tolerance requirement	★★★★	★★	★★★	★★★★★	★★★
through coolant	★★★★★	★★★★★	★★★	★★★	★★
minimum quantity lubrication (MQL)	★★★★★	★★★★★	★	★	★
dampening capability	★★★★★	★	★★★	★★★	★★★
shank diameter range[3]	★★★★★	★	★★★★★	★★★★★	★
cost of toolholder	★★	★★★	★	★★★★	★★★★★
low requirement of external devices[4]	★★★★★	★	★★★★	★★★★	★★★★★
ease of handling	★★★★★	★★★	★★	★★★★	★★★★
dust resistance	★★★★★	★★★★★	★★★	★★★	★★★★
high-speed capability	★★★★★	★★★★★	★★★	★★★	★
balancing accuracy	★★★★★	★★★★★	★★★	★★★	★

[1] Radial runout may affect tool life.
[2] Radial rigidity for Weldon holder is low at a direction perpendicular to the screw.
[3] Accepts different shank diameters through the use of reduction sleeves or due to collapse range.
[4] Collet chucks and milling chucks may require the use of a torque or special wrench; Shrink Fit adaptor requires a shrinking unit.

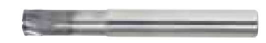
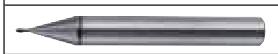
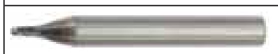
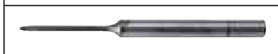
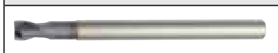
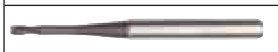
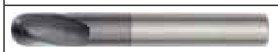
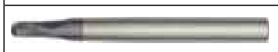
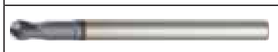
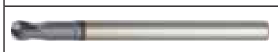
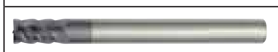
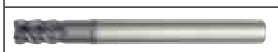
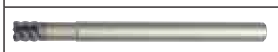
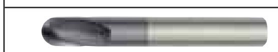
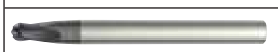
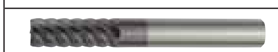
● first choice ○ alternate choice	Series	Range of Diameter Ø min– Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB_2	Diamond	PCD
High-Performance Solid Carbide End Mills • VariMill™											
VariMill I™											
	4777	4–25	4	Yes			X				
	4778	4–25	4	Yes			X				
	4717	6–20	4	Yes				X			
	4727	12–20	4	Yes				X			
	47N7 ALTIN	4–20	4	Yes			X				
	47N7 TIALN	4–20	4	Yes				X			
	47N6	6–20	4	Yes				X			
	47N0	5–20	4	Yes			X				
VariMill II™											
	577C	4–25	5	Yes			X				
	57NC	6–25	5	Yes			X				
VariMill II™ ER											
	577E	10–25	5	Yes			X				
	57NE	10–25	5	Yes			X				
VariMill II™ Long											
	5718	6–25	5	No			X				
VariMill III™ ER											
	77NE	10–20	7	Yes			X				
	771E/772E	10–20	7	Yes			X				
High-Performance Solid Carbide End Mills • Roughing											
	DQ13	3–20	3	Yes			X				
	49H6	8–20	3/4	Yes				X			
	422152/422150	6–25	4	Yes			X				
	4976	4–25	3/4/5	Yes			X				
	422824/422820	6–25	4	Yes				X			
	4U40	6–25	4/6	Yes			X				
	4U70	6–25	4/6	Yes			X				
	49N6	4–25	3/4/5	Yes			X				
	4969	5–20	3/4	Yes				X			
	422813/022813	6–25	3	Yes	X			X			
	422818	6–20	4	Yes	X			X			
	422846	6–25	4/6	Yes	X			X			
	4906	4–25	3/4/5	Yes		X		X			
	4966	5–25	3/4	Yes		X		X			

P 1 2 3 Steel <35 HRC	P 4 Steel >36–48 HRC	P 5 PH and Ferritic Stainless Steel <35 HRC	P 6 PH and Ferritic Stainless Steel >35 HRC	M 1 2 3 Stainless Steel	K 1 2 3 Cast Iron	N 1 2 3 4 5 Non-Ferrous	N 6 Graphite	S 1 Iron Based	S 2 Nickel Based	S 3 Pure Titanium	S 4 Titanium Alloys	H 1 2 Hardened Steels H1 = <48 HRC H2 = 48–55	H 3 4 H3 = 56–60 HRC H4 = >60 HRC	Page References: Product Information	Page References: Cutting Data
High-Performance Solid Carbide End Mills • VariMill™ *(continued)*															
VariMill I™ *(continued)*															
●	●	○	○	●	●			○	○	○	○	○		O4–O5	O13
●	●	●	●	●	○			○	●	●	●	●		O6	O14
●	●	●	●	●	○			●	●	●	●	●		O7	O15
●	●	●	●	●	○			●	●	●	●	●		O8	O16
●	●	●	●	●	○			●	●	●	●	●		O9–O10	O17
●	●	○	○	●	○			○	○	○	○	○		O9–O10	O18
●	●	○	○	●	○			○	○	○	○	○		O11	O19
●	●	○	○	●	●			○	○	○	○	○		O12	O20
VariMill II™ *(continued)*															
●	●	○	○	●	●			○	○	○	○	○		O24	O27
○	●	●	●	●	○			○	●	●	●	●		O25–O26	O28
VariMill II™ ER *(continued)*															
○	○	●	●	●	○			●	●	●	●	●		O32	O34
○	○	●	●	●	○			●	●	●	●	●		O33	O35
VariMill II™ Long *(continued)*															
●	●	●	●	●	○			○	●	●	●	●		O38–O39	O40
VariMill III™ ER *(continued)*															
		○	○	○					●	●	●	○		O44	O46
		○	○	○					●	●	●	○		O45	O47–O48
High-Performance Solid Carbide End Mills • Roughing *(continued)*															
●	●	●	○	○	○			○	○	○	○	○		O54	O68
●	●	●	○	●	●			●	●	●	●	○		O55	O69
●	●	●			●			○	○	○	○	○		O56	O70
●	●	○	○	●	●			○	○	○	○	○		O57	O71
●	●	○	○	●	●			○	○	○	○	○		O58	O72
○	●	●	●	●	○			○	○	○	○	○		O59	O73
○	●	●	●	●	○			○	○	○	○	○		O60	O74
●	●	○	○	○	●			○	○	○	○	○		O61	O75
●	●	○	○	○	●			○	○	○	○	○		O62	O76
●	●			●	●									O63	O77
●	●			●	●									O64	O78
●	●			●	●									O65	O79
●	●	●	●	●	●	○		○	○	○	○	○		O66	O80
●	●	●	●	●	●	●		○	○	○	○	○		O67	O81

● first choice
○ alternate choice

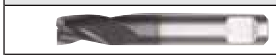
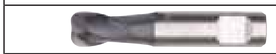
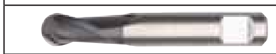
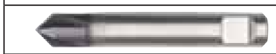
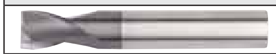
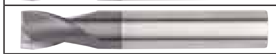
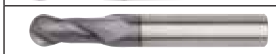
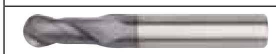
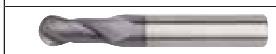
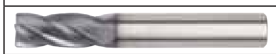
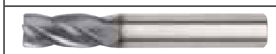
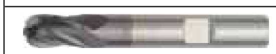
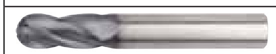
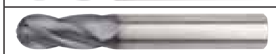
	Series	Range of Diameter Ø min– Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB_2	Diamond	PCD
High-Performance Solid Carbide End Mills • Finishing											
	4001 JJ	1–20	2	Yes			X				
	D503/D513	2–20	3	Yes	X	X		X			
	DC03	3–20	3	Yes				X			
	4503 JJ	1–20	3	Yes			X				
	422802/322802/022802	2–20	3	Yes	X	X		X			
	4603	3–20	3	Yes				X			
	D507/D517	6–20	6	Yes			X				
	422826/422822	6–25	6/8	No			X				
	422827	6–25	6/8	No			X				
	D518	4–25	4/6/8	Yes			X				
	026621	8–20	4/6/8	No	X						
	024112	6–10	2	Yes						X	
	024111	2–12	2	Yes						X	
High-Performance Solid Carbide End Mills • Micro End Mills											
	423007/023007	0,4–3,0	2	Yes	X		X				
	4632	0,4–2,0	2	Yes	X			X			
	4633	0,4–3,0	3	Yes	X			X			
	4651	1,0–2,0	2	Yes	X	X		X			
High-Performance Solid Carbide End Mills • Aluminium											
AluSurf™											
	5102	1,5–20	2	Yes	X						
	5103	3–20	3	Yes	X						
	51N3	6–20	3	Yes	X						
High-Performance Aluminium											
	524149	3–12	1	Yes					X		
	022849	2–12	1	Yes	X						
	D502	3–20	2	Yes	X			X			
	022814/022817	4–20	2	Yes	X						
	4102	1,0–20	2	Yes	X						
	524152/022852	3–16	2	Yes	X				X		
	024101	6–10	2	Yes							X
	4103	3–20	3	Yes	X	X					

	P 1 2 3 Steel <35 HRC	P 4 Steel >36–48 HRC	P 5 PH and Ferritic Stainless Steel <35 HRC	P 6 PH and Ferritic Stainless Steel >35 HRC	M 1 2 3 Stainless Steel	K 1 2 3 Cast Iron	N 1 2 3 4 5 Non-Ferrous	N 6 Graphite	S 1 Iron Based	S 2 Nickel Based	S 3 Pure Titanium	S 4 Titanium Alloys	H 1 2 Hardened Steels H1 = <48 HRC H2 = 48–55	H 3 4 H3 = 56–60 HRC H4 = >60 HRC	Page References: Product Information	Page References: Cutting Data
High-Performance Solid Carbide End Mills • Finishing *(continued)*																
	●	●			●		○								O84	O99
	●	●	○	○	●	●			●	●	●	●	○		O85	O100–O101
	●	●	○	○	○	○			●	●	●	●	○		O86	O102
	●	●	○	○	●	○			○	○	○	○	○		O87	O103
	●	●	●	●	●	●			●	●	●	●	○		O88–O90	O104
	●	●	○	○	●	●			●	●	●	●	○		O91	O105
	●	●	○	○	●	●			○	○	○	○	○		O92	O106–O107
	●	●			●	●									O93	O108
	●	●	●	●	●	●			●	●	●	●	○		O94	O109
	●	●	●	●	●	○			○	○	○	○			O95	O110
	●	●	○	○		●									O96	O111
							●								O97	O112
							●								O98	O113
High-Performance Solid Carbide End Mills • Micro End Mills *(continued)*																
	●	●	●	●	●	●	●	●	○	○	○				O116	O120
	●	●	●	●	●	●	●								O117	O121
	●	●	●	●	●	●	●								O118	O122
	●	●	●	●	●	●	●								O119	O123
High-Performance Solid Carbide End Mills • Aluminium *(continued)*																
AluSurf™ *(continued)*																
							●	○							O126	O129
							●	○							O127	O129
							●	○							O128	O129
High-Performance Aluminium *(continued)*																
							●	●							O132	O144
							●	○							O133	O144
							●	○							O134	O144
							●	○							O135	O145
							●	○							O136	O145
							●	●							O137	O146
							●	○							O138	O146
							●	○							O139	O147

● first choice ○ alternate choice	Series	Range of Diameter Ø min– Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB_2	Diamond	PCD
High-Performance Aluminium *(continued)*											
	4909	6–25	3	Yes	X						
	4979	6–25	3	Yes	X	X					
	49N9	6–20	3	Yes	X						
	49G9	8–25	3	Yes		X					
High-Performance Solid Carbide End Mills • Hard Materials											
VisionPlus™ X-Feed™											
	70N6/71N6	6–20	6	No			X				
	70N7	6–20	6	No			X				
VisionPlus™ Micro											
	7N02/7N12/7N22	0,3–3,1	2	Yes			X	X			
	423034	0,5–3,0	2	Yes			X				
	7N01	0,3–6,0	2	Yes			X	X			
	7N21	0,5–3,0	2	Yes				X			
VisionPlus™											
	75N2	3–12	2	Yes				X			
	422875	2–12	2	Yes			X				
	7151	1–20	2	Yes				X			
	7061	1–12	2	Yes				X			
	70N1	1–12	2	Yes				X			
	422869/422868	1–16	2	Yes			X				
	422870	2–12	2	Yes			X				
	422873	6–10	2	Yes			X				
	7505/7545/7515/7525	3–25	4/5/6	Yes				X			
	7585/7595	3–25	4/5	Yes				X			
	75N5	3–25	4/5	Yes				X			
	75N8	6–12	6	Yes				X			
	422876/422878	4–12	4	Yes			X				
	7150	2–20	4	Yes				X			
	7050/7060	2–20	4	Yes				X			
	422871	3–10	4	Yes			X				
	D618	3–20	4/6	Yes				X			
	422837/422831	6–25	6/8	No			X				
	7670	4–25	3/4/6	Yes				X			

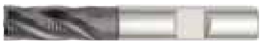
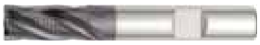
	P				M	K	N		S				H		Page References	
	1 2 3	4	5	6	1 2 3	1 2 3	1 2 3 4 5	6	1	2	3	4	1 2	3 4		
	Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron	Non-Ferrous	Graphite	Iron Based	Nickel Based	Pure Titanium	Titanium Alloys	Hardened Steels H1 = <48 HRC H2 = 48–55	H3 = 56–60 HRC H4 = >60 HRC	Product Information	Cutting Data
High-Performance Aluminium *(continued)*																
							●	○							O140	O147
							●	○							O141	O148
							●	○							O142	O148
							●	○							O143	O149
High-Performance Solid Carbide End Mills • Hard Materials *(continued)*																
VisionPlus™ X-Feed™ *(continued)*																
			○										●		O152	O154
													●	●	O153	O155
VisionPlus™ Micro *(continued)*																
	○	●	○			○							●	○	O160–O163	O167
	○	○											●	○	O164	O168
	○	○											●	○	O165	O169
	○	○											●	○	O166	O170
VisionPlus™ *(continued)*																
	○	○											●	○	O172	O194
	○	○											●	○	O173	O194
	○	○											●	○	O174	O195
	○	○											●	○	O175	O195
	○	○											●	○	O176	O196
	○	●											●	○	O177	O196
	○	●											●	○	O178	O197
	○	●											●	○	O179	O197
	○	○											●	○	O180–O181	O198–O199
	○	○											●	○	O182–O183	O199
	○	○											●	○	O184–O185	O200
	○	○											●	○	O186	O200
	○	●											●	○	O187	O201
	○	○											●	○	O188	O201
	○	○											●	○	O189	O202
	○	○											●	○	O190	O202
	○	○											●	○	O191	O203
	○	●											●	○	O192	O203
	○	○	○	○	○	○							●	○	O193	O204

● first choice
○ alternate choice

	Series	Range of Diameter Ø min– Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB_2	Diamond	PCD
General Purpose Solid Carbide End Mills • Roughing/Finishing											
NINA™											
	423002/323002/ 423001/323001	2–12	3	Yes		X		X			
	423004/423003	4–12	4	Yes			X				
	423048/423047	2–12	2	Yes			X				
	423039/423038	2–12	2	Yes			X				
	423036/423037	6–10	4	No			X	X			
VariMill™ GP • 2-Flute											
	D002/D012	2–20	2	Yes	X			X			
	2819	3–20	2	Yes	X			X			
	4002/4012	1–20	2	Yes				X			
	D001/D011	2–20	2	Yes				X			
	2838	2–20	2	Yes	X			X			
	4001/4011/4021	1–20	2	Yes	X			X			
VariMill GP • 4-Flute											
	D004/D014	2–20	4	Yes	X			X			
	2528	4–20	4	Yes	X			X			
	4004/4014/4024	1–20	4	Yes	X			X			
	D010	3–20	4	Yes	X			X			
	2848	4–20	4	Yes	X			X			
	4000/4010	2–20	4	Yes				X			

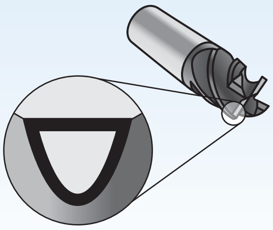
	P				M	K	N		S				H		Page References	
	1 2 3	4	5	6	1 2 3	1 2 3	1 2 3 4 5	6	1	2	3	4	1 2	3 4		
	Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron	Non-Ferrous	Graphite	Iron Based	Nickel Based	Pure Titanium	Titanium Alloys	Hardened Steels H1 = <48 HRC H2 = 48–55	H3 = 56–60 HRC H4 = >60 HRC	Product Information	Cutting Data
General Purpose Solid Carbide End Mills • Roughing/Finishing *(continued)*																
NINA™ *(continued)*																
	●	●	●	●	●	●	●	●							P4	P9
	●	●	●	●	●	●									P5	P9
	●	●	●	●	●	●									P6	P10
	●	●	●	●	●	●									P7	P10
	●	●	●	●	●	●	●	●	●	●	●	●	●		P8	P11
VariMill™ GP • 2-Flute *(continued)*																
	●	●	●	●	●	●									P14–P15	P23
	●	●	●	●	●	●									P16	P23
	●	●	●	●	●	●									P17–P18	P23–P24
	●	●	●	●	●	●									P19	P25
	●	●	●	●	●	●									P20	P25
	●	●	●	●	●	●									P21–P22	P25–P26
VariMill GP • 4-Flute *(continued)*																
	●	●	●	●	●	●									P32–P33	P40–P41
	●	●	●	●	●	●									P34	P41
	●	●	●	●	●	●									P35–P36	P40–P41
	●	●	●	●	●	●									P37	P42
	●	●	●	●	●	●									P38	P42
	●	●	●	●	●	●									P39	P42–P43

● first choice
○ alternate choice

	Series	Range of Diameter Ø min– Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB_2	Diamond	PCD
High-Performance High-Speed Steel (HSS-E-PM) • Roughing											
WavCut™											
	664W/660W/661W	25–50	5/6/8	Yes	X						
High-Performance High-Speed Steel											
	6N06	6–30	4/5/6	Yes				X			
	6N70	6–32	4/6	Yes				X			
	6NL6	10–25	4/6	Yes				X			
High-Performance HSS-E/PM End Mills • Finishing											
	1N0M JJ	3–22	4	Yes				X			
	1N77	6–30	4	Yes		X					

	P 1 2 3 Steel <35 HRC	P 4 Steel >36–48 HRC	P 5 PH and Ferritic Stainless Steel <35 HRC	P 6 PH and Ferritic Stainless Steel >35 HRC	M 1 2 3 Stainless Steel	K 1 2 3 Cast Iron	N 1 2 3 4 5 Non-Ferrous	N 6 Graphite	S 1 Iron Based	S 2 Nickel Based	S 3 Pure Titanium	S 4 Titanium Alloys	H 1 2 Hardened Steels H1 = <48 HRC H2 = 48–55	H 3 4 H3 = 56–60 HRC H4 = >60 HRC	Page References: Product Information	Page References: Cutting Data
	High-Performance High-Speed Steel (HSS-E-PM) • Roughing *(continued)*															
	WavCut™ (continued)															
			○		●						●	●			Q4	Q10
	High-Performance High-Speed Steel *(continued)*															
	●	●	●	●	●	●			●	●	●	●			Q5	Q10
	●	●	●	●	●	●			●	●	●	●			Q6	Q11
	●	●	●	●	●	●			●	●	●	●			Q7	Q11
	High-Performance HSS-E/PM End Mills • Finishing *(continued)*															
	●	●	●	●	●	●			●	●	●	●			Q8	Q12
	●	●	●	●	●	●			●	●	●	●			Q9	Q13

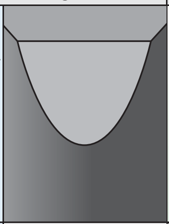
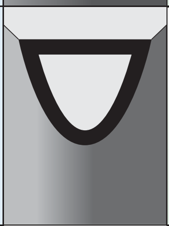
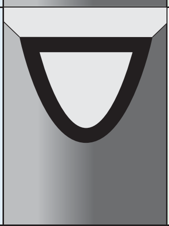
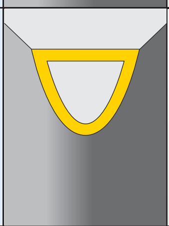
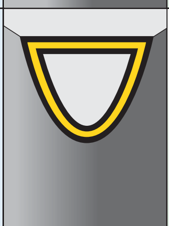
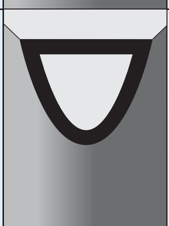
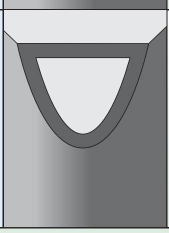
WIDIA HANITA

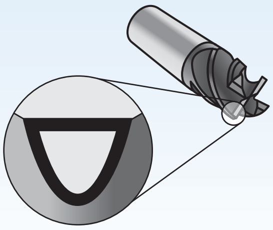


Coatings provide high-speed capability and are engineered for roughing to finishing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ←→ toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
Uncoated, Unocoated -WW, -JJ		Carbide grade made from high-quality, micrograin materials for cutting all types of workpiece materials. Very high toughness ensures a controlled wear rate. The micrograin structure enables extremely sharp cutting edges.	P						■	■	■	
			M					■	■	■		
			K				■	■	■			
			N				■	■	■			
			S					■	■			
WP15PE		Coated carbide grade with thick PVD coating and optimised chemistry and process for increased wear resistance. Outstanding protection in milling of steels to mitigate crater, DOCN (depth-of-cut notching), and flank wear. Excellent performance up to 52 HRC.	P		■	■	■	■				
			M		■	■	■	■				
			K		■	■	■	■				
WS15PE		PVD coated carbide grade with optimised chemistry and process for increased wear resistance. State-of-the art post-coat treatment reduces friction and helps manage heat when cutting super alloys.										
			S	■	■	■	■					
			H	■	■	■	■					
TiN-TT, -TW		This TiN PVD coated grade offers well-balanced machining performance for general purpose applications. This grade offers great versatility at intermediate Metal Removal Rates (MRR).	P					■	■	■	■	
			M					■	■	■	■	
			K					■	■	■	■	
			N					■	■	■	■	
			S					■	■	■	■	
TiAlN-LT1, -LW1		Ultra-fine grain carbide grade with TiAlN PVD multilayer coating for high-performance machining of most materials. This grade is especially designed for dry milling hardened steels due to its unique combination of a high hardness substrate and tough multilayer coating.	P			■	■	■	■			
			H			■	■	■	■			
TiAlN-RT1, -RW1		Ultra-fine carbide grade with TiAlN PVD coating. This grade is a high-performance grade for finishing operations, especially for hardened steels. This grade is characterised by high hardness and wear resistance.	P		■	■	■	■				
			H		■	■	■	■				
TiCN-CT, -CW, -CJ		General purpose coated carbide grade with TiCN PVD coating for use at intermediate cutting speeds. For universal use due to its high wear resistance and hardness. Only use wet or with MQL (Minimum Quantity Lubrication).	P		■	■	■	■				
			M		■	■	■	■				
			K		■	■	■	■				
			N		■	■	■	■				
			H		■	■	■	■				



Coatings provide high-speed capability and are engineered for roughing to finishing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
TiAlN-LT, -LW		Coated carbide grade with PVD multilayer coating. This grade is designed for dry milling most types of material, apart from the hardened variety. This grade is characterised by excellent toughness and wear resistance. It provides outstanding protection against cratering and abrasion.	P				■	■	■	■		
			M				■	■	■	■		
			K				■	■	■	■		
			S				■	■	■	■		
TiAlN-RT, -RW, -RJ		Universal carbide grade with TiAlN PVD coating. This grade is a high-performance grade for finishing operations and is characterised by high hardness and wear resistance.	P				■	■	■	■		
			M				■	■	■	■		
			K				■	■	■	■		
			S				■	■	■	■		
AlTiN-MT1, -MW1, -MJ1		AlTiN PVD coated ultra-fine carbide grade. The combination between hard substrate and wear-resistant coating provides outstanding performance in high-feed milling of hardened materials (58–65 HRC).	H		■	■	■	■				
AlTiN-MT, -MW		Coated fine-grain grade with AlTiN PVD coating. This grade is a thin, hard PVD coating particularly suitable for cutting steel, cast iron, stainless steel (wet), and titanium (wet) with high metal removal rates. This grade can be used for materials with hardness up to 52 HRC.	P				■	■	■	■		
			M				■	■	■	■		
			K				■	■	■	■		
			S				■	■	■	■		
KC10F		High-quality submicron carbide grade for high-performance machining of non-ferrous alloys. Excellent toughness ensures a controlled wear rate and the submicron structure enables extremely sharp cutting edges.	N			■	■	■	■	■		
K30F-DCF		Coated carbide grade with PVD multilayer coating. K30F-DCF is designed for dry milling most types of material, apart from the hardened variety. This grade is characterised by excellent hardness and wear resistance. It provides outstanding protection against cratering and abrasion.	P				■	■	■	■		
			M				■	■	■	■		
			K				■	■	■	■		
K30F-TiCN		General purpose coated carbide grade with TiCN PVD coating for use at intermediate cutting speeds. For universal use due to its high wear resistance and hardness. Only use wet or with MQL (Minimum Quantity Lubrication).	P		■	■	■	■				
			M		■	■	■	■				
			K		■	■	■	■				
			N		■	■	■	■				

Victory™ Grades for High-Performance

Solid Carbide End Mills

Victory

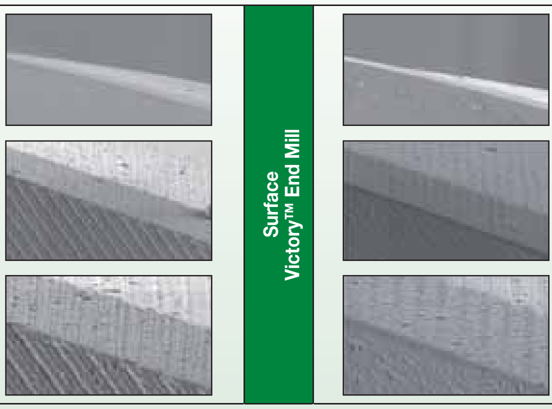
WIDIA™ has taken the next step in solid carbide end mill innovation by introducing the Victory™ Grades WP15PE™ and WS15PE™. Victory combines state-of-the-art surface treatments and proprietary edge technology with the successful market-leading WIDIA geometries, delivering significant improvement to tool life and Metal Removal Rates (MRR). The new Victory Grades can be found across the entire high-performance offering, which includes the VariMill™ family, high-performance roughers, and high-performance finishers.

Features and Benefits

- Innovative edge preparation providing consistent tool life by eliminating most edge microchipping caused by grinding.
- Advanced post-coat finish reducing chip build-up and improving chip flow.
- First-time use of Victory Grade nomenclature for better identification of grades.
- Centre cutting addition on VariMill II™.

Innovative Advantage of Victory™ Grades

WIDIA VICTORY



View: 1st and 2nd relief

Eliminates sharp corner for superior coating adhesion

Eliminates grinding damage

P ● M ● K ● N S ○ H ○ **WP15PE™**	P ○ M ○ K N S ● H ○ **WS15PE™**
W = WIDIA™	W = WIDIA
P = Steels	S = High-Temp Alloys
15 = Application Range (Medium to Roughing)	15 = Application Range (Medium to Roughing)
P = Carbide + PVD	P = Carbide + PVD
E = Solid End Mills	E = Solid End Mills
Primary Materials	**Primary Materials**
P0 through P4 Steels	S1 through S4 High-Temp Alloys
M1 through M3 Austenitic Stainless Steels	P5 through P6 Ferritic and Martensitic Stainless Steels
K1 through K3 Cast Irons	H1 Hardened Steels
H1 Hardened Steels	
Secondary Materials	**Secondary Materials**
S1 through S4 High-Temp Alloys	M1 through M3 Austenitic Stainless Steels
H2 Hardened Steels	H2 Hardened Steels

The new Victory grades are spread across the high-performance offering, including high-performance roughers, high-performance finishers, and select VariMill™ platforms.

WIDIA VICTORY

		Victory Grade		● first choice ○ alternate choice					
Metric	**series**	**WP15PE**	**WS15PE**	**P**	**M**	**K**	**N**	**S**	**H**
VariMill I™	**477, 47N0**	✓		●	●	●		○	○
VariMill II™	**577C**	✓		●	●	●		○	○
VariMill II™	**57NC**		✓	○	○			●	○
VariMill II™ ER	**577E, 57NE**		✓	○	○			●	○
HP Roughers	**DQ13, 4976, 4U40, 4U70**	✓		●	●	●		○	○
HP Finishers	**4001JJ, 4503JJ, D507, D518**	✓		●	●	●		○	○

How do the new Victory Catalogue numbers work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.

OLD Grade Nomenclature • Metric

Series Number

5	77	7	250
	Series		Cutting Diameter

5 = 5-Flute Carbide
4 = 4-Flute Carbide

010	=	1mm
020	=	2mm
030	=	3mm
040	=	4mm
050	=	5mm
060	=	6mm
070	=	7mm
080	=	8mm
090	=	9mm
100	=	10mm
120	=	12mm
140	=	14mm
160	=	16mm
180	=	18mm
200	=	20mm
250	=	25mm
320	=	32mm

NEW Victory Nomenclature • Metric

Series Number

577	C	250	0	B	W
Series	Special Designation	Cutting Diameter	Corner Condition	Shank Diameter	Shank Style
5 = 5-Flute Carbide	**C** = Centre Cutting	**010** = 1mm	**0 & Z** = Sharp	**2** = 6mm	**T** = Plain
4 = 4-Flute Carbide		**020** = 2mm	**1** = 0,75	**3** = 8mm	**W** = Weldon®
		030 = 3mm	**2** = 0,50	**4** = 10mm	**V** = SAFE-λOCK®
		040 = 4mm	**3** = 1,00	**5** = 12mm	
		050 = 5mm	**4** = 1,50	**6** = 16mm	
		060 = 6mm	**5** = 2,00	**7** = 20mm	
		070 = 7mm	**6** = 2,50	**8** = 25mm	
		080 = 8mm	**7** = 3,00	**9** = 32mm	
		090 = 9mm	**8** = 4,00		
		100 = 10mm			
		120 = 12mm			
		140 = 14mm			
		160 = 16mm			
		180 = 18mm			
		200 = 20mm			
		250 = 25mm			
		320 = 32mm			

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.

OLD Grade Nomenclature • Metric

0	8	M	W
Corner Condition	Shank Diameter	Grade	Shank Style
0 = Sharp **1** = Radius	**2** = 6mm **3** = 8mm **4** = 10mm **5** = 12mm **6** = 16mm **7** = 20mm **8** = 25mm **9** = 32mm	**L** = TiAlN **M** = AlTiN **C** = TiCN **R** = TiAlN **J** = Uncoated	**T** = Plain **W** = Weldon® **J** = JIS

NEW Victory Nomenclature • Metric

W	P	15	P	E
Brand	ISO Material Code	Wear Range	Coating Type	Product Family
WIDIA™	**P** = Steel **S** = High-Temperature Alloys	**15** = High Wear	**P** = PVD	**E** = End Mill

Reconditioning Services

WIDIA™ Reconditioning Services Optimise the Total Value of Metalcutting Tools Throughout Their Entire Life

WIDIA Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

- Local support you can trust.
- Rapid turnaround to minimise inventory.
- Like-new performance continues delivering productivity.
- Application support throughout the tool lifecycle.
- WIDIA proprietary geometry specifications after each regrind.
- WIDIA certified coatings.
- Easy logistics through the reconditioning process.

Simple Logistics

Our unique reconditioning program simplifies sending and receiving reconditioned tools to reduce shipping time and increase on-hand inventory.

To use WIDIA tool reconditioning services, contact your authorised WIDIA distributor to get started.

Global Reconditioning Network

To locate a Reconditioning Center near you, visit **widia.com/services.**

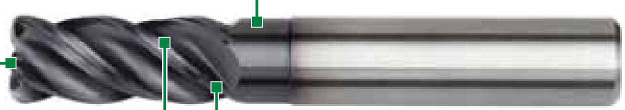
WIDIA™

Solid End Milling • High-Performance Solid Carbide End Mills

VariMill I

VariMill I offers plunging, slotting, and profiling at the highest possible feed rates for a wide range of materials. They are designed to provide maximum Metal Removal Rates (MRR) and to achieve superior surface conditions. A wide range of diameters and corner configurations, such as chamfer, radii, and sharp edges, are available from stock.

- High-performance universal tools for almost all workpiece materials.
- Roughing and finishing with one tool.
- Various length-of-cut, long reach and necked versions, ball nose, corner chamfer, and corner radius available.



VariMill I™ Series

- Increase your output with less tool changes and increased Metal Removal Rates (MRR).
- No specific tools for roughing and finishing required.
- Less passes due to 1 x D slotting capability (not recommended for 4717 and 4727).

4777 Series

- High metal removal rates and tool life in:
  - Stainless steels, steels, and alloyed steels.
  - High-temperature alloys and titanium.

4778 AlTiN Series

- Titanium geometry design.
- Corner radii.

4717 Series

- Stainless steel and steel geometry design.
- 3,5 x D length-of-cut.
- Less passes necessary for long wall machining.

4727 TiAlN Series

- Stainless steel and steel geometry design.
- 5–6 x D length-of-cut.
- Less passes necessary for long wall machining.

47N7 TiAlN Series

- Stainless steel and steel geometry design.
- Radii corner and neck design for cutting depths requiring additional passes.

47N7 AlTiN Series

- Titanium and stainless steel geometry design.
- Radii corner and neck design for cutting depths requiring additional passes.

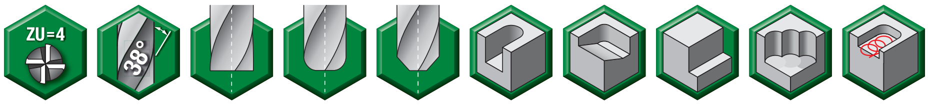
47N6 Series

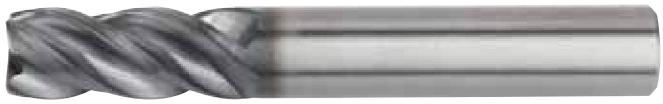
- Stainless steel and steel geometry design.
- Benefit from long reach and neck design for deep cavities.

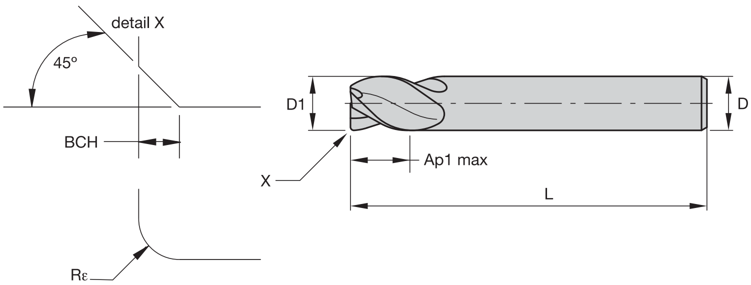
47N0 Series

- Stainless steel and steel geometry design.
- Centre cutting ball nose.

- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.





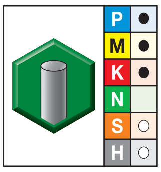


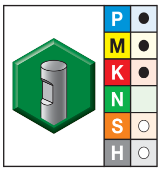
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 4777 • VariMill • Victory Grades



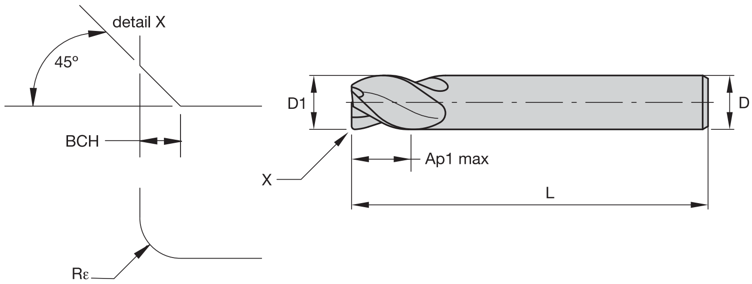


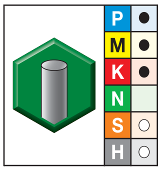
● first choice
○ alternate choice

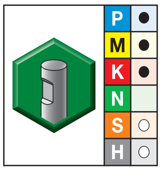
grade WP15PE AlTiN order #	grade WP15PE AlTiN catalogue #	grade WP15PE AlTiN order #	grade WP15PE AlTiN catalogue #	D1	D	length of cut Ap1 max	length L	Rε	BCH
5576753	477704001T		–	4,0	6	12,00	55	0,20	—
5576751	477704002T	5576752	477704002W	4,0	6	12,00	55	—	0,40
5576754	4777040Z2T		–	4,0	6	12,00	55	—	—
5576755	477705002T	5576756	477705002W	5,0	6	13,00	57	—	0,40
5576757	477705012T		–	5,0	6	13,00	57	0,20	—
5576758	4777050Z2T		–	5,0	6	13,00	57	—	—
5576759	477706002T	5576760	477706002W	6,0	6	13,00	57	—	0,40
5576761	477706012T		–	6,0	6	13,00	57	0,20	—
5576762	4777060Z2T		–	6,0	6	13,00	57	—	—
5576763	477707003T	5576764	477707003W	7,0	8	16,00	63	—	0,40
5576765	477707013T		–	7,0	8	16,00	63	0,20	—
5576766	4777070Z3T		–	7,0	8	16,00	63	—	—
5576767	477708003T	5576768	477708003W	8,0	8	16,00	63	—	0,40
5576769	477708013T		–	8,0	8	16,00	63	0,20	—
5576770	4777080Z3T		–	8,0	8	16,00	63	—	—
5576771	477709004T	5576772	477709004W	9,0	10	19,00	72	—	0,50
5576773	477709014T		–	9,0	10	19,00	72	0,20	—
5576774	4777090Z4T		–	9,0	10	19,00	72	—	—
5576775	477710004T	5576776	477710004W	10,0	10	22,00	72	—	0,50
5576777	477710024T		–	10,0	10	22,00	72	0,30	—

(continued)

(Series 4777 • VariMill • Victory Grades — continued)



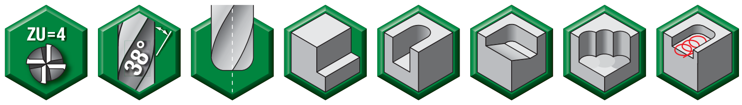


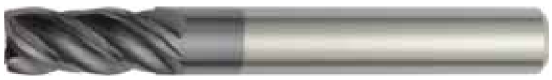


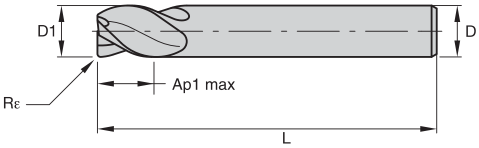
● first choice
○ alternate choice

grade WP15PE AlTiN order #	grade WP15PE AlTiN catalogue #	grade WP15PE AlTiN order #	grade WP15PE AlTiN catalogue #	D1	D	length of cut Ap1 max	length L	Rε	BCH
5576778	4777100Z4T		–	10,0	10	22,00	72	—	—
5576779	4777110Z5T		–	11,0	12	26,00	83	—	—
5576790	477712005T	5576791	477712005W	12,0	12	26,00	83	—	0,50
5576792	477712025T		–	12,0	12	26,00	83	0,30	—
5576793	4777120Z5T		–	12,0	12	26,00	83	—	—
5576794	477714015T	5576795	477714014W	14,0	14	26,00	83	—	0,50
5576796	477716006T	5576797	477716006W	16,0	16	32,00	92	—	0,50
5576798	477716026T		–	16,0	16	32,00	92	0,30	—
5576799	4777160Z6T		–	16,0	16	32,00	92	—	—
5576810	477718018T	5576811	477718018W	18,0	18	32,00	92	—	0,50
5576812	477720007T	5576813	477720007W	20,0	20	38,00	104	—	0,50
5576814	47772002T		–	20,0	20	38,00	104	0,30	—
5576816	477725008T	5576817	477725008W	25,0	25	45,00	121	—	0,50

- Unequal flute spacing.
- Centre cutting.
- Optimised geometry for titanium machining.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



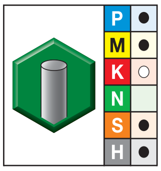


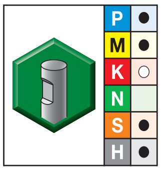


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series 4778 • VariMill

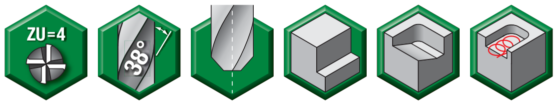


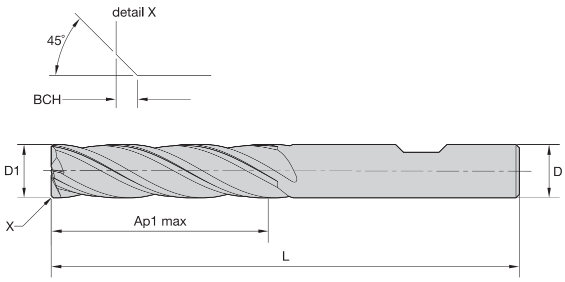


● first choice
○ alternate choice

grade AlTiN-MT AlTiN order #	catalogue #	grade AlTiN-MW AlTiN order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
2545563	477804002MT	3592826	477804002MW	4,0	6	12,00	55	0,20
2545564	477805002MT	3592827	477805002MW	5,0	6	13,00	57	0,20
2545565	477806002MT	3592828	477806002MW	6,0	6	13,00	57	0,20
2545570	477807003MT	3592829	477807003MW	7,0	8	16,00	63	0,20
2545603	477808003MT	3592830	477808003MW	8,0	8	16,00	63	0,20
2545605	477809004MT	3592831	477809004MW	9,0	10	19,00	72	0,20
2601245	477810004MT	3592832	477810004MW	10,0	10	22,00	72	0,30
2601246	477812005MT	3592833	477812005MW	12,0	12	26,00	83	0,30
2601248	477814014MT	3592834	477814014MW	14,0	14	26,00	83	0,30
2601249	477816006MT	3592835	477816006MW	16,0	16	32,00	92	0,30
2601250	477818018MT	3592836	477818018MW	18,0	18	32,00	92	0,30
2601251	477820007MT	3592837	477820007MW	20,0	20	38,00	104	0,30
2601252	477825008MT	3592838	477825008MW	25,0	25	45,00	121	0,30

- Unequal flute spacing.
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

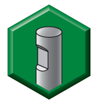




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series 4717 • VariMill • Extended Length of Cut



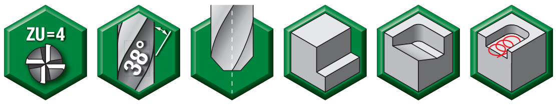
P	●
M	●
K	○
N	
S	●
H	●

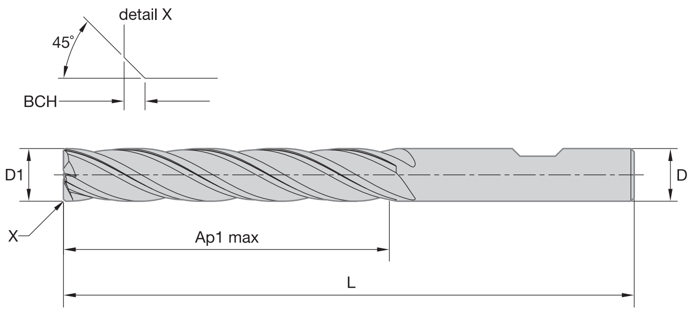
● first choice
○ alternate choice

grade TiAlN-LW
TiAlN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
3641112	471706002LW	6,0	6	32,00	76	0,40
3641113	471708003LW	8,0	8	32,00	87	0,40
3641114	471710004LW	10,0	10	38,00	89	0,50
3641115	471712005LW	12,0	12	51,00	100	0,50
3641116	471716006LW	16,0	16	57,00	125	0,50
3641117	471720007LW	20,0	20	57,00	125	0,50

- Unequal flute spacing.
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

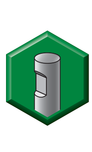




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series 4727 • VariMill • Extended Length of Cut

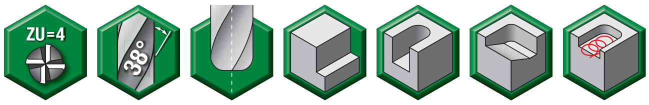


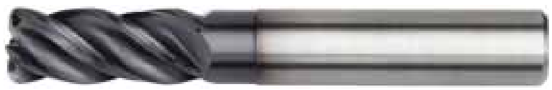
P	●
M	●
K	○
N	
S	●
H	●

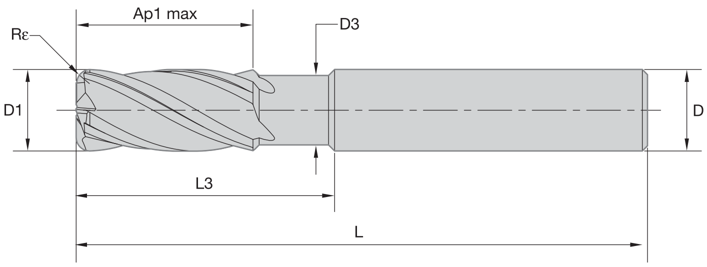
● first choice
○ alternate choice

order #	catalogue # grade TiAlN-LW TiAlN	D1	D	length of cut Ap1 max	length L	BCH
3641118	472712005LW	12,0	12	76,00	125	0,50
3641119	472716006LW	16,0	16	76,00	150	0,50
3641120	472720007LW	20,0	20	102,00	175	0,50

- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



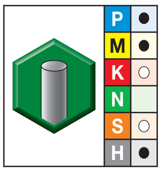




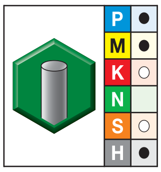
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series 47N7 • VariMill • With Neck



grade AlTiN-MT
AlTiN



grade TiAlN-LT
TiAlN

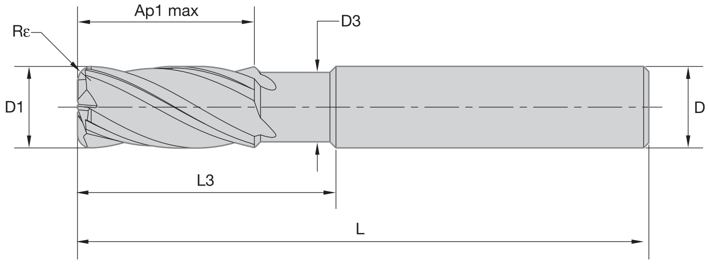
● first choice
○ alternate choice

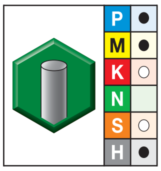
order # (AlTiN-MT)	catalogue # (AlTiN-MT)	order # (TiAlN-LT)	catalogue # (TiAlN-LT)	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
	–	3462450	47N704002LT	4,0	6	3,60	12,00	16,00	55	0,40
3462452	47N704012MT	3462451	47N704012LT	4,0	6	3,60	12,00	16,00	55	0,50
	–	3462453	47N704022LT	4,0	6	3,60	12,00	16,00	55	1,00
	–	3462454	47N705002LT	5,0	6	4,60	13,00	18,00	57	0,50
3462456	47N705012MT	3462455	47N705012LT	5,0	6	4,60	13,00	18,00	57	1,00
3462458	47N706002MT	3462457	47N706002LT	6,0	6	5,50	13,00	21,00	57	0,50
3462460	47N706012MT	3462459	47N706012LT	6,0	6	5,50	13,00	21,00	57	1,00
	–	3462461	47N706022LT	6,0	6	5,50	13,00	21,00	57	1,50
3462463	47N708003MT	3462462	47N708003LT	8,0	8	7,50	16,00	27,00	63	0,50
3462465	47N708013MT	3462464	47N708013LT	8,0	8	7,50	16,00	27,00	63	1,00
	–	3462466	47N708023LT	8,0	8	7,50	16,00	27,00	63	1,50
	–	3462467	47N708033LT	8,0	8	7,50	16,00	27,00	63	2,00
3462469	47N710004MT	3462468	47N710004LT	10,0	10	9,50	22,00	32,00	72	0,50
3462471	47N710014MT	3462470	47N710014LT	10,0	10	9,50	22,00	32,00	72	1,00
	–	3462472	47N710024LT	10,0	10	9,50	22,00	32,00	72	1,50
3462474	47N710034MT	3462473	47N710034LT	10,0	10	9,50	22,00	32,00	72	2,00
3462476	47N712005MT	3462475	47N712005LT	12,0	12	11,50	26,00	38,00	83	0,50
3462478	47N712015MT	3462477	47N712015LT	12,0	12	11,50	26,00	38,00	83	1,00
	–	3462479	47N712025LT	12,0	12	11,50	26,00	38,00	83	1,50
3462481	47N712035MT	3462480	47N712035LT	12,0	12	11,50	26,00	38,00	83	2,00

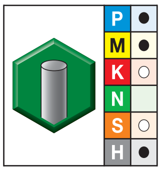
(continued)

High-Performance Solid Carbide End Mills

(Series 47N7 • VariMill • With Neck — continued)



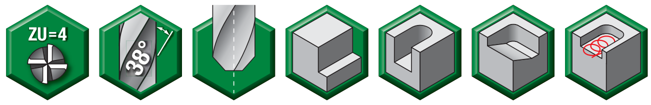


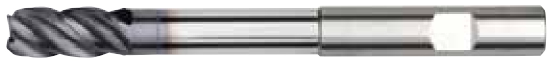


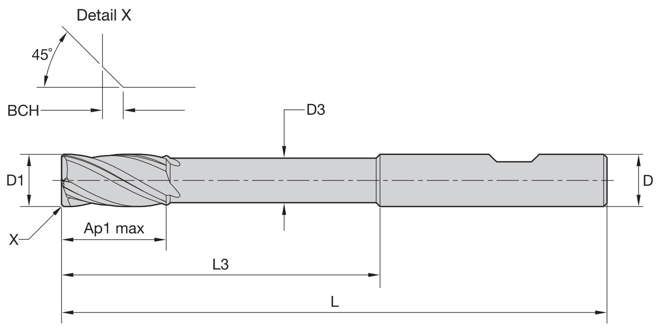
● first choice
○ alternate choice

grade AlTiN-MT AlTiN order #	catalogue #	grade TiAlN-LT TiAlN order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
3462483	47N712045MT	3462482	47N712045LT	12,0	12	11,50	26,00	38,00	83	4,00
3462485	47N716006MT	3462484	47N716006LT	16,0	16	15,00	32,00	44,00	92	1,00
3462487	47N716016MT	3462486	47N716016LT	16,0	16	15,00	32,00	44,00	92	2,00
3462489	47N716026MT	3462488	47N716026LT	16,0	16	15,00	32,00	44,00	92	4,00
3462491	47N720007MT	3462490	47N720007LT	20,0	20	19,00	38,00	55,00	104	1,00
3462493	47N720017MT	3462492	47N720017LT	20,0	20	19,00	38,00	55,00	104	2,00
3462495	47N720027MT	3462494	47N720027LT	20,0	20	19,00	38,00	55,00	104	4,00

- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



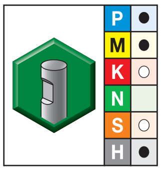




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

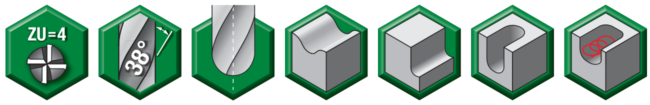
Series 47N6 • VariMill • Extended Reach with Neck

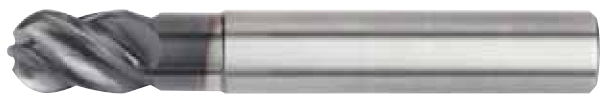


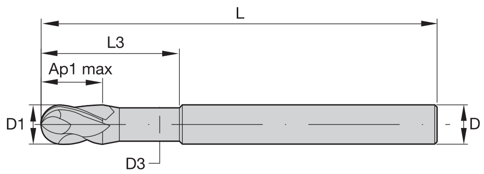
● first choice
○ alternate choice

grade TiAlN-LW TiAlN order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	BCH
4067705	47N606002LW	6,0	6	5,50	12,00	42,00	100	0,40
4067706	47N608003LW	8,0	8	7,30	16,00	62,00	100	0,40
4067707	47N610004LW	10,0	10	9,10	20,00	60,00	100	0,50
4067708	47N612005LW	12,0	12	11,00	24,00	73,00	125	0,50
4067709	47N616006LW	16,0	16	14,56	32,00	100,00	150	0,50
4067710	47N620007LW	20,0	20	18,20	40,00	98,00	175	0,50

- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.







End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 47N0 • VariMill • Ball Nose • Victory Grades

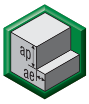
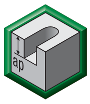
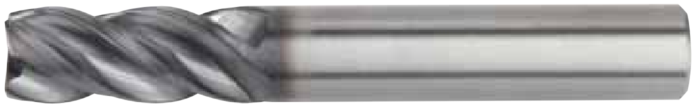
P	●
M	●
K	●
N	
S	○
H	●

● first choice
○ alternate choice

grade WP15PE AlTiN order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
5576818	47N005002T	5,0	6	4,70	9,00	15,00	57
5576819	47N006002T	6,0	6	5,64	10,00	15,00	57
5576820	47N008003T	8,0	8	7,52	12,00	20,00	63
5576821	47N010004T	10,0	10	9,40	14,00	25,00	72
5576822	47N012005T	12,0	12	11,28	16,00	30,00	83
5576823	47N016006T	16,0	16	15,04	22,00	38,00	92
5576824	47N020007T	20,0	20	18,80	26,00	50,00	104

Series 4777 • VariMill • Victory Grades

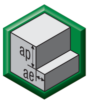
WIDIA VICTORY

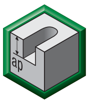
Material Group		A		B															
																			
		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	3	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
P	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
P	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
P	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
M	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
M	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
K	2	1,5 x D	0,5 x D	1 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
K	3	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
S	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
S	3	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098

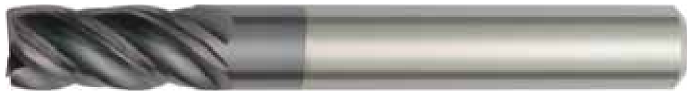
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

WIDIA HANITA

Series 4778 • VariMill



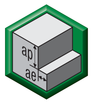




Material Group		Side Milling (A) and Slotting (B)			AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	4,0	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	3	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088	0,098
	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	100	–	130	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081	0,091
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,013	0,019	0,026	0,032	0,037	0,046	0,054	0,061
	3	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,016	0,026	0,037	0,045	0,052	0,064	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088	0,098

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4717 • VariMill

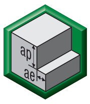


Material Group		Side Milling (A) Finishing A ap	ae	TiAlN Cutting Speed — vc m/min min		max	Roughing A ap	ae	TiAlN Cutting Speed — vc m/min min		max	Recommended feed per tooth (fz = mm/th) for side milling (A). mm	D1 — Diameter 6,0	8,0	10,0	12,0	16,0	20,0
P	1	Ap1 max	0,05 x D*	300	–	400	Ap1 max	0,2 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,092	0,114
P	2	Ap1 max	0,05 x D*	280	–	380	Ap1 max	0,2 x D	140	–	190	fz	0,044	0,060	0,072	0,083	0,092	0,114
P	3	Ap1 max	0,05 x D*	240	–	320	Ap1 max	0,2 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,079	0,101
P	4	Ap1 max	0,05 x D*	180	–	300	Ap1 max	0,2 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,070	0,088
P	5	Ap1 max	0,05 x D*	120	–	200	Ap1 max	0,2 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,063	0,081
P	6	Ap1 max	0,05 x D*	100	–	150	Ap1 max	0,2 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,052	0,065
M	1	Ap1 max	0,05 x D*	180	–	230	Ap1 max	0,2 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,079	0,101
M	2	Ap1 max	0,05 x D*	120	–	160	Ap1 max	0,2 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,063	0,081
M	3	Ap1 max	0,05 x D*	120	–	140	Ap1 max	0,2 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,052	0,065
K	1	Ap1 max	0,05 x D*	240	–	300	Ap1 max	0,2 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,092	0,114
K	2	Ap1 max	0,05 x D*	220	–	260	Ap1 max	0,2 x D	110	–	130	fz	0,036	0,050	0,061	0,070	0,079	0,101
K	3	Ap1 max	0,05 x D*	200	–	260	Ap1 max	0,2 x D	100	–	130	fz	0,029	0,040	0,048	0,056	0,063	0,081
S	1	Ap1 max	0,05 x D*	100	–	180	Ap1 max	0,2 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,079	0,101
S	2	Ap1 max	0,05 x D*	50	–	80	Ap1 max	0,2 x D	25	–	40	fz	0,036	0,050	0,061	0,070	0,079	0,101
S	3	Ap1 max	0,05 x D*	120	–	160	Ap1 max	0,2 x D	60	–	80	fz	0,019	0,026	0,032	0,037	0,042	0,054
S	4	Ap1 max	0,05 x D*	100	–	120	Ap1 max	0,2 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,058	0,074
H	1	Ap1 max	0,05 x D*	160	–	280	Ap1 max	0,2 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,070	0,088

**For cutting data above, use ae ≤ 0,8mm.*

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.
For finishing, increase feed per tooth by 20%.

Series 4727 • VariMill

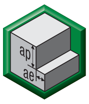
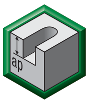
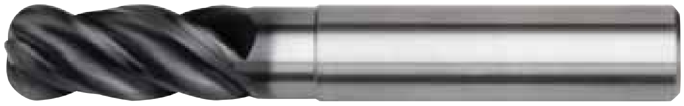


Material Group		Side Milling (A)										Recommended feed per tooth (fz = mm/th) for side milling (A).				
		Finishing					Roughing						D1 — Diameter			
		A		TiAlN Cutting Speed — vc m/min			A		TiAlN Cutting Speed — vc m/min							
		ap	ae	min		max	ap	ae	min		max	mm	12,0	16,0	20,0
P	1	Ap1 max	0,05 x D*	300	–	400	Ap1 max	0,2 x D	150	–	200	fz	0,083	0,101	0,114
	2	Ap1 max	0,05 x D*	280	–	380	Ap1 max	0,2 x D	140	–	190	fz	0,083	0,101	0,114
	3	Ap1 max	0,05 x D*	240	–	320	Ap1 max	0,2 x D	120	–	160	fz	0,070	0,087	0,101
	4	Ap1 max	0,05 x D*	180	–	300	Ap1 max	0,2 x D	90	–	150	fz	0,062	0,077	0,088
	5	Ap1 max	0,05 x D*	120	–	200	Ap1 max	0,2 x D	60	–	100	fz	0,056	0,070	0,081
	6	Ap1 max	0,05 x D*	100	–	150	Ap1 max	0,2 x D	50	–	75	fz	0,047	0,057	0,065
M	1	Ap1 max	0,05 x D*	180	–	230	Ap1 max	0,2 x D	90	–	115	fz	0,070	0,087	0,101
	2	Ap1 max	0,05 x D*	120	–	160	Ap1 max	0,2 x D	60	–	80	fz	0,056	0,070	0,081
	3	Ap1 max	0,05 x D*	120	–	140	Ap1 max	0,2 x D	60	–	70	fz	0,047	0,057	0,065
K	1	Ap1 max	0,05 x D*	240	–	300	Ap1 max	0,2 x D	120	–	150	fz	0,083	0,101	0,114
	2	Ap1 max	0,05 x D*	220	–	260	Ap1 max	0,2 x D	110	–	130	fz	0,070	0,087	0,101
	3	Ap1 max	0,05 x D*	200	–	260	Ap1 max	0,2 x D	100	–	130	fz	0,056	0,070	0,081
S	1	Ap1 max	0,05 x D*	100	–	180	Ap1 max	0,2 x D	50	–	90	fz	0,070	0,087	0,101
	2	Ap1 max	0,05 x D*	50	–	80	Ap1 max	0,2 x D	25	–	40	fz	0,070	0,087	0,101
	3	Ap1 max	0,05 x D*	120	–	160	Ap1 max	0,2 x D	60	–	80	fz	0,037	0,046	0,054
	4	Ap1 max	0,05 x D*	100	–	120	Ap1 max	0,2 x D	50	–	60	fz	0,052	0,064	0,074
H	1	Ap1 max	0,05 x D*	160	–	280	Ap1 max	0,2 x D	80	–	140	fz	0,062	0,077	0,088

**For cutting data above, use ae ≤ 0,8mm.*

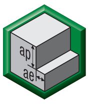
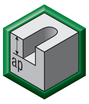
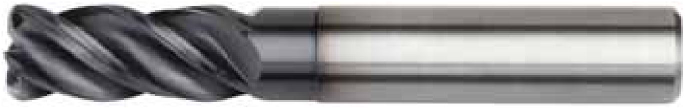
*NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.
For finishing, increase feed per tooth by 20%.*

Series 47N7 AlTiN • VariMill • With Neck

Material Group		A		B											
															
		Side Milling (A) and Slotting (B)			AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min	–	max	mm	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
P	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
P	3	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
P	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088
P	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
P	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
M	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
M	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
K	2	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
K	3	1,5 x D	0,5 x D	1 x D	100	–	130	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
S	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,013	0,019	0,026	0,032	0,037	0,046	0,054
S	3	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
S	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,016	0,026	0,037	0,045	0,052	0,064	0,074
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 47N7 TiAlN • VariMill • With Neck

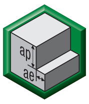
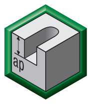
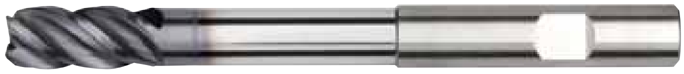




Material Group		Side Milling (A) and Slotting (B) A ap	A ae	B ap	TiAlN Cutting Speed — vc m/min min		max	mm	D1 — Diameter 4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088
	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	3	1,5 x D	0,5 x D	1 x D	100	–	130	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,013	0,019	0,026	0,032	0,037	0,046	0,054
	3	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,016	0,026	0,037	0,045	0,052	0,064	0,074
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088

Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.

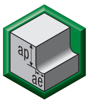
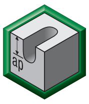
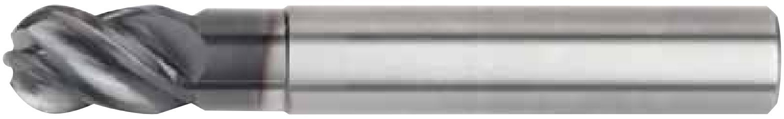
*NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.*

Series 47N6 • VariMill • With Neck

Material Group															
		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
P	0	1,5 x D	0,2 x D	0,5 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,101	0,114
	1	1,5 x D	0,2 x D	0,5 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,101	0,114
	2	1,5 x D	0,2 x D	0,5 x D	140	–	190	fz	0,044	0,060	0,072	0,083	0,101	0,114
	3	1,5 x D	0,2 x D	0,5 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,087	0,101
	4	1,5 x D	0,2 x D	0,5 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,077	0,088
	5	1,5 x D	0,2 x D	0,5 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,070	0,081
	6	1,5 x D	0,2 x D	0,5 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,057	0,065
M	1	1,5 x D	0,2 x D	0,5 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,087	0,101
	2	1,5 x D	0,2 x D	0,5 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081
	3	1,5 x D	0,2 x D	0,5 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,057	0,065
K	1	1,5 x D	0,2 x D	0,5 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,101	0,114
	2	1,5 x D	0,2 x D	0,5 x D	110	–	130	fz	0,036	0,050	0,061	0,070	0,087	0,101
	3	1,5 x D	0,2 x D	0,5 x D	110	–	130	fz	0,029	0,040	0,048	0,056	0,070	0,081
S	1	1,5 x D	0,2 x D	0,5 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,087	0,101
	2	1,5 x D	0,1 x D	0,3 x D	25	–	40	fz	0,019	0,026	0,032	0,037	0,046	0,054
	3	1,5 x D	0,2 x D	0,5 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081
	4	1,5 x D	0,2 x D	0,5 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,064	0,074
H	1	1,5 x D	0,1 x D	0,3 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,077	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 47N0 • With Neck • VariMill • Victory Grades

Material Group																	
		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	1,25 x D	0,5 x D	1 x D	150	–	200	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	1,25 x D	0,5 x D	1 x D	150	–	200	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1,25 x D	0,5 x D	1 x D	140	–	190	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	1,25 x D	0,5 x D	1 x D	120	–	160	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	1,25 x D	0,5 x D	0,75 x D	90	–	150	fz	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
	5	1,25 x D	0,5 x D	1 x D	60	–	100	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	6	1,25 x D	0,5 x D	0,75 x D	50	–	75	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	1,25 x D	0,5 x D	1 x D	90	–	115	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1,25 x D	0,5 x D	1 x D	60	–	80	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	1,25 x D	0,5 x D	1 x D	60	–	70	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	1,25 x D	0,5 x D	1 x D	120	–	150	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1,25 x D	0,5 x D	1 x D	110	–	140	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	3	1,25 x D	0,5 x D	1 x D	110	–	130	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	1 x D	0,3 x D	0,3 x D	50	–	90	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1 x D	0,3 x D	0,3 x D	25	–	40	fz	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054
	3	1,25 x D	0,5 x D	1 x D	60	–	80	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	4	1,25 x D	0,5 x D	1 x D	50	–	60	fz	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	1,25 x D	0,5 x D	0,75 x D	80	–	140	fz	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

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EXTREME **CHALLENGES.** EXTREME **RESULTS.**

HydroForce™ HT Chuck High Torque for High Metal Removal Rates (MRR) and Superior Surface Finish

- HydroForce gives you an unmatched combination of accuracy and clamping forces.
- Compact and stable design.
- Advanced hydraulic clamping with lowest runout and superior vibration dampening.
- Balanced quality to lower vibration, especially at high speeds.
- Focused and flexible product offering.

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WIDIA™

VariMill II

VariMill II end mills are the proven leader in the field of high-performance, chatter-free machining. They are designed to provide maximum metal removal rates and to achieve supreme surface conditions. Utilising an innovative and proprietary design with unequal flute spacing, VariMill II carbide end mills provide users with the most versatile technology available, capable of outperforming other high-performance tools.

- 1 x D slotting in titanium and stainless steels with five unequally spaced flutes.
- Roughing and finishing with one tool.
- Various lengths-of-cut; necked and corner radius versions available.

WIDIA VICTORY

VariMill II™ Series

- Five unequally spaced flutes boosting your output with higher feed rates.
- Centre cutting.
- Roughing and finishing with one tool.
- Less passes due to 1 x D slotting capability on almost all materials, including titanium.

577C Series

- Highest metal removal rates and tool life in:
  - — Stainless steels, steels, and alloyed steels.
  - — Cast iron.
  - — High-temperature alloys and titanium.
- Corner radii and sharp edges.

57NC Series

- Titanium and stainless steel geometry design.
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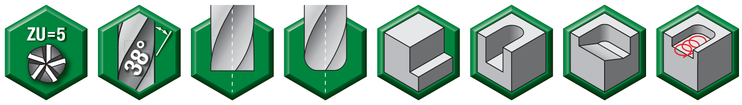
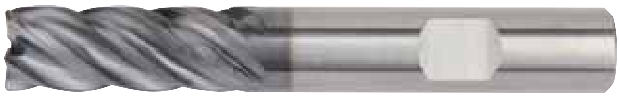
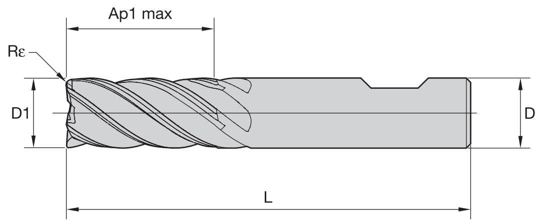
- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Slotting up to 1 x D.
- Standard items listed. Additional styles and coatings made-to-order.



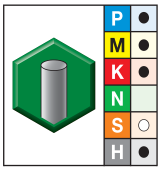


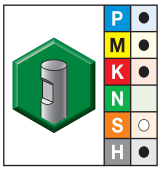


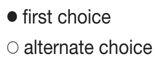
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series 577C • VariMill II • With Centre Cut • Victory Grades

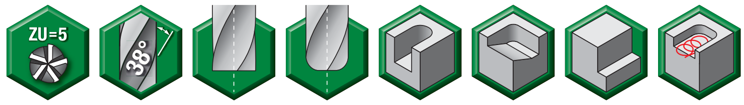


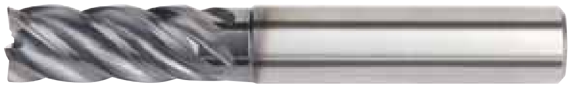


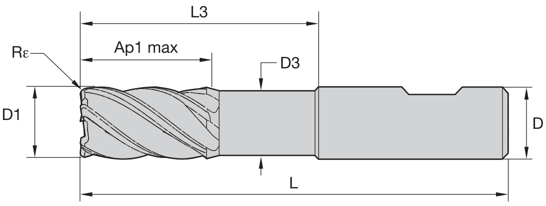


grade WP15PE AlTiN order #	grade WP15PE AlTiN catalogue #	grade WP15PE AlTiN order #	grade WP15PE AlTiN catalogue #	D1	D	length of cut Ap1 max	length L	Rε
5578866	577C04002T	5578867	577C04002W	4,0	6	11,00	55	0,25
5578868	577C04012T		–	4,0	6	11,00	55	–
5578990	577C05002T	5578991	577C05002W	5,0	6	13,00	57	0,25
5578992	577C06002T	5578993	577C06002W	6,0	6	13,00	57	0,40
5578994	577C06012T		–	6,0	6	13,00	57	–
5578995	577C07003T	5578996	577C07003W	7,0	8	16,00	63	0,40
5578997	577C08003T	5578998	577C08003W	8,0	8	19,00	63	0,50
5578999	577C08013T		–	8,0	8	19,00	63	–
5579021	577C09004T	5579022	577C09004W	9,0	10	19,00	72	0,50
5579023	577C10004T	5579024	577C10004W	10,0	10	22,00	72	0,50
5579025	577C10014T		–	10,0	10	22,00	72	–
5579026	577C12005T	5579027	577C12005W	12,0	12	26,00	83	0,75
5579028	577C12015T		–	12,0	12	26,00	83	–
5579029	577C14004T	5579040	577C14004W	14,0	14	26,00	83	0,75
5579041	577C14014T		–	14,0	14	26,00	83	–
5579042	577C16006T	5579043	577C16006W	16,0	16	32,00	92	0,75
5579044	577C16016T		–	16,0	16	32,00	92	–
5579045	577C18008T	5579046	577C18008W	18,0	18	32,00	92	0,75
5579047	577C20007T	5579048	577C20007W	20,0	20	38,00	104	0,75
5579049	577C20017T		–	20,0	20	38,00	104	–
5579060	577C25008T	5579061	577C25008W	25,0	25	45,00	121	0,75

- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Slotting up to 1 x D.
- Standard items listed. Additional styles and coatings made-to-order.







End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 57NC • VariMill II • With Neck • With Centre Cut • Victory Grades

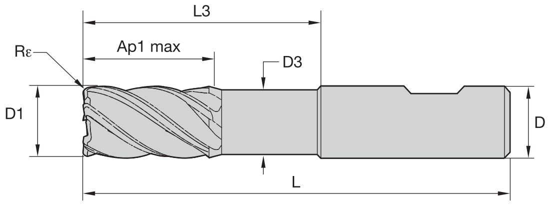
● first choice
○ alternate choice

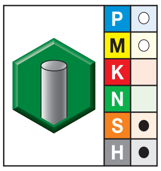
P	M	K	N	S	H
○	○			●	●

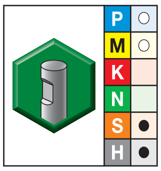
WS15PE AlTiN order #	WS15PE AlTiN catalogue #	WS15PE AlTiN order #	WS15PE AlTiN catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
5598906	57NC06002T		–	6,0	6	5,64	13,00	18,00	63	–
5598907	57NC06022T	5598908	57NC06022W	6,0	6	5,64	13,00	18,00	63	0,50
5598909	57NC06032T	5599070	57NC06032W	6,0	6	5,64	13,00	18,00	63	1,00
	–	5599071	57NC06042W	6,0	6	5,64	13,00	18,00	63	1,50
5599072	57NC08003T		–	8,0	8	7,52	19,00	24,00	76	–
5599073	57NC08023T	5599074	57NC08023W	8,0	8	7,52	19,00	24,00	76	0,50
5599075	57NC08033T	5599076	57NC08033W	8,0	8	7,52	19,00	24,00	76	1,00
	–	5599077	57NC08053W	8,0	8	7,52	19,00	24,00	76	2,00
5599078	57NC10004T		–	10,0	10	9,40	22,00	30,00	76	–
5599079	57NC10024T	5599080	57NC10024W	10,0	10	9,40	22,00	30,00	76	0,50
5599081	57NC10034T	5599082	57NC10034W	10,0	10	9,40	22,00	30,00	76	1,00
5599083	57NC10054T	5599084	57NC10054W	10,0	10	9,40	22,00	30,00	76	2,00
5599085	57NC12005T		–	12,0	12	11,28	26,00	36,00	83	–
5599086	57NC12025T	5599087	57NC12025W	12,0	12	11,28	26,00	36,00	83	0,50
5599088	57NC12035T	5599089	57NC12035W	12,0	12	11,28	26,00	36,00	83	1,00
5599090	57NC12055T	5599091	57NC12055W	12,0	12	11,28	26,00	36,00	83	2,00
5599092	57NC16006T		–	16,0	16	15,04	32,00	48,00	100	–
5599093	57NC16026T	5598905	57NC16026W	16,0	16	15,04	32,00	48,00	100	0,50
5599094	57NC16036T	5599095	57NC16036W	16,0	16	15,04	32,00	48,00	100	1,00
5599096	57NC16056T	5599097	57NC16056W	16,0	16	15,04	32,00	48,00	100	2,00

(continued)

(Series 57NC • VariMill II • With Neck • With Centre Cut • Victory Grades — continued)





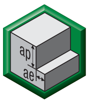


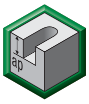
● first choice
○ alternate choice

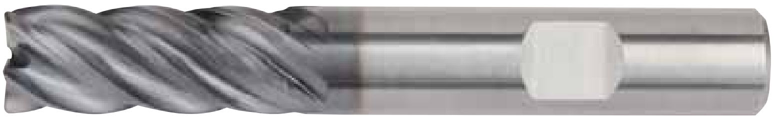
WS15PE AlTiN order #	WS15PE AlTiN catalogue #	WS15PE AlTiN order #	WS15PE AlTiN catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
5599098	57NC16076T	5599099	57NC16076W	16,0	16	15,04	32,00	48,00	100	3,00
5599100	57NC20007T		—	20,0	20	18,80	38,00	60,00	115	—
5599101	57NC20027T	5599102	57NC20027W	20,0	20	18,80	38,00	60,00	115	0,50
5599103	57NC20037T	5599104	57NC20037W	20,0	20	18,80	38,00	60,00	115	1,00
5599105	57NC20057T	5599106	57NC20057W	20,0	20	18,80	38,00	60,00	115	2,00
5599107	57NC20077T	5599108	57NC20077W	20,0	20	18,80	38,00	60,00	115	3,00
5599109	57NC20087T	5599110	57NC20087W	20,0	20	18,80	38,00	60,00	115	4,00
5599111	57NC25008T		—	25,0	25	23,50	45,00	75,00	135	—
5599112	57NC25028T	5599113	57NC25028W	25,0	25	23,50	45,00	75,00	135	0,50
5599114	57NC25038T	5599115	57NC25038W	25,0	25	23,50	45,00	75,00	135	1,00
5599116	57NC25058T	5599117	57NC25058W	25,0	25	23,50	45,00	75,00	135	2,00
5599118	57NC25078T	5599119	57NC25078W	25,0	25	23,50	45,00	75,00	135	3,00
5599120	57NC25088T	5599121	57NC25088W	25,0	25	23,50	45,00	75,00	135	4,00

Series 577C • VariMill II • Victory Grades

WIDIA VICTORY





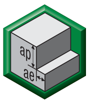


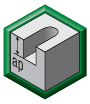
Material Group		Side Milling (A) and Slotting (B)			WP15PE				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	3	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
P	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
P	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
M	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
M	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
K	2	1,5 x D	0,5 x D	1 x D	110	–	140	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
K	3	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
S	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
S	3	1,5 x D	0,3 x D	1 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
H	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071

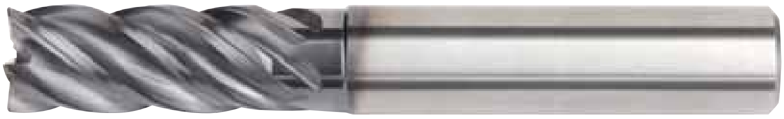
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 57NC • VariMill II • With Neck • Victory Grades

WIDIA VICTORY







Material Group		Side Milling (A) and Slotting (B)			WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	110	–	140	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

X-Feed™ End Mills for High-Feed Milling

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Specifically engineered to machine hardened steel up to 67 HRC at extreme speeds and feeds

- Unique tool with new 6-flute style for high productivity.
- Necked shanks provide extended reach in deep cavities.
- High feed rates, up to 0,6mm per tooth on a 20mm tool.
- Machine hardened materials at 2–3x the metal removal rate of competitive end mills.
- Wide range of cutting diameters: down to 6mm for small and medium pocket work.
- Innovative new geometry maximises metal removal rates.
- High metal removal rates and lower manufacturing costs.

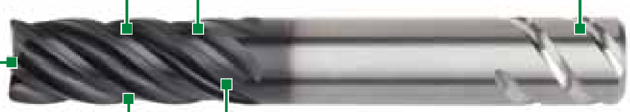
To learn more about our innovations, contact your local Authorised Distributor or visit **widia.com.**

WIDIA™

VariMill II ER

Engineered with Eccentric Relief (ER) grind at the cutting edges for greater edge strength, enabling higher metal removal rates and increased productivity. The new VariMill II ER is the first WIDIA™ off-the-shelf end mill available with **SAFE-λOCK®** by HAIMER, providing excellent stability, eliminating end mill pullout, and increasing concentric tool clamping. Though primarily designed for roughing and finishing applications in the aerospace industry, VariMill II ER can be used as a solution for any titanium or stainless steel application and is capable of slotting, ramping, and plunging.

- High-performance tools for titanium and stainless steel workpiece materials.
- Roughing and finishing with one tool, lowering tool costs.
- Various radius and necked versions available.
- Standard offering with **SAFE-λOCK®** by HAIMER.



SAFE-λOCK®
by HAIMER

WIDIA VICTORY

VariMill II™ ER Series

- Unique geometry providing increased tool life and higher metal removal rates in difficult-to-machine workpiece materials.
- Increased output due to fewer tool changes and higher metal removal rates.
- Roughing and finishing with one tool, lowering tool costs.
- 1 x D slotting capability requires less passes, increasing productivity.

5V0E Series

- Eccentric relief for edge stability and strength.
- Extensive radii corner offering.

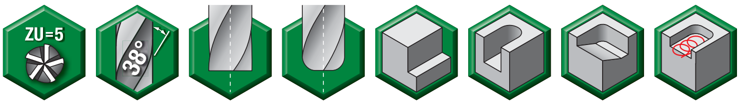
5VNE Series

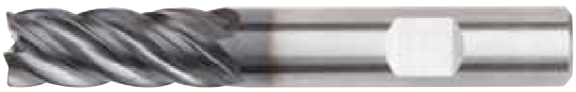
- Eccentric relief for edge stability and strength.
- Extensive radii corner offering.
- Neck design for depths requiring additional passes.

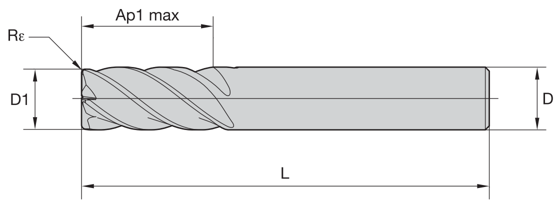
Application Example
Side milling of INCONEL® 718 component.

Workpiece material:	INCONEL 718
Tool:	D = 16mm
Cutting data:	ap = 27,43mm
	ae = 1,3mm
	vc = 19,8 m/min
	fz = 0,05 mm/th
Result:	Increased tool life from 2 years to 5.

- Unequal flute spacing.
- Centre cutting.
- Optimised geometry for titanium machining.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.





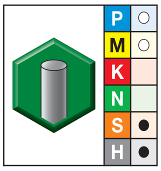


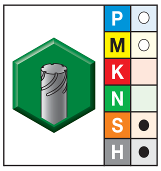
End Mill Tolerances

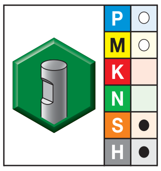
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 577E • VariMill II ER • Victory Grades



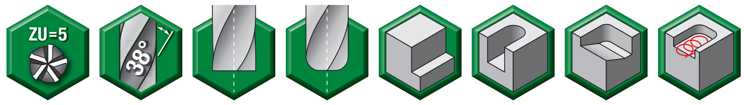


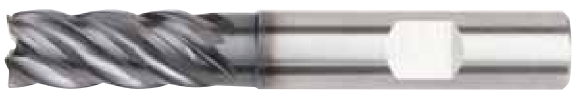


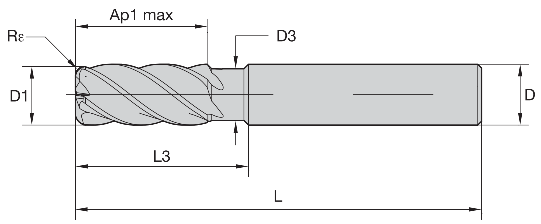
● first choice
○ alternate choice

WS15PE AlTiN		WS15PE AlTiN		WS15PE AlTiN						
order #	**catalogue #**	**order #**	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**length of cut Ap1 max**	**length L**	**Rε**
5599171	577E10004T		–		–	10,0	10	22,00	72	–
5599172	577E10024T		–	5599173	577E10024W	10,0	10	22,00	72	0,50
	–	5599174	577E12005V		–	12,0	12	26,00	83	–
	–	5599175	577E12015V	5599176	577E12015W	12,0	12	26,00	83	0,75
	–	5599177	577E16006V		–	16,0	16	32,00	92	–
	–	5599178	577E16016V	5599179	577E16016W	16,0	16	32,00	92	0,75
	–	5599180	577E20007V		–	20,0	20	38,00	104	–
	–	5599181	577E20017V	5599182	577E20017W	20,0	20	38,00	104	0,75
	–	5599183	577E25018V	5599184	577E25018W	25,0	25	45,00	121	0,75

- Unequal flute spacing.
- Centre cutting.
- Optimised geometry for titanium machining.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.





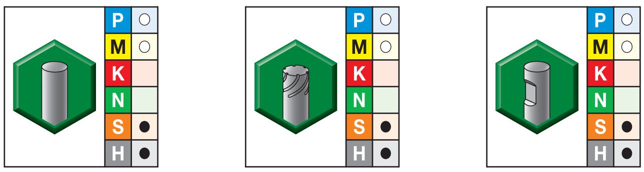


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 57NE • VariMill II ER • With Neck • Victory Grades

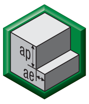
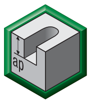
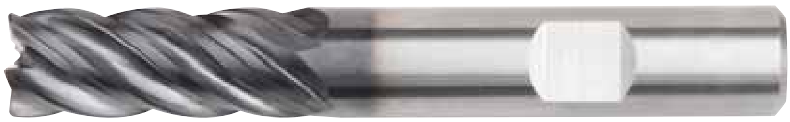


● first choice
○ alternate choice

WS15PE AlTiN order #	WS15PE AlTiN catalogue #	WS15PE AlTiN order #	WS15PE AlTiN catalogue #	WS15PE AlTiN order #	WS15PE AlTiN catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
5599122	57NE10004T		–		–	10,0	10	9,40	22,00	30,00	76	–
5599123	57NE10024T		–	5599124	57NE10024W	10,0	10	9,40	22,00	30,00	76	0,50
5599125	57NE10034T		–	5599126	57NE10034W	10,0	10	9,40	22,00	30,00	76	1,00
5599127	57NE10054T		–	5599128	57NE10054W	10,0	10	9,40	22,00	30,00	76	2,00
	–	5599129	57NE12005V		–	12,0	12	11,28	26,00	36,00	83	–
	–	5599130	57NE12025V	5599131	57NE12025W	12,0	12	11,28	26,00	36,00	83	0,50
	–	5599132	57NE12035V	5599133	57NE12035W	12,0	12	11,28	26,00	36,00	83	1,00
	–	5599134	57NE12055V	5599135	57NE12055W	12,0	12	11,28	26,00	36,00	83	2,00
	–	5599136	57NE16006V		–	16,0	16	15,04	32,00	48,00	100	–
	–	5599137	57NE16026V	5599138	57NE16026W	16,0	16	15,04	32,00	48,00	100	0,50
	–	5599139	57NE16036V	5599140	57NE16036W	16,0	16	15,04	32,00	48,00	100	1,00
	–	5599141	57NE16056V	5599142	57NE16056W	16,0	16	15,04	32,00	48,00	100	2,00
	–	5599143	57NE20007V		–	20,0	20	18,80	38,00	60,00	115	–
	–	5599144	57NE20027V	5599145	57NE20027W	20,0	20	18,80	38,00	60,00	115	0,50
	–	5599146	57NE20037V	5599147	57NE20037W	20,0	20	18,80	38,00	60,00	115	1,00
	–	5599148	57NE20057V	5599149	57NE20057W	20,0	20	18,80	38,00	60,00	115	2,00
	–	5599160	57NE20087V	5599161	57NE20087W	20,0	20	18,80	38,00	60,00	115	4,00
	–	5599162	57NE25008V		–	25,0	25	23,50	45,00	75,00	135	–
	–	5599163	57NE25028V	5599164	57NE25028W	25,0	25	23,50	45,00	75,00	135	0,50
	–	5599165	57NE25038V	5599166	57NE25038W	25,0	25	23,50	45,00	75,00	135	1,00
	–	5599167	57NE25058V	5599168	57NE25058W	25,0	25	23,50	45,00	75,00	135	2,00
	–	5599169	57NE25088V	5599170	57NE25088W	25,0	25	23,50	45,00	75,00	135	4,00

Series 577E • VariMill II ER • Victory Grades

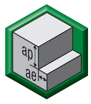
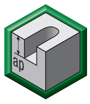
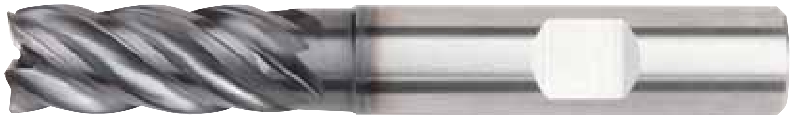
WIDIA VICTORY

Material Group														
		Side Milling (A) and Slotting (B)			WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min		max	mm	10,0	12,0	16,0	18,0	20,0	25,0
P	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,048	0,056	0,070	0,076	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,040	0,047	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,040	0,047	0,057	0,061	0,065	0,071
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,032	0,037	0,046	0,050	0,054	0,061
	3	1,5 x D	0,3 x D	1 x D	25	–	40	fz	0,048	0,056	0,070	0,076	0,081	0,091
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,045	0,052	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,054	0,062	0,077	0,083	0,088	0,098
	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	fz	0,040	0,047	0,057	0,061	0,065	0,071

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 57NE • VariMill II ER • With Neck • Victory Grades

WIDIA VICTORY

Material Group															
		Side Milling (A) and Slotting (B)			WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	10,0	12,0	16,0	18,0	20,0	25,0
P	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,048	0,056	0,070	0,076	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,040	0,047	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,040	0,047	0,057	0,061	0,065	0,071
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	–	50	fz	0,032	0,037	0,046	0,050	0,054	0,061
	3	1,5 x D	0,3 x D	1 x D	40	–	90	fz	0,048	0,056	0,070	0,076	0,081	0,091
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,045	0,052	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,054	0,062	0,077	0,083	0,088	0,098
	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	fz	0,040	0,047	0,057	0,061	0,065	0,071

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

VariMill II Long

Designed to achieve highest surface quality and tool life in titanium, stainless steels, and steels. Innovative core and tool geometry design enable chatter-free corner machining in one pass. VariMill II Long covers 4 x D lengths-of-cut for semi-finishing and fine finishing operations with radii and sharp corner versions from stock.

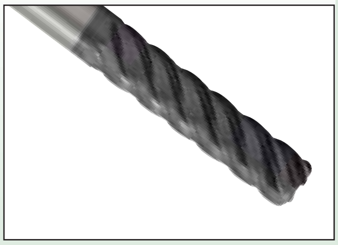
- Tailored 43° helix improves surface finish.
- Less passes in side milling with 4 x D length-of-cut capability.
- One tool for semi-finishing and fine finishing operations.
- No need for feed rate reduction when machining corners.

VariMill II™ Long Series

- Achieve excellent surface finish and outstanding wall straightness.
- Benefit from high accuracy even with thin wall machining.
- Simplify your programming of cavities by keeping the feed rate and radial engagement constant.

5718 Series

- Highest surface quality and tool life in:
  - Titanium
  - Stainless steels
- Corner radii and sharp edges.
- 4 x D length of cut.

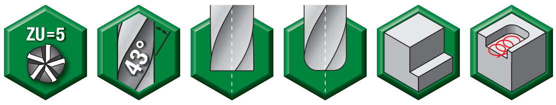


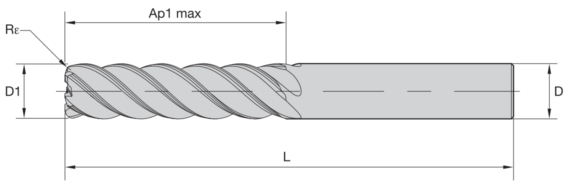
Application Example

Side milling 60° angled corner with constant feed rate.

Workpiece material:	Titanium 6Al-4V
Tool:	D = 15,875mm
Cutting data:	ap = 63mm
	ae = 0,5mm
	vc = 100 m/min
	fz = 0,06 mm/z
Result:	Surface finish Ra 0,4 µm

- Unequal flute spacing.
- Non-centre cutting.
- For finishing and semi-finishing applications.
- Standard items listed. Additional styles and coatings made-to-order.





End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series 5718 • VariMill II Long • 4 x D Length of Cut

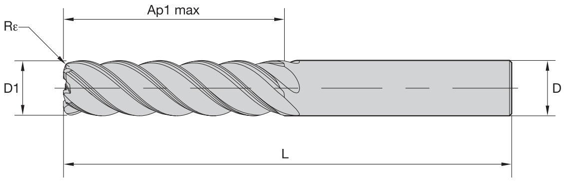
P	●
M	●
K	○
N	
S	●
H	●

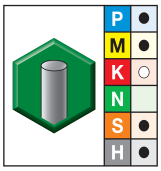
● first choice
○ alternate choice

order #	catalogue # grade AlTiN-MT AlTiN	D1	D	length of cut Ap1 max	length L	Rε
5096566	571806002MT	6,0	6	24,00	76	–
5096567	571806012MT	6,0	6	24,00	76	0,50
5096568	571806022MT	6,0	6	24,00	76	1,00
5096569	571808003MT	8,0	8	32,00	76	–
5096660	571808013MT	8,0	8	32,00	76	0,50
5096661	571808023MT	8,0	8	32,00	76	1,00
4124297	571810004MT	10,0	10	40,00	100	–
5096662	571810014MT	10,0	10	40,00	100	0,50
5096664	571810034MT	10,0	10	40,00	100	2,00
5096665	571810044MT	10,0	10	40,00	100	2,50
4124298	571812005MT	12,0	12	48,00	125	–
5096667	571812025MT	12,0	12	48,00	125	1,00
5096668	571812035MT	12,0	12	48,00	125	2,00
5096669	571812045MT	12,0	12	48,00	125	2,50
4124299	571814014MT	14,0	14	56,00	120	–
5096752	571814024MT	14,0	14	56,00	120	1,00
5096753	571814034MT	14,0	14	56,00	120	2,00
5096754	571814044MT	14,0	14	56,00	120	3,00
5096755	571814054MT	14,0	14	56,00	120	4,00
4124300	571816006MT	16,0	16	64,00	141	–

(continued)

(Series 5718 • VariMill II Long • 4 x D Length of Cut — continued)

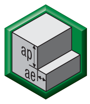




● first choice
○ alternate choice

grade AlTiN-MT AlTiN order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
5096756	571816016MT	16,0	16	64,00	141	0,50
5096757	571816026MT	16,0	16	64,00	141	1,00
5096758	571816036MT	16,0	16	64,00	141	2,00
5096759	571816046MT	16,0	16	64,00	141	3,00
5096800	571816056MT	16,0	16	64,00	141	4,00
4124301	571818018MT	18,0	18	72,00	150	—
5096801	571818028MT	18,0	18	72,00	150	1,00
5096802	571818038MT	18,0	18	72,00	150	2,00
5096803	571818048MT	18,0	18	72,00	150	3,00
5096804	571818058MT	18,0	18	72,00	150	4,00
4124302	571820007MT	20,0	20	80,00	150	—
5096805	571820017MT	20,0	20	80,00	150	0,50
5096806	571820027MT	20,0	20	80,00	150	1,00
5096807	571820037MT	20,0	20	80,00	150	2,00
5096808	571820047MT	20,0	20	80,00	150	3,00
5096809	571820057MT	20,0	20	80,00	150	4,00
4124323	571825008MT	25,0	25	100,00	170	—
5096860	571825018MT	25,0	25	100,00	170	0,50
5096861	571825028MT	25,0	25	100,00	170	1,00
5096862	571825038MT	25,0	25	100,00	170	2,00
5096863	571825048MT	25,0	25	100,00	170	3,00
5096864	571825058MT	25,0	25	100,00	170	4,00

Series 5718 • VariMill II Long • 4 x D Length of Cut



Material Group		Side Milling (A)		AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	Ap1 max	0,05 x D*	300	–	400	fz	0,053	0,072	0,086	0,099	0,111	0,121	0,130	0,137	0,149
	1	Ap1 max	0,05 x D*	300	–	400	fz	0,053	0,072	0,086	0,099	0,111	0,121	0,130	0,137	0,149
	2	Ap1 max	0,05 x D*	280	–	380	fz	0,053	0,072	0,086	0,099	0,111	0,121	0,130	0,137	0,149
	3	Ap1 max	0,05 x D*	240	–	320	fz	0,044	0,060	0,073	0,084	0,095	0,105	0,113	0,121	0,137
	4	Ap1 max	0,05 x D*	180	–	300	fz	0,039	0,054	0,065	0,075	0,084	0,092	0,099	0,106	0,117
	5	Ap1 max	0,05 x D*	120	–	200	fz	0,035	0,048	0,058	0,067	0,076	0,084	0,091	0,097	0,109
	6	Ap1 max	0,05 x D*	100	–	150	fz	0,030	0,040	0,048	0,056	0,062	0,068	0,073	0,078	0,085
M	1	Ap1 max	0,05 x D*	180	–	230	fz	0,044	0,060	0,073	0,084	0,095	0,105	0,113	0,121	0,137
	2	Ap1 max	0,05 x D*	120	–	160	fz	0,035	0,048	0,058	0,067	0,076	0,084	0,091	0,097	0,109
	3	Ap1 max	0,05 x D*	120	–	140	fz	0,030	0,040	0,048	0,056	0,062	0,068	0,073	0,078	0,085
K	1	Ap1 max	0,05 x D*	240	–	300	fz	0,053	0,072	0,086	0,099	0,111	0,121	0,130	0,137	0,149
	2	Ap1 max	0,05 x D*	220	–	280	fz	0,044	0,060	0,073	0,084	0,095	0,105	0,113	0,121	0,137
	3	Ap1 max	0,05 x D*	220	–	260	fz	0,035	0,048	0,058	0,067	0,076	0,084	0,091	0,097	0,109
S	1	Ap1 max	0,05 x D*	100	–	180	fz	0,044	0,060	0,073	0,084	0,095	0,105	0,113	0,121	0,137
	2	Ap1 max	0,05 x D*	50	–	80	fz	0,023	0,032	0,038	0,045	0,050	0,056	0,060	0,065	0,074
	3	Ap1 max	0,05 x D*	120	–	160	fz	0,035	0,048	0,058	0,067	0,076	0,084	0,091	0,097	0,109
	4	Ap1 max	0,05 x D*	100	–	120	fz	0,031	0,044	0,053	0,062	0,070	0,077	0,083	0,089	0,100
H	1	Ap1 max	0,05 x D*	160	–	280	fz	0,039	0,054	0,065	0,075	0,084	0,092	0,099	0,106	0,117
	2	Ap1 max	0,06 x D*	140	–	240	fz	0,030	0,040	0,048	0,056	0,062	0,068	0,073	0,078	0,085

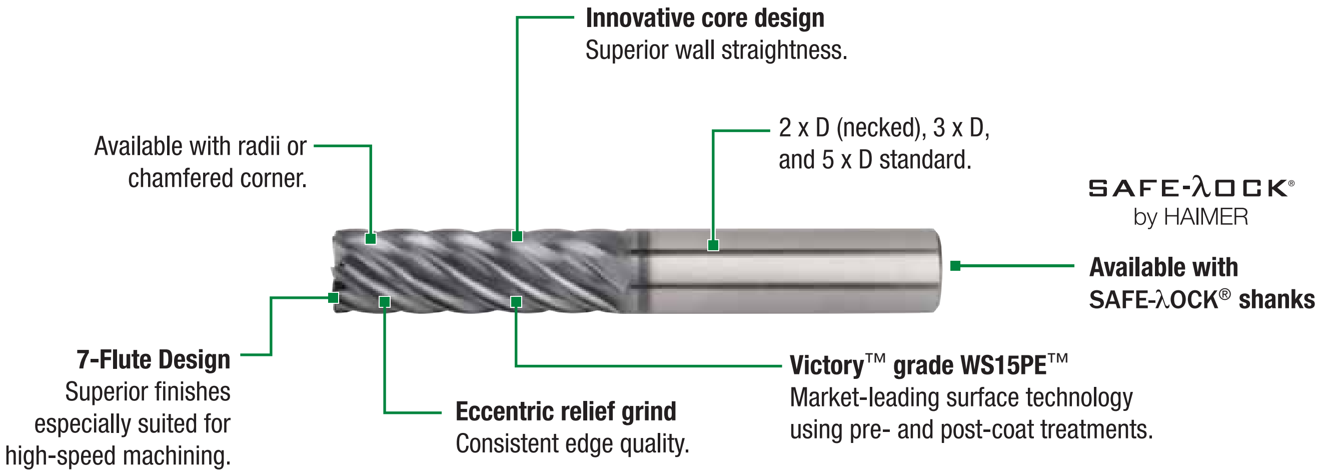
** For the above cutting data, do not exceed an overall ae of 0,8mm.*

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machinining centres, please adjust parameters accordingly on >0,5mm diameters.

VariMill III ER

The trend towards more efficiency and increased productivity using high-speed machining techniques such as trochoidal and peel milling will continue to be a focus for aerospace components. The new VariMill III ER is designed to provide the highest Metal Removal Rates (MRR) and extended tool life in the most demanding materials in the aerospace industry. VariMill III ER is designed to be applied in titanium and stainless steel workpiece materials for both semi-finishing and finishing applications.

- 7-flute eccentric relief design provides edge strength along with high productivity.
- Superior surface finishes and wall straightness capability from specialised core.
- Finishing and semi-finishing at up to 30% of the diameter with one tool.
- First choice for high-speed machining in difficult-to-cut workpiece materials.



WIDIA VICTORY

VariMill III™ ER Series

- Seven unequally spaced flutes provide the maximum output and surface quality.
- Eccentric relief for edge strength and stability.
- Semi-finishing and finishing with one tool.
- Victory™ grade WS15PE™ for increased heat and wear resistance.

77NE Series

- Titanium and stainless steel geometry design.
- Corner radii and chamfered corners.
- 2 x D length of cut.
- Necked 5 x D reach.
- Centre cutting.

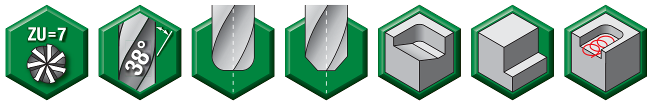
772E Series

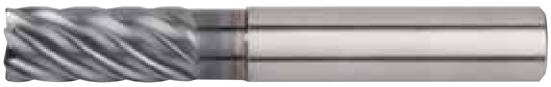
- Titanium and stainless steel geometry design.
- Corner radii and chamfered corners.
- 5 x D length of cut.
- Centre cutting.
- **SAFE-λOCK**®.

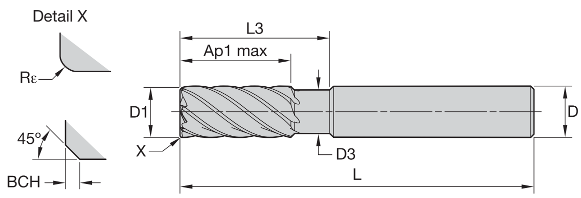
771E Series

- Titanium and stainless steel geometry design.
- Corner radii and chamfered corners.
- 3 x D length of cut.
- Centre cutting.

- Unequal flute spacing.
- Centre cutting.
- Ramping angle 3°.
- Optimised for difficult-to-machine workpiece materials.
- Semi-finishing to finishing applications.
- High-speed machining capability.
- Standard items listed. Additional styles and coatings made-to-order.





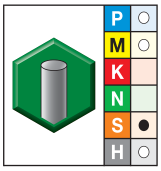


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

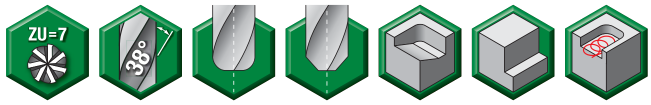
■ Series 77NE • VariMill III ER • With Neck • Victory Grades

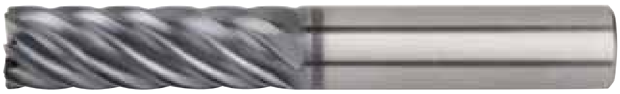


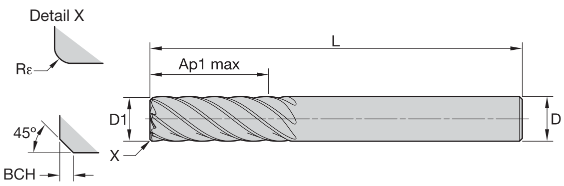
● first choice
○ alternate choice

WS15PE AlTiN order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	BCH
5978039	77NE10004T	10,0	10	9,40	22,00	30,00	76	–	0,50
5978040	77NE10024T	10,0	10	9,40	22,00	30,00	76	0,50	–
5978096	77NE12005T	12,0	12	11,28	26,00	36,00	83	–	0,50
5978097	77NE12025T	12,0	12	11,28	26,00	36,00	83	0,50	–
5978104	77NE16006T	16,0	16	15,04	32,00	48,00	100	–	0,50
5978105	77NE16026T	16,0	16	15,04	32,00	48,00	100	0,50	–
5978112	77NE20007T	20,0	20	18,80	38,00	60,00	115	–	0,50
5978113	77NE20027T	20,0	20	18,80	38,00	60,00	115	0,50	–

- Unequal flute spacing .
- Centre cutting.
- Ramping angle 3°.
- Optimised for difficult-to-machine workpiece materials.
- Semi-finishing to finishing applications.
- High-speed machining capability.
- Standard items listed. Additional styles and coatings made-to-order.





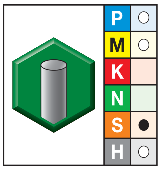


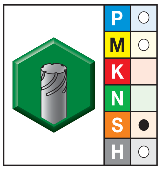
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 771E 772E • VariMill III ER • Victory Grades



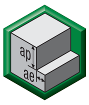


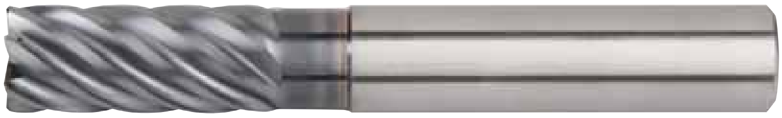
● first choice
○ alternate choice

WS15PE AlTiN		WS15PE AlTiN							
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	BCH
5978092	771E10004T	–		10,0	10	30,00	76	–	0,50
5978093	771E10024T	–		10,0	10	30,00	76	0,50	–
5978094	772E10004T	–		10,0	10	50,00	100	–	0,50
5978095	772E10024T	–		10,0	10	50,00	100	0,50	–
5978098	771E12005T	–		12,0	12	36,00	100	–	0,50
5978099	771E12025T	–		12,0	12	36,00	100	0,50	–
5978100	772E12005T	5978102	772E12005V	12,0	12	60,00	125	–	0,50
5978101	772E12025T	5978103	772E12025V	12,0	12	60,00	125	0,50	–
5978106	771E16006T	–		16,0	16	48,00	110	–	0,50
5978107	771E16026T	–		16,0	16	48,00	110	0,50	–
5978108	772E16006T	5978110	772E16006V	16,0	16	80,00	141	–	0,50
5978109	772E16026T	5978111	772E16026V	16,0	16	80,00	141	0,50	–
5978114	771E20007T	–		20,0	20	60,00	125	–	0,50
5978115	771E20027T	–		20,0	20	60,00	125	0,50	–
5978116	772E20007T	5978118	772E20007V	20,0	20	100,00	166	–	0,50
5978117	772E20027T	5978119	772E20027V	20,0	20	100,00	166	0,50	–

Series 77NE • VariMill III ER • With Neck • Semi-Finishing • Victory Grades

WIDIA VICTORY



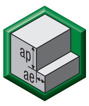


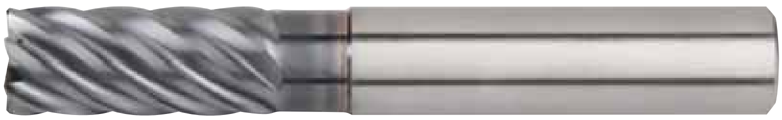
Material Group		Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).					
		A		Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0
P	4	Ap1 max	0,3 x D	90	–	150	fz	0,054	0,062	0,077	0,083	0,088
P	5	Ap1 max	0,3 x D	60	–	100	fz	0,048	0,056	0,070	0,076	0,081
M	1	Ap1 max	0,3 x D	90	–	115	fz	0,061	0,070	0,087	0,095	0,101
M	2	Ap1 max	0,3 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081
M	3	Ap1 max	0,3 x D	60	–	70	fz	0,040	0,047	0,057	0,061	0,065
S	1	Ap1 max	0,3 x D	50	–	90	fz	0,061	0,070	0,087	0,095	0,101
S	2	Ap1 max	0,3 x D	25	–	40	fz	0,032	0,037	0,046	0,050	0,054
S	3	Ap1 max	0,3 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081
S	4	Ap1 max	0,3 x D	50	–	60	fz	0,045	0,052	0,064	0,069	0,074
H	1	Ap1 max	0,3 x D	80	–	140	fz	0,054	0,062	0,077	0,083	0,088
H	2	Ap1 max	0,3 x D	70	–	120	fz	0,040	0,047	0,057	0,061	0,065

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 77NE • VariMill III ER • With Neck • Finishing • Victory Grades

WIDIA VICTORY



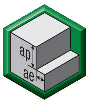


Material Group		Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).					
		A		Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0
P	4	Ap1 max	0,06 x D	180	–	300	fz	0,065	0,075	0,092	0,099	0,106
P	5	Ap1 max	0,06 x D	120	–	200	fz	0,058	0,067	0,084	0,091	0,097
M	1	Ap1 max	0,06 x D	180	–	230	fz	0,073	0,084	0,105	0,113	0,121
M	2	Ap1 max	0,06 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
M	3	Ap1 max	0,06 x D	120	–	140	fz	0,048	0,056	0,068	0,073	0,078
S	1	Ap1 max	0,06 x D	100	–	180	fz	0,073	0,084	0,105	0,113	0,121
S	2	Ap1 max	0,06 x D	50	–	80	fz	0,038	0,045	0,056	0,060	0,065
S	3	Ap1 max	0,06 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
S	4	Ap1 max	0,06 x D	100	–	120	fz	0,053	0,062	0,077	0,083	0,089
H	1	Ap1 max	0,06 x D	160	–	280	fz	0,065	0,075	0,092	0,099	0,106
H	2	Ap1 max	0,06 x D	140	–	240	fz	0,048	0,056	0,068	0,073	0,078

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 771E • VariMill III ER • Semi-Finishing • Victory Grades

WIDIA VICTORY

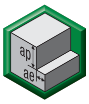
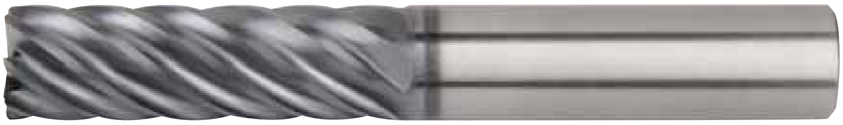



Material Group		Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).					
		A		Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0
P	4	3 x D	0,2 x D	90	–	150	fz	0,054	0,062	0,077	0,083	0,088
	5	3 x D	0,2 x D	60	–	100	fz	0,048	0,056	0,070	0,076	0,081
M	1	3 x D	0,2 x D	90	–	115	fz	0,061	0,070	0,087	0,095	0,101
	2	3 x D	0,2 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081
	3	3 x D	0,2 x D	60	–	70	fz	0,040	0,047	0,057	0,061	0,065
S	1	3 x D	0,2 x D	50	–	90	fz	0,061	0,070	0,087	0,095	0,101
	2	3 x D	0,2 x D	25	–	40	fz	0,032	0,037	0,046	0,050	0,054
	3	3 x D	0,2 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081
	4	3 x D	0,2 x D	50	–	60	fz	0,045	0,052	0,064	0,069	0,074
H	1	3 x D	0,2 x D	80	–	140	fz	0,054	0,062	0,077	0,083	0,088
	2	3 x D	0,2 x D	70	–	120	fz	0,040	0,047	0,057	0,061	0,065

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 771E • VariMill III ER • Finishing • Victory Grades

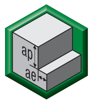
WIDIA VICTORY

Material Group		Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).					
		A		Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0
P	4	3 x D	0,06 x D	180	–	300	fz	0,065	0,075	0,092	0,099	0,106
	5	3 x D	0,06 x D	120	–	200	fz	0,058	0,067	0,084	0,091	0,097
M	1	3 x D	0,06 x D	180	–	230	fz	0,073	0,084	0,105	0,113	0,121
	2	3 x D	0,06 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	3	3 x D	0,06 x D	120	–	140	fz	0,048	0,056	0,068	0,073	0,078
S	1	3 x D	0,06 x D	100	–	180	fz	0,073	0,084	0,105	0,113	0,121
	2	3 x D	0,06 x D	50	–	80	fz	0,038	0,045	0,056	0,060	0,065
	3	3 x D	0,06 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	4	3 x D	0,06 x D	100	–	120	fz	0,053	0,062	0,077	0,083	0,089
H	1	3 x D	0,06 x D	160	–	280	fz	0,065	0,075	0,092	0,099	0,106
	2	3 x D	0,06 x D	140	–	240	fz	0,048	0,056	0,068	0,073	0,078

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 772E • VariMill III ER • Finishing • Victory Grades



Material Group		Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).					
		A		Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0
P	0	5 x D	0,05 x D	300	–	400	fz	0,086	0,099	0,121	0,130	0,137
	1	5 x D	0,05 x D	300	–	400	fz	0,086	0,099	0,121	0,130	0,137
	2	5 x D	0,05 x D	280	–	380	fz	0,086	0,099	0,121	0,130	0,137
	3	5 x D	0,05 x D	240	–	320	fz	0,073	0,084	0,105	0,113	0,121
	4	5 x D	0,05 x D	180	–	300	fz	0,065	0,075	0,092	0,099	0,106
	5	5 x D	0,05 x D	120	–	200	fz	0,058	0,067	0,084	0,091	0,097
	6	5 x D	0,05 x D	100	–	150	fz	0,048	0,056	0,068	0,073	0,078
M	1	5 x D	0,05 x D	180	–	230	fz	0,073	0,084	0,105	0,113	0,121
	2	5 x D	0,05 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	3	5 x D	0,05 x D	120	–	140	fz	0,048	0,056	0,068	0,073	0,078
K	1	5 x D	0,05 x D	240	–	300	fz	0,086	0,099	0,121	0,130	0,137
	2	5 x D	0,05 x D	220	–	280	fz	0,073	0,084	0,105	0,113	0,121
	3	5 x D	0,05 x D	220	–	260	fz	0,058	0,067	0,084	0,091	0,097
S	1	5 x D	0,05 x D	100	–	180	fz	0,073	0,084	0,105	0,113	0,121
	2	5 x D	0,05 x D	50	–	80	fz	0,038	0,045	0,056	0,060	0,065
	3	5 x D	0,05 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	4	5 x D	0,05 x D	100	–	120	fz	0,053	0,062	0,077	0,083	0,089
H	1	5 x D	0,05 x D	160	–	280	fz	0,065	0,075	0,092	0,099	0,106
	2	5x D	0,06 x D	140	–	240	fz	0,048	0,056	0,068	0,073	0,078

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Putting your round tools in a position to succeed

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Precision Collet Chuck

- Minimises runout to dramatically boost performance.
- Creates an upsurge in tool life.
- Eliminates pullout with **SAFE-λOCK**® by HAIMER option.
- Chatter-free refined balancing to G2.5@25,000 RPM.
- Extreme versatility for use with most rotating applications.

To learn more about our innovations, contact your local Authorised Distributor or visit **widia.com.**

WIDIA™

HP ROUGHER

Special proprietary carbide substrates and state-of-the-art surface technology, combined with unique geometries, provides end users with the capability to significantly reduce machining time with heavier and deeper cuts, fewer passes, and faster surface speed. WIDIA™ geometries are uniquely formed and fine-tuned to optimise chip form, size, and evacuation generated by a given workpiece material.

- For all ferrous workpiece materials.
- Low power consumption at high speeds with long tool life.
- Provides maximum metal removal rates in both slotting and profiling operations.
- Alternative solution for productivity gains on light machines.

WIDIA VICTORY

High-Performance Solid Carbide Roughers

- Reduce machine time with heavier, deeper cuts requiring fewer passes.
- Lower power consumption at higher speeds providing productivity even when horsepower may be limited.
- Maximum Metal Removal Rates (MRR) in both slotting and profiling.
- Uniquely designed profiles to optimise chip form in given workpiece materials.

DQ13 Series

- Centre Cutting.
- 3-flute.
- 35° helix.
- Chipbreaker pitch.
- Victory™ grade.
- DIN 6527.

422824 422820 Series

- Centre cutting.
- 4-flute.
- 30° helix.
- Flat shallow pitch.

49H6 Series

- Centre cutting.
- 20° helix.
- Fine pitch.
- Through coolant.

4U40 Series

- Centre cutting.
- 4- and 6-flutes.
- 45° helix.
- Unequal flute spacing.
- Flat shallow pitch.
- Victory™ grade.

422152 422150 Series

- Centre cutting.
- 4-flute.
- 25° helix.
- Cord profile.
- Steels and cast irons.
- DIN 6527.

4U70 Series

- Centre cutting.
- 4- and 6-flutes.
- 45° helix.
- Unequal flute spacing.
- Flat and shallow pitch.
- Victory™ grade.

4976 Series

- Centre cutting.
- 3-, 4-, and 5-flutes.
- 30° helix.
- Unequal flute spacing.
- Flat shallow pitch.
- Victory™ grade.

49N6 Series

- Centre cutting.
- 3- and 4-flutes.
- 30° helix.
- With neck.
- Flat and shallow pitch.

(continued)

High-Performance Solid Carbide Roughers *(continued)*

4969 Series

- Centre cutting.
- 3- and 4-flutes.
- 45° helix.
- Flat shallow pitch.
- Ball nose.

422846 022846 Series

- Centre cutting.
- 4- and 6-flutes.
- 45° helix.
- Flat shallow pitch.
- Steels and cast irons.
- DIN 6527.

422813 022813 Series

- Centre cutting.
- 3-flute.
- 30° helix.
- Flat shallow pitch.
- DIN 6527.

4906 Series

- Centre cutting.
- 4-, 5-, and 6-flutes.
- 20° helix.
- Fine pitch.
- Universal applications.

422818 022818 Series

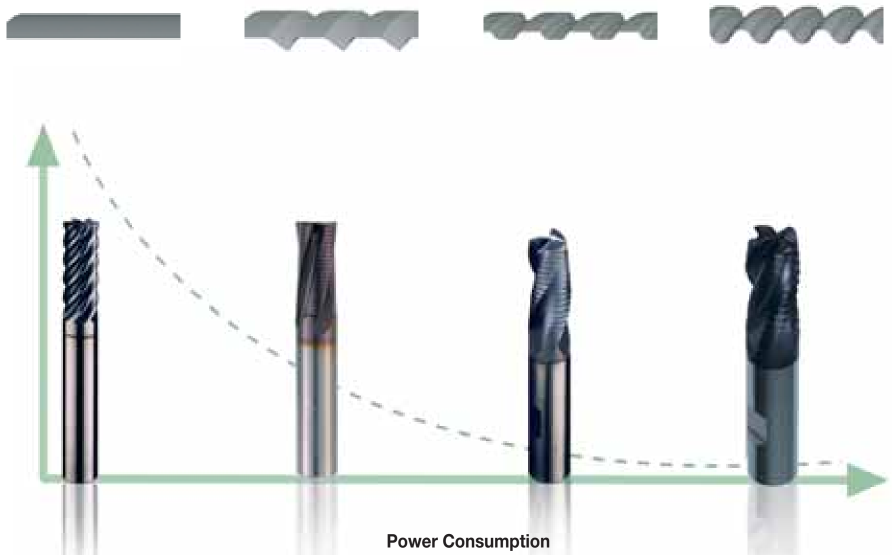
- Centre cutting.
- 4-flute.
- 30° helix.
- Flat shallow pitch.
- Steels and cast irons.
- DIN 6527.

4966 Series

- Centre cutting.
- 3- and 4-flutes.
- 20° helix.
- Fine pitch.
- Ball nose.
- Universal applications.

Rougher Profiles

Finishing End Mill	Fine-Profile Rougher	Semi-Finishing End Mill	Coarse Profile Rougher
Straight cutting edge Ra = 0,5–0,8 Rz = 4–6	Cord profile Ra = 12–14 Rz = 90–110	Flat profile Ra = 2,5–3,5 Rz = 20–25	Roughing profile Ra = 2,5–3,5 Rz = 20–25



Coarse profile
For slotting, pocketing, and heavy profile cuts in ferrous materials.

Fine profile
For profile cuts and shallow slots (less than .50) in ferrous materials.

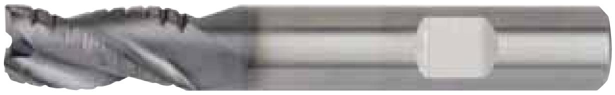
Extra-Fine profile
For profiling cuts in medium to hard steels.

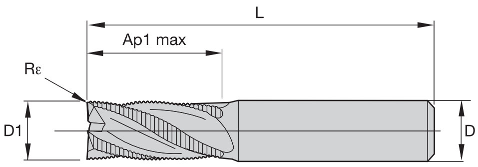
Chamfered profile
For machining non-ferrous materials.

Flat shallow profile
For machining alloyed steels, stainless steels, high-temp alloys, titanium, and hard materials.

Chipbreaker profile
For roughing and semi-finishing.

- Centre cutting.
- Chipbreaker pitch.
- Standard items listed. Additional styles and coatings made-to-order.



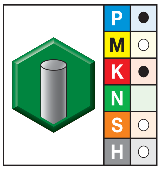


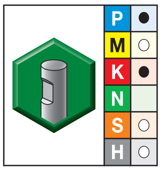
End Mill Tolerances

D1	tolerance h11 + / -	D	tolerance h6 + / -
≤ 3	0/-0,060	≤ 3	0/-0,006
> 3–6	0/-0,075	> 3–6	0/-0,008
> 6–10	0/-0,09	> 6–10	0/-0,009
> 10–18	0/-0,11	> 10–18	0/-0,011
> 18–30	0/-0,13	> 18–30	0/-0,013

WIDIA VICTORY

Series DQ13 • Victory Grades

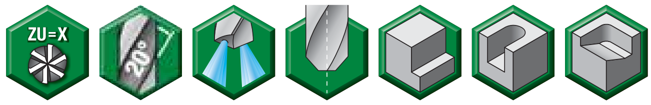


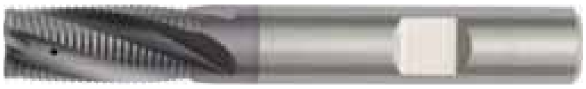


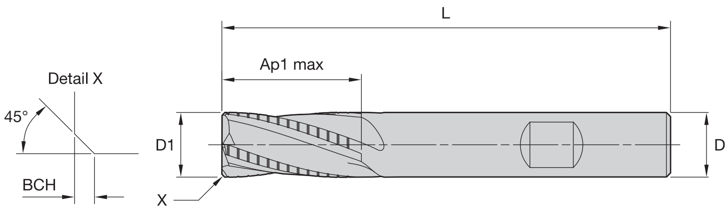
● first choice
○ alternate choice

grade WP15PE AlTiN order #	grade WP15PE AlTiN catalogue #	grade WP15PE AlTiN order #	grade WP15PE AlTiN catalogue #	D1	D	length of cut Ap1 max	length L	Rε
5560534	DQ1303002T	5560536	DQ1303002W	3,0	6	7,00	54	0,25
5560535	DQ1304002T	5560537	DQ1304002W	4,0	6	8,00	57	0,25
–		5560538	DQ1305002W	5,0	6	10,00	57	0,25
–		5560539	DQ1306002W	6,0	6	10,00	57	0,45
–		5560700	DQ1307003W	7,0	8	13,00	63	0,45
–		5560701	DQ1308003W	8,0	8	16,00	63	0,45
–		5560702	DQ1310004W	10,0	10	19,00	72	0,45
–		5560703	DQ1312005W	12,0	12	22,00	83	0,45
–		5560704	DQ1314014W	14,0	14	22,00	83	0,45
–		5560705	DQ1316006W	16,0	16	32,00	92	0,45
–		5560706	DQ1318018W	18,0	18	32,00	92	0,45
–		5560707	DQ1320007W	20,0	20	38,00	104	0,45

- Centre cutting.
- Fine pitch.
- TiAlN-LW = Multilayer.
- TiAlN-RW = Monolayer.
- Standard items listed. Additional styles and coatings made-to-order.



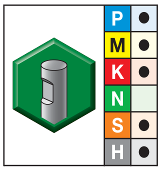


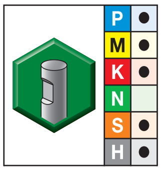


End Mill Tolerances

D1	tolerance h11 + / -	D	tolerance h6 + / -
≤ 3	0/-0,060	≤ 3	0/-0,006
> 3–6	0/-0,075	> 3–6	0/-0,008
> 6–10	0/-0,09	> 6–10	0/-0,009
> 10–18	0/-0,11	> 10–18	0/-0,011
> 18–30	0/-0,13	> 18–30	0/-0,013

Series 49H6

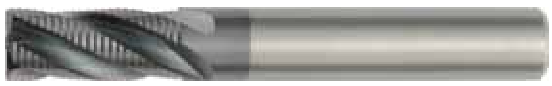


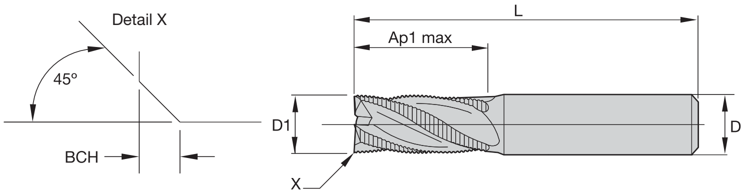


● first choice
○ alternate choice

grade TiAlN-LW TiAlN order #	grade TiAlN-LW TiAlN catalogue #	grade TiAlN-RW TiAlN order #	grade TiAlN-RW TiAlN catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
1657259	49H608003LW	1657260	49H608003RW	8,0	8	16,00	63	0,30	3
1657263	49H610004LW	1657264	49H610004RW	10,0	10	22,00	72	0,50	4
—		1657268	49H612005RW	12,0	12	26,00	83	0,50	4
1968206	49H614014LW	—		14,0	14	26,00	83	0,50	4
1657273	49H616006LW	1657274	49H616006RW	16,0	16	32,00	92	0,50	4
1657277	49H618018LW	1657278	49H618018RW	18,0	18	32,00	92	0,50	4
1657281	49H620007LW	1657282	49H620007RW	20,0	20	38,00	104	0,50	4

- Centre cutting.
- Cord profile.
- Standard items listed. Additional styles and coatings made-to-order.

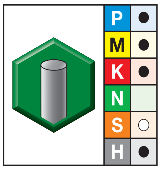


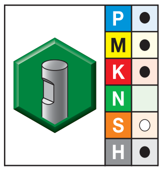


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 422150 422152

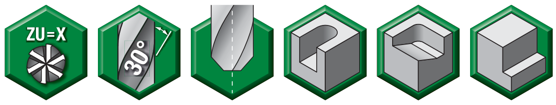


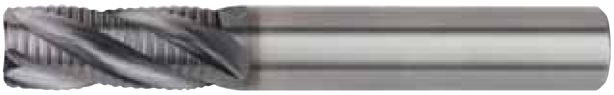


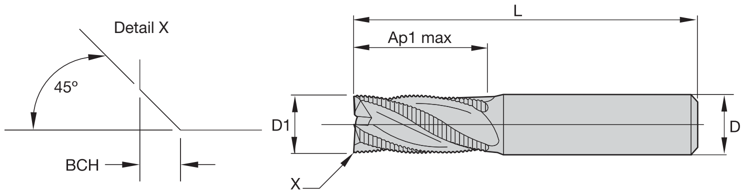
● first choice
○ alternate choice

grade K30F-DCHP TiAlN order #	grade K30F-DCHP TiAlN catalogue #	grade K30F-DCHP TiAlN order #	grade K30F-DCHP TiAlN catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2630665	422150-000060	2630679	422152-000060	6,0	6	13,00	57	0,10
2630667	422150-000080	2630680	422152-000080	8,0	8	19,00	63	0,20
2630669	422150-000100	2630713	422152-000100	10,0	10	22,00	72	0,30
2630670	422150-000120	2630714	422152-000120	12,0	12	26,00	83	0,30
2630672	422150-000160	2630717	422152-000160	16,0	16	32,00	92	0,40
2630675	422150-000200	2630718	422152-000200	20,0	20	38,00	104	0,40
2630677	422150-000250	2630719	422152-000250	25,0	25	45,00	121	0,40

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.







End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

WIDIA VICTORY

Series 4976 • Victory Grades

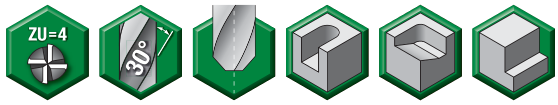
P	●
M	●
K	●
N	
S	○
H	●

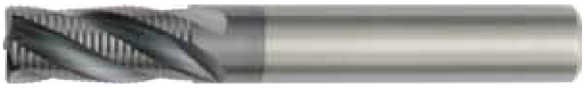
● first choice
○ alternate choice

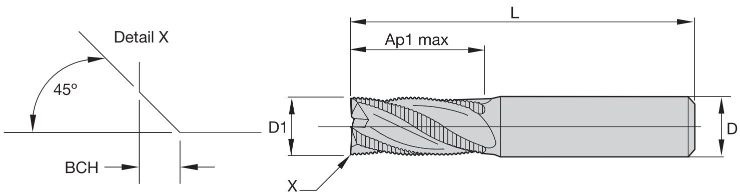
grade WP15PE AlTiN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
5560708	497604002T	4,0	6	8,00	57	0,30	3
5560709	497605002T	5,0	6	13,00	57	0,30	3
5560710	497606002T	6,0	6	13,00	57	0,30	3
5560711	497608003T	8,0	8	16,00	63	0,30	3
5560712	497610004T	10,0	10	22,00	72	0,50	4
5560713	497612005T	12,0	12	26,00	83	0,50	4
5560714	497614014T	14,0	14	26,00	83	0,50	4
5560715	497616006T	16,0	16	32,00	92	0,50	4
5560716	497618018T	18,0	18	32,00	92	0,50	4
5560717	497620007T	20,0	20	38,00	104	0,50	4
5560718	497625008T	25,0	25	45,00	121	0,50	5

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.



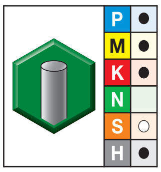


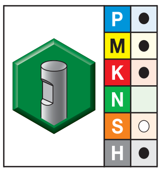


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 422820 422824

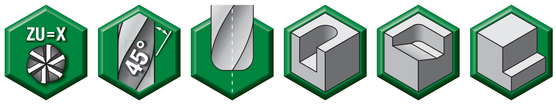


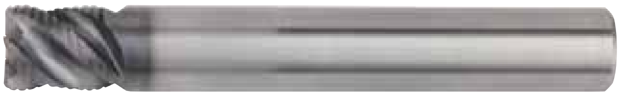


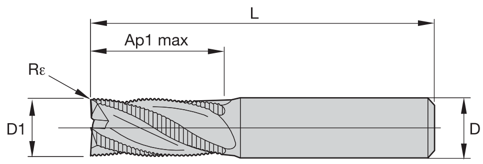
● first choice
○ alternate choice

grade K30F-DCHP TiAlN		grade K30F-DCHP TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2628396	422820-000060	2628451	422824-000060	6,0	6	18,00	62	0,10
2628397	422820-000080	2628473	422824-000080	8,0	8	24,00	68	0,20
2628400	422820-000100	2628475	422824-000100	10,0	10	30,00	80	0,30
2628401	422820-000120	2628477	422824-000120	12,0	12	36,00	93	0,30
2628446	422820-000160	2628478	422824-000160	16,0	16	48,00	108	0,40
2628447	422820-000200	2628481	422824-000200	20,0	20	60,00	126	0,40
2628448	422820-000250	2628482	422824-000250	25,0	25	75,00	150	0,40

- Centre cutting.
- Flat shallow pitch.
- Unequal flute spacing.
- Standard items listed. Additional styles and coatings made-to-order.







End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

WIDIA VICTORY

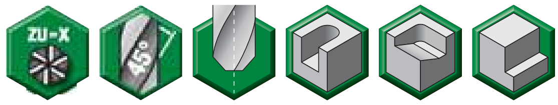
Series 4U40 • Victory Grades

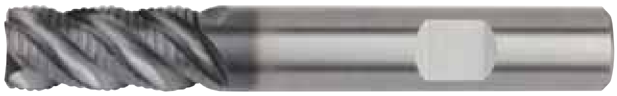
P	○
M	●
K	○
N	
S	○
H	●

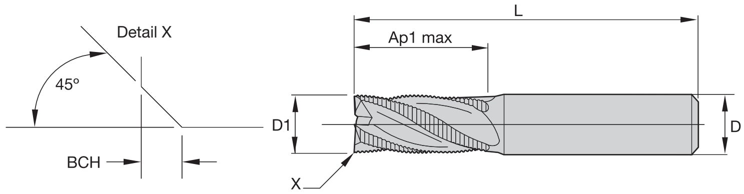
● first choice
○ alternate choice

grade WP15PE AlTiN order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	ZU
5583159	4U4006002T	6,0	6	6,00	57	0,75	4
5583420	4U4008003T	8,0	8	8,00	63	0,75	4
5583421	4U4010004T	10,0	10	10,00	72	0,75	4
5583422	4U4012005T	12,0	12	12,00	83	1,00	4
5583423	4U4016006T	16,0	16	16,00	92	1,00	6
5583424	4U4020007T	20,0	20	20,00	104	1,25	6
5583425	4U4025008T	25,0	25	25,00	121	1,25	6

- Centre cutting.
- Flat shallow pitch.
- Unequal flute spacing.
- Standard items listed. Additional styles and coatings made-to-order.



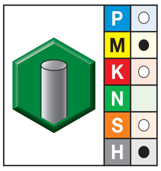


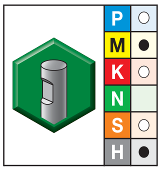


End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

Series 4U70 • Victory Grades

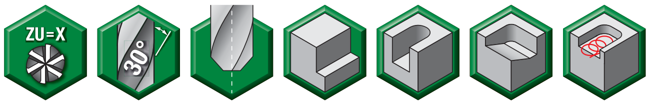


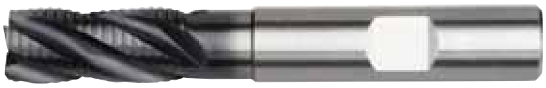


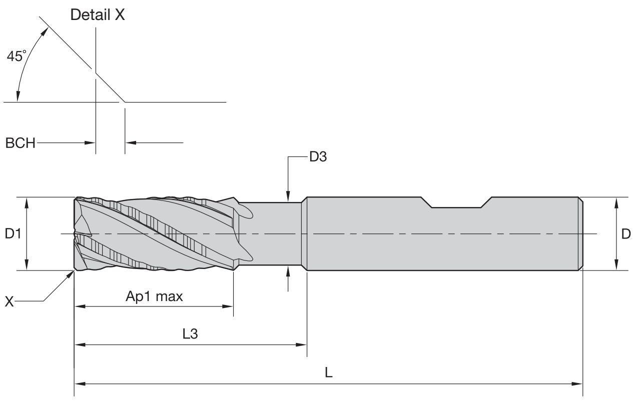
● first choice
○ alternate choice

grade WP15PE AlTiN order #	grade WP15PE AlTiN catalogue #	grade WP15PE AlTiN order #	grade WP15PE AlTiN catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
5583426	4U7006002T	5583436	4U7006002W	6,0	6	13,00	57	0,30	4
5583427	4U7008003T	5583437	4U7008003W	8,0	8	16,00	63	0,40	4
5583428	4U7010004T	5583438	4U7010004W	10,0	10	22,00	72	0,50	4
5583429	4U7012005T	5583439	4U7012005W	12,0	12	26,00	83	0,50	4
5583430	4U7016006T	5583440	4U7016006W	16,0	16	32,00	92	0,60	6
5583431	4U7016046T		—	16,0	16	32,00	92	0,60	4
5583432	4U7020007T	5583441	4U7020007W	20,0	20	38,00	104	1,00	6
5583433	4U7020047T		—	20,0	20	38,00	104	1,00	4
5583434	4U7025008T	5583442	4U7025008W	25,0	25	45,00	121	1,12	6
5583435	4U7025048T		—	25,0	25	45,00	121	1,12	4

- Centre cutting.
- Flat shallow profile.
- Standard items listed. Additional styles and coatings made-to-order.



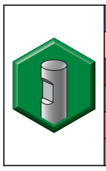




End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

Series 49N6 • With Neck



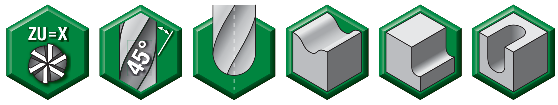
P	M	K	N	S	H
●	○	●		○	●

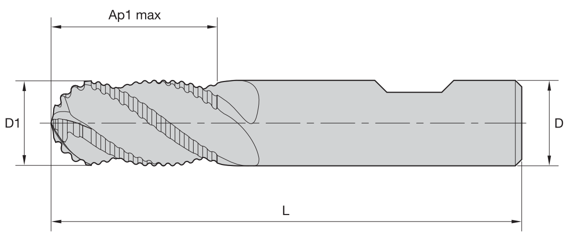
● first choice
○ alternate choice

grade AlTiN-MW
AlTiN

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	BCH	ZU
3474583	49N604002MW	4,0	6	–	8,00	8,00	57	0,30	3
3474584	49N605002MW	5,0	6	–	13,00	13,00	57	0,30	3
3474585	49N606002MW	6,0	6	6	13,00	21,00	57	0,30	3
3474587	49N608003MW	8,0	8	8	16,00	27,00	63	0,30	3
3474589	49N610004MW	10,0	10	10	22,00	32,00	72	0,50	4
3474591	49N612005MW	12,0	12	11	26,00	38,00	83	0,50	4
3474593	49N614014MW	14,0	14	13	26,00	38,00	83	0,50	4
3474594	49N616006MW	16,0	16	15	32,00	44,00	92	0,50	4
3474595	49N618018MW	18,0	18	17	32,00	44,00	92	0,50	4
3474596	49N620007MW	20,0	20	19	38,00	54,00	104	0,50	4
3474597	49N625008MW	25,0	25	24	45,00	65,00	121	0,50	5

- Centre cutting.
- Flat shallow profile.
- Standard items listed. Additional styles and coatings made-to-order.
- Roughing profile also on radii portion of end mill.

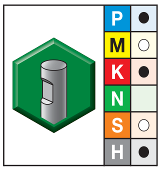




End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

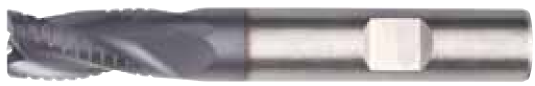
Series 4969

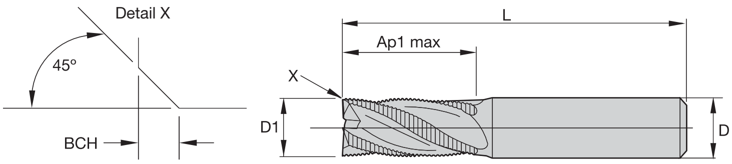


● first choice
○ alternate choice

grade TiAlN-LW TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
3881115	496905002LW	5,0	6	13,00	57	3
3881116	496906002LW	6,0	6	13,00	57	3
3881117	496908003LW	8,0	8	16,00	63	4
3881118	496910004LW	10,0	10	22,00	72	4
3881119	496912005LW	12,0	12	26,00	83	4
3881120	496914014LW	14,0	14	26,00	83	4
3881121	496916006LW	16,0	16	32,00	92	4
3881122	496918018LW	18,0	18	32,00	92	4
3881123	496920007LW	20,0	20	38,00	104	4

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.

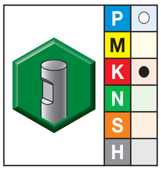


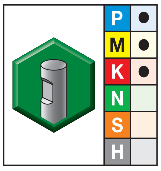


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,04	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 022813 422813

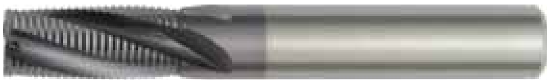


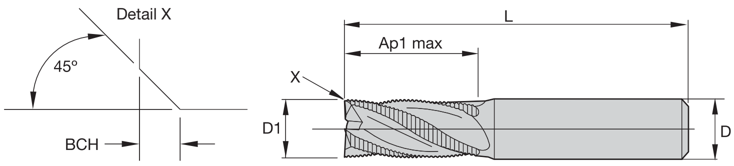


● first choice
○ alternate choice

grade K30F uncoated order #	catalogue #	grade K30F-DCF TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2332360	022813-000060	2342043	422813-000060	6,0	6	10,00	57	0,10
2332361	022813-000080	2342045	422813-000080	8,0	8	16,00	63	0,20
2332362	022813-000100	2342047	422813-000100	10,0	10	19,00	72	0,30
2332363	022813-000120	2342049	422813-000120	12,0	12	22,00	83	0,30
2332364	022813-000160	2342051	422813-000160	16,0	16	26,00	92	0,40
2332365	022813-000200	2342053	422813-000200	20,0	20	32,00	104	0,40
2332366	022813-000250	2342055	422813-000250	25,0	25	45,00	121	0,40

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.

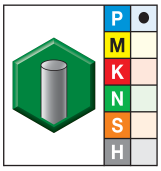


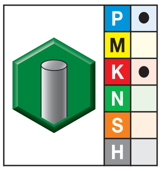


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,04	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 022818 422818

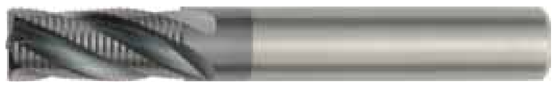


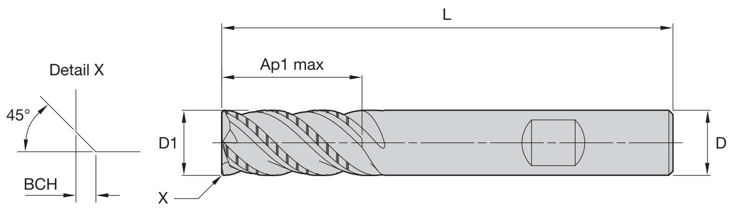


● first choice
○ alternate choice

grade K30F uncoated		grade K30F-DCF TiAlN						
order #	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**length of cut Ap1 max**	**length L**	**BCH**
2332420	022818-000060	2342154	422818-000060	6,0	6	13,00	57	0,10
2332421	022818-000080	2342156	422818-000080	8,0	8	19,00	63	0,20
2332422	022818-000100	2342158	422818-000100	10,0	10	22,00	72	0,30
2332423	022818-000120	2342160	422818-000120	12,0	12	26,00	83	0,30
2332425	022818-000160	2342162	422818-000160	16,0	16	32,00	92	0,40
2332427	022818-000200	2342164	422818-000200	20,0	20	38,00	104	0,40

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.

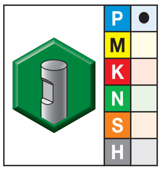


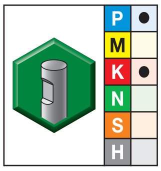


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,04	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 022846 422846

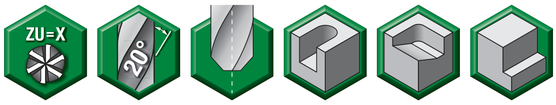


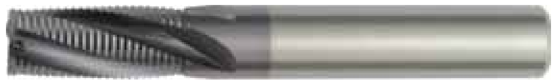


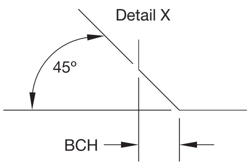
● first choice
○ alternate choice

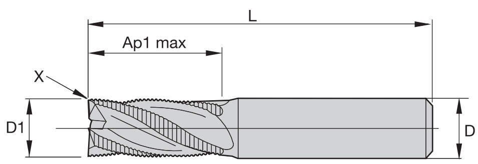
grade K30F uncoated		grade K30F-DCF TiAlN							
order #	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**length of cut Ap1 max**	**length L**	**BCH**	**ZU**
2332652	022846-000060	2342676	422846-000060	6,0	6	13,00	57	0,10	4
2332653	022846-000080	2342678	422846-000080	8,0	8	19,00	63	0,20	4
2332654	022846-000100	2342680	422846-000100	10,0	10	22,00	72	0,30	4
2332655	022846-000120	2342684	422846-000120	12,0	12	26,00	83	0,30	4
2332656	022846-000160	2342686	422846-000160	16,0	16	32,00	92	0,40	6
2332657	022846-000200	2342688	422846-000200	20,0	20	38,00	104	0,40	6
2332658	022846-000250	2342690	422846-000250	25,0	25	45,00	121	0,40	6

- Centre cutting.
- Fine pitch.
- LW = Multilayer.
- RW = Monolayer.
- Standard items listed. Additional styles and coatings made-to-order.









End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

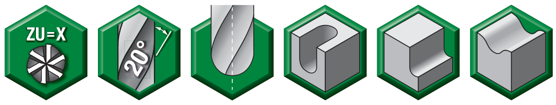
Series 4906

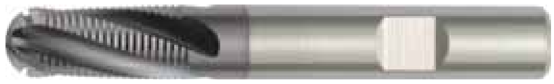
	grade TiAlN-RT	grade TiCN-CW	grade TiAlN-LW	grade TiAlN-RW
P	●	●	●	●
M	●	●	●	●
K	●	●	●	●
N		●		
S	○	○	○	○
H	●	●	●	●

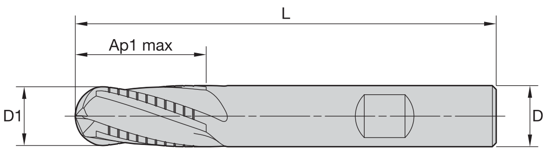
● first choice
○ alternate choice

grade TiAlN-RT TiAlN order #	catalogue #	grade TiCN-CW TiCN order #	catalogue #	grade TiAlN-LW TiAlN order #	catalogue #	grade TiAlN-RW TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
1657001	490604002RT	1656997	490604002CW	1657000	490604002LW	1657002	490604002RW	4,0	6	11,00	55	0,30	3
1657009	490605002RT	1657007	490605002CW	1657008	490605002LW	1657010	490605002RW	5,0	6	13,00	57	0,30	3
1657018	490606002RT	1657016	490606002CW	1657017	490606002LW	1657019	490606002RW	6,0	6	13,00	57	0,30	3
3133084	490607003RT	1657023	490607003CW	1657024	490607003LW	1657025	490607003RW	7,0	8	16,00	63	0,30	3
1657033	490608003RT	1657031	490608003CW	1657032	490608003LW	1657034	490608003RW	8,0	8	16,00	63	0,30	3
3133085	490609004RT	1657039	490609004CW	1657040	490609004LW	1657041	490609004RW	9,0	10	19,00	72	0,50	4
1657050	490610004RT	1657048	490610004CW	1657049	490610004LW	1657051	490610004RW	10,0	10	22,00	72	0,50	4
3133086	490611005RT	1657055	490611005CW	1968092	490611005LW	1657056	490611005RW	11,0	12	26,00	83	0,50	4
1657063	490612005RT	1657061	490612005CW	1657062	490612005LW	1657064	490612005RW	12,0	12	26,00	83	0,50	4
3133087	490613014RT	1657068	490613014CW	1968204	490613014LW	1657069	490613014RW	13,0	14	26,00	83	0,50	4
1657084	490614014RT	1570244	490614014CW	1657083	490614014LW	1657085	490614014RW	14,0	14	26,00	83	0,50	4
1657096	490616006RT	1657094	490616006CW	1657095	490616006LW	1657097	490616006RW	16,0	16	32,00	92	0,50	4
1657104	490618018RT	1657102	490618018CW	1657103	490618018LW	1657105	490618018RW	18,0	18	32,00	92	0,50	4
1657112	490620007RT	1657110	490620007CW	1657111	490620007LW	1657113	490620007RW	20,0	20	38,00	104	0,50	4
1657120	490625008RT	1657118	490625008CW	1657119	490625008LW	1657121	490625008RW	25,0	25	45,00	121	0,50	5

- Centre cutting.
- Fine pitch.
- LW = Multilayer.
- RW = Monolayer.
- Standard items listed. Additional styles and coatings made-to-order.



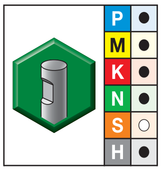


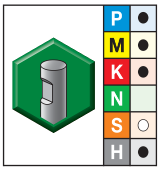


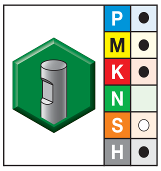
End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

Series 4966





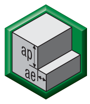


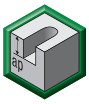
● first choice
○ alternate choice

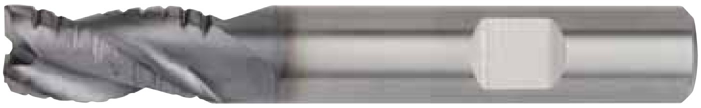
grade TiCN-CW TiCN order #	catalogue #	grade TiAlN-LW TiAlN order #	catalogue #	grade TiAlN-RW TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
1657191	496605002CW	1657192	496605002LW	1657193	496605002RW	5,0	6	13,00	57	3
1657196	496606002CW	1657197	496606002LW	1657198	496606002RW	6,0	6	13,00	57	3
1657201	496608003CW	1657202	496608003LW	1657203	496608003RW	8,0	8	16,00	63	3
1657206	496610004CW	1657207	496610004LW	1657208	496610004RW	10,0	10	22,00	72	4
1657211	496612005CW	1657212	496612005LW	1657213	496612005RW	12,0	12	26,00	83	4
–		1657217	496614014LW	1657218	496614014RW	14,0	14	26,00	83	4
1657221	496616006CW	1657222	496616006LW	1657223	496616006RW	16,0	16	32,00	92	4
1657227	496618018CW	–		–		18,0	18	32,00	92	4
1657232	496620007CW	–		1657234	496620007RW	20,0	20	38,00	104	4
1657237	496625008CW	–		1657239	496625008RW	25,0	25	45,00	121	4

Series DQ13 • Victory Grades

WIDIA VICTORY



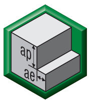
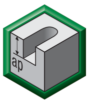
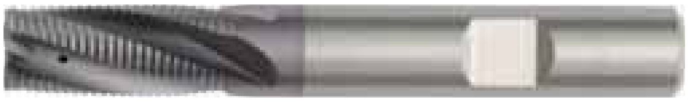




Material Group		Side Milling (A) and Slotting (B)			WP15PE				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter											
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	7,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	1 x D	0,5 x D	0,75 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,052	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	1	1 x D	0,5 x D	0,75 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,052	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	2	1 x D	0,5 x D	0,75 x D	140	–	190	fz	0,021	0,028	0,036	0,044	0,052	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	3	1 x D	0,5 x D	0,75 x D	120	–	160	fz	0,017	0,023	0,030	0,036	0,043	0,050	0,061	0,070	0,079	0,087	0,095	0,101
P	4	1 x D	0,5 x D	0,5 x D	90	–	150	fz	0,016	0,021	0,027	0,033	0,039	0,045	0,054	0,062	0,070	0,077	0,083	0,088
P	5	1 x D	0,5 x D	0,75 x D	60	–	100	fz	0,014	0,019	0,024	0,029	0,035	0,040	0,048	0,056	0,063	0,070	0,076	0,081
P	6	1 x D	0,4 x D	0,5 x D	50	–	75	fz	0,012	0,016	0,020	0,025	0,029	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	1 x D	0,5 x D	0,75 x D	90	–	115	fz	0,017	0,023	0,030	0,036	0,043	0,050	0,061	0,070	0,079	0,087	0,095	0,101
M	2	1 x D	0,4 x D	0,75 x D	60	–	80	fz	0,014	0,019	0,024	0,029	0,035	0,040	0,048	0,056	0,063	0,070	0,076	0,081
M	3	1 x D	0,4 x D	0,75 x D	60	–	70	fz	0,012	0,016	0,020	0,025	0,029	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	1 x D	0,5 x D	0,75 x D	120	–	150	fz	0,021	0,028	0,036	0,044	0,052	0,060	0,072	0,083	0,092	0,101	0,108	0,114
K	2	1 x D	0,5 x D	0,75 x D	110	–	140	fz	0,017	0,023	0,030	0,036	0,043	0,050	0,061	0,070	0,079	0,087	0,095	0,101
K	3	1 x D	0,4 x D	0,75 x D	110	–	130	fz	0,014	0,019	0,024	0,029	0,035	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	1 x D	0,3 x D	0,4 x D	50	–	90	fz	0,017	0,023	0,030	0,036	0,043	0,050	0,061	0,070	0,079	0,087	0,095	0,101
S	2	1 x D	0,3 x D	0,3 x D	25	–	40	fz	0,009	0,013	0,016	0,019	0,023	0,026	0,032	0,037	0,042	0,046	0,050	0,054
S	3	1 x D	0,4 x D	0,75 x D	60	–	80	fz	0,014	0,019	0,024	0,029	0,035	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	4	1 x D	0,4 x D	0,75 x D	50	–	60	fz	0,011	0,016	0,021	0,026	0,031	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	1 x D	0,2 x D	0,3 x D	80	–	140	fz	0,016	0,021	0,027	0,033	0,039	0,045	0,054	0,062	0,070	0,077	0,083	0,088

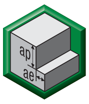
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

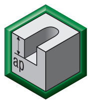
Series 49H6

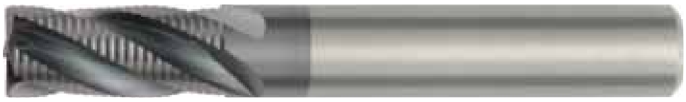
															
		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
Material Group		ap	ae	ap	min		max	mm	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,048	0,058	0,066	0,074	0,081	0,086	0,091
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,048	0,058	0,066	0,074	0,081	0,086	0,091
P	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,048	0,058	0,066	0,074	0,081	0,086	0,091
P	3	1,0 x D	0,4 x D	0,75 x D	120	–	160	fz	0,040	0,048	0,056	0,063	0,070	0,076	0,081
P	4	1,0 x D	0,3 x D	0,5 x D	90	–	150	fz	0,036	0,043	0,050	0,056	0,061	0,066	0,070
P	5	1,0 x D	0,4 x D	0,75 x D	60	–	100	fz	0,032	0,039	0,045	0,051	0,056	0,060	0,065
M	1	1,0 x D	0,4 x D	0,75 x D	90	–	115	fz	0,040	0,048	0,056	0,063	0,070	0,076	0,081
M	2	1,0 x D	0,4 x D	0,75 x D	60	–	80	fz	0,032	0,039	0,045	0,051	0,056	0,060	0,065
M	3	1,0 x D	0,4 x D	0,75 x D	60	–	70	fz	0,027	0,032	0,037	0,042	0,046	0,049	0,052
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,048	0,058	0,066	0,074	0,081	0,086	0,091
K	2	1,5 x D	0,4 x D	1 x D	110	–	140	fz	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	3	1,5 x D	0,4 x D	1 x D	110	–	130	fz	0,032	0,039	0,045	0,051	0,056	0,060	0,065
S	1	1,5 x D	0,5 x D	0,75 x D	50	–	90	fz	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	3	1,5 x D	0,5 x D	0,75 x D	60	–	80	fz	0,032	0,039	0,045	0,051	0,056	0,060	0,065
H	1	1,0 x D	0,3 x D	0,5 x D	80	–	140	fz	0,036	0,043	0,050	0,056	0,061	0,066	0,070

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 422150 422152





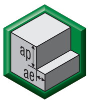


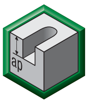
Material Group		Side Milling (A) and Slotting (B): A		B	K30F-DCHP AlTiN Cutting Speed — vc m/min			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.	D1 — Diameter						
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,031	0,041	0,049	0,060	0,073	0,082	0,087
P	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,031	0,041	0,049	0,060	0,073	0,082	0,087
P	3	1,5 x D	0,4 x D	1 x D	120	–	160	fz	0,025	0,034	0,041	0,051	0,063	0,073	0,080
P	4	1,5 x D	0,4 x D	0,75 x D	90	–	150	fz	0,023	0,030	0,037	0,045	0,055	0,063	0,068
P	5	1,5 x D	0,4 x D	0,75 x D	60	–	100	fz	0,021	0,027	0,033	0,040	0,050	0,058	0,064
K	1	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,031	0,041	0,049	0,060	0,073	0,082	0,087
K	2	1,5 x D	0,4 x D	1 x D	110	–	140	fz	0,025	0,034	0,041	0,051	0,063	0,073	0,080
K	3	1,5 x D	0,4 x D	1 x D	100	–	130	fz	0,021	0,027	0,033	0,040	0,050	0,058	0,064
S	1	1,5 x D	0,5 x D	1 x D	50	–	90	fz	0,025	0,034	0,041	0,051	0,063	0,073	0,080
H	1	1,5 x D	0,3 x D	0,75 x D	80	–	140	fz	0,023	0,030	0,037	0,045	0,055	0,063	0,068

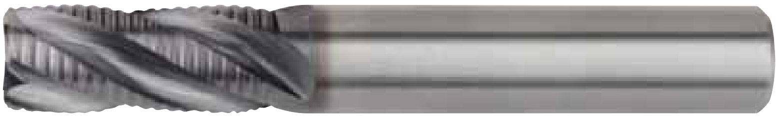
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Low cutting force through chipbreaker for use with unstable clamping and components.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4976 • Victory Grades

WIDIA VICTORY



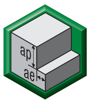
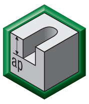
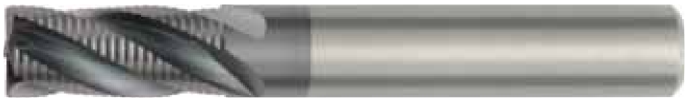




Material Group		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	3	1,5 x D	0,4 x D	0,75 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
P	4	1,5 x D	0,4 x D	0,75 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
P	5	1,5 x D	0,4 x D	0,75 x D	60	–	100	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
M	1	1,5 x D	0,4 x D	0,75 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
M	2	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
M	3	1,5 x D	0,4 x D	0,75 x D	60	–	70	fz	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
K	2	1,5 x D	0,4 x D	1 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
K	3	1,5 x D	0,4 x D	1 x D	110	–	130	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	1,5 x D	0,3 x D	0,75 x D	50	–	90	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
S	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
S	3	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	4	1,5 x D	0,3 x D	0,75 x D	50	–	60	fz	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,3 x D	0,3 x D	80	–	140	fz	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

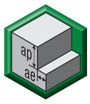
Series 422820 422824

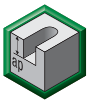
Material Group		Side Milling (A) and Slotting (B)			K30F-DCHP			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
																
		A		B	AlTiN											
					Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	3 x D	0,25 x D	0,7 x D	150	–	200	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,095
P	2	3 x D	0,25 x D	0,5 x D	140	–	190	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,095
P	3	3 x D	0,25 x D	0,5 x D	120	–	160	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,087
P	4	3 x D	0,25 x D	0,25 x D	90	–	150	fz	0,024	0,032	0,039	0,048	0,059	0,067	0,075
P	5	3 x D	0,25 x D	0,25 x D	60	–	100	fz	0,021	0,029	0,035	0,043	0,053	0,062	0,070
P	6	3 x D	0,25 x D	0,25 x D	50	–	75	fz	0,018	0,024	0,029	0,036	0,044	0,050	0,054
M	1	3 x D	0,25 x D	0,5 x D	80	–	100	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,087
M	3	3 x D	0,25 x D	0,5 x D	60	–	80	fz	0,018	0,024	0,029	0,036	0,044	0,050	0,054
K	1	3 x D	0,25 x D	0,5 x D	120	–	160	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,095
K	2	3 x D	0,25 x D	0,5 x D	110	–	140	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,087
K	3	3 x D	0,25 x D	0,5 x D	100	–	130	fz	0,021	0,029	0,035	0,043	0,053	0,062	0,070
S	1	3 x D	0,25 x D	0,5 x D	50	–	90	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,087
H	1	3 x D	0,25 x D	0,5 x D	80	–	140	fz	0,024	0,032	0,039	0,048	0,059	0,067	0,075

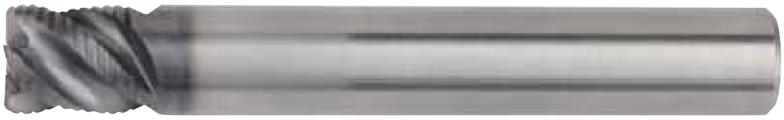
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4U40 • Victory Grades

WIDIA VICTORY





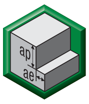
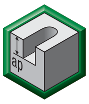
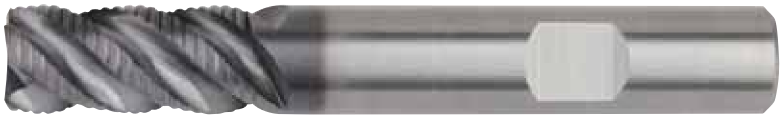


Material Group		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	0,8 x D	0,5 x D	0,75 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	4	0,8 x D	0,4 x D	0,5 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098
	5	0,8 x D	0,5 x D	0,75 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	6	0,8 x D	0,4 x D	0,5 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
M	1	0,8 x D	0,5 x D	0,75 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	0,8 x D	0,4 x D	0,75 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	3	0,8 x D	0,4 x D	0,75 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
K	1	0,8 x D	0,5 x D	0,75 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	0,8 x D	0,5 x D	0,75 x D	110	–	140	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	3	0,8 x D	0,4 x D	0,75 x D	110	–	130	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
S	1	0,8 x D	0,4 x D	0,75 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	0,8 x D	0,25 x D	0,3 x D	25	–	40	fz	0,019	0,026	0,032	0,037	0,046	0,054	0,061
	3	0,8 x D	0,4 x D	0,75 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	4	0,8 x D	0,3 x D	0,5 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,064	0,074	0,084
H	1	0,8 x D	0,5 x D	0,5 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098
	2	0,8 x D	0,2 x D	0,3 x D	70	–	120	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
	3	0,8 x D	0,15 x D	0,2 x D	60	–	90	fz	0,019	0,026	0,032	0,037	0,046	0,054	0,061

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For rougher tool with 6 flutes, use ap in slotting 60% of table value.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

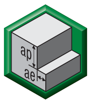
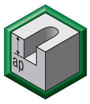
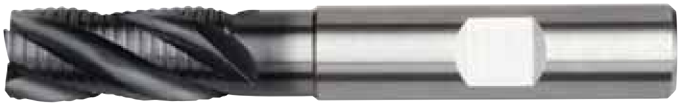
Series 4U70 • Victory Grades

WIDIA VICTORY

Material Group																
		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	1 x D	0,5 x D	0,75 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
P	4	1 x D	0,3 x D	0,75 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098
P	5	1 x D	0,5 x D	0,75 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
P	6	1 x D	0,3 x D	0,3 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
M	1	1 x D	0,5 x D	0,75 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
M	2	1 x D	0,5 x D	0,75 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
M	3	1 x D	0,5 x D	0,75 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
K	1	1 x D	0,5 x D	1 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,101	0,114	0,124
K	2	1 x D	0,5 x D	1 x D	110	–	140	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
K	3	1 x D	0,5 x D	1 x D	110	–	130	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
S	1	1 x D	0,3 x D	0,75 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
S	2	1 x D	0,3 x D	0,3 x D	25	–	40	fz	0,019	0,026	0,032	0,037	0,046	0,054	0,061
S	3	1 x D	0,4 x D	0,75 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
S	4	1 x D	0,4 x D	0,75 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,064	0,074	0,084
H	1	1 x D	0,3 x D	0,3 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098
H	2	1 x D	0,2 x D	0,2 x D	70	–	120	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
H	3	1 x D	0,2 x D	0,2 x D	60	–	90	fz	0,019	0,026	0,032	0,037	0,046	0,054	0,061

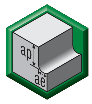
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For rougher tool with 6 flutes, use ap in slotting 60% of table value.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

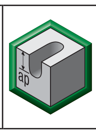
Series 49N6

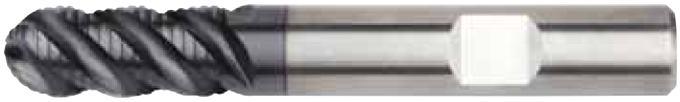
Material Group																			
		Side Milling (A) and Slotting (B)			AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	3	1,5 x D	0,4 x D	0,75 x D	120	–	160	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	4	1,5 x D	0,3 x D	0,5 x D	90	–	150	fz	0,018	0,023	0,028	0,038	0,046	0,053	0,060	0,065	0,070	0,075	0,083
	5	1,5 x D	0,4 x D	0,75 x D	60	–	100	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
M	1	1,5 x D	0,4 x D	0,75 x D	80	–	100	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	2	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
	3	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,014	0,017	0,021	0,029	0,034	0,040	0,044	0,048	0,052	0,055	0,060
K	1	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	2	1,5 x D	0,4 x D	1 x D	110	–	140	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	3	1,5 x D	0,4 x D	1 x D	100	–	130	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
S	1	1,5 x D	0,4 x D	0,75 x D	50	–	90	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	3	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
H	1	1,5 x D	0,3 x D	0,3 x D	80	–	140	fz	0,018	0,023	0,028	0,038	0,046	0,053	0,060	0,065	0,070	0,075	0,083

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4969



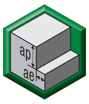
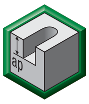
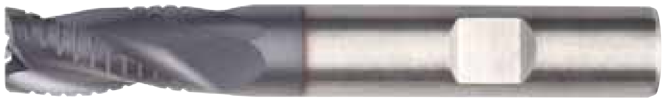




Material Group		Side Milling (A) and Slotting (B) A		B	TiAlN Cutting Speed – vc m/min			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.	D1 – Diameter									
		ap	ae	ap	min		max	mm	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,107	0,114	0,124
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,107	0,114	0,124
P	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,107	0,114	0,124
P	3	1,5 x D	0,4 x D	0,75 x D	120	–	160	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,094	0,101	0,114
P	4	1,5 x D	0,3 x D	0,3 x D	90	–	150	fz	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,082	0,088	0,098
P	5	1,5 x D	0,4 x D	0,75 x D	60	–	100	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,075	0,081	0,091
P	6	1,5 x D	0,3 x D	0,3 x D	50	–	75	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,4 x D	0,75 x D	80	–	100	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,094	0,101	0,114
M	2	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,075	0,081	0,091
M	3	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,107	0,114	0,124
K	2	1,5 x D	0,4 x D	1 x D	110	–	140	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,094	0,101	0,114
K	3	1,5 x D	0,4 x D	1 x D	100	–	130	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,075	0,081	0,091
S	1	1,5 x D	0,4 x D	0,75 x D	50	–	90	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,094	0,101	0,114
S	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
S	3	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,075	0,081	0,091
S	4	1,5 x D	0,3 x D	0,75 x D	50	–	60	fz	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,3 x D	0,3 x D	80	–	140	fz	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,082	0,088	0,098
H	2	1,5 x D	0,2 x D	0,2 x D	70	–	120	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
H	3	1,5 x D	0,2 x D	0,2 x D	60	–	90	fz	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061

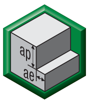
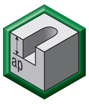
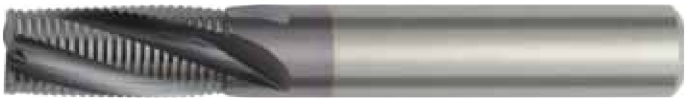
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 022813 422813

Material Group		Side Milling (A) and Slotting (B) 			K30F			K30F-DCF			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%. 							
		A		B	Uncoated Cutting Speed — vc m/min			TiAlN Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	1 x D	0,5 x D	1 x D	60	–	80	150	–	200	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,097
P	2	1 x D	0,5 x D	1 x D	56	–	76	140	–	190	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,097
P	3	1 x D	0,5 x D	1 x D	–	–	–	120	–	160	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,088
P	4	1 x D	0,4 x D	1 x D	–	–	–	90	–	150	fz	0,024	0,032	0,039	0,048	0,059	0,067	0,076
M	1	1 x D	0,4 x D	0,75 x D	–	–	–	80	–	100	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,088
M	2	1 x D	0,4 x D	0,5 x D	–	–	–	60	–	80	fz	0,018	0,024	0,029	0,036	0,044	0,050	0,056
K	1	1 x D	0,5 x D	1 x D	48	–	64	120	–	160	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,097
K	2	1 x D	0,4 x D	1 x D	44	–	56	110	–	140	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,088
K	3	1 x D	0,4 x D	1 x D	40	–	52	100	–	130	fz	0,021	0,029	0,035	0,043	0,053	0,062	0,070

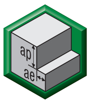
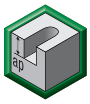
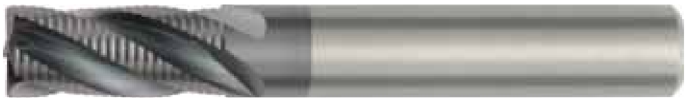
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 022818 422818

Material Group																	
		Side Milling (A) and Slotting (B)			K30F			K30F-DCF			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Uncoated			TiAlN				D1 — Diameter					
					Cutting Speed — vc m/min			Cutting Speed — vc m/min									
		ap	ae	ap	min		max	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
P	1	1,5 x D	0,5 x D	1 x D	60	–	80	150	–	200	fz	0,033	0,041	0,049	0,060	0,073	0,082
P	2	1,5 x D	0,5 x D	1 x D	56	–	76	140	–	190	fz	0,033	0,041	0,049	0,060	0,073	0,082
P	3	1,5 x D	0,4 x D	1 x D	–	–	–	120	–	160	fz	0,027	0,034	0,041	0,051	0,063	0,073
P	4	1,5 x D	0,4 x D	0,75 x D	–	–	–	90	–	150	fz	0,024	0,030	0,037	0,045	0,055	0,063
K	1	1,5 x D	0,5 x D	1 x D	–	–	–	120	–	160	fz	0,033	0,041	0,049	0,060	0,073	0,082
K	2	1,5 x D	0,4 x D	1 x D	–	–	–	110	–	140	fz	0,027	0,034	0,041	0,051	0,063	0,073
K	3	1,5 x D	0,4 x D	1 x D	–	–	–	100	–	130	fz	0,021	0,027	0,033	0,040	0,050	0,058

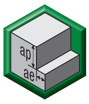
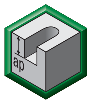
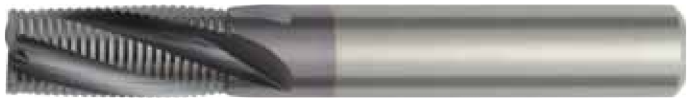
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 022846 422846

Material Group																		
		Side Milling (A) and Slotting (B)			K30F			K30F-DCF			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
					Uncoated			TiAlN										
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	60	–	80	150	–	200	fz	0,033	0,045	0,054	0,062	0,076	0,086	0,093
	1	1,5 x D	0,5 x D	1 x D	60	–	80	150	–	200	fz	0,033	0,045	0,054	0,062	0,076	0,086	0,093
	2	1,5 x D	0,5 x D	1 x D	56	–	76	140	–	190	fz	0,033	0,045	0,054	0,062	0,076	0,086	0,093
	3	1,5 x D	0,4 x D	1 x D	–	–	–	120	–	160	fz	0,027	0,038	0,045	0,053	0,065	0,076	0,085
	4	1,5 x D	0,4 x D	0,75 x D	–	–	–	90	–	150	fz	0,025	0,034	0,041	0,047	0,058	0,066	0,073
	5	1,5 x D	0,4 x D	0,75 x D	–	–	–	60	–	100	fz	0,022	0,030	0,036	0,042	0,052	0,061	0,068
K	1	1,5 x D	0,5 x D	1 x D	–	–	–	120	–	150	fz	0,033	0,045	0,054	0,062	0,076	0,086	0,093
	2	1,5 x D	0,4 x D	1 x D	–	–	–	110	–	140	fz	0,027	0,038	0,045	0,053	0,065	0,076	0,085
	3	1,5 x D	0,4 x D	1 x D	–	–	–	110	–	130	fz	0,022	0,030	0,036	0,042	0,052	0,061	0,068

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4906

Material Group																						
		Side Milling (A) and Slotting (B)			TiCN			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	120	–	160	150	–	200	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	1	1,5 x D	0,5 x D	1 x D	120	–	160	150	–	200	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	2	1,5 x D	0,5 x D	1 x D	112	–	152	140	–	190	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	3	1,5 x D	0,4 x D	0,75 x D	96	–	128	120	–	160	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	4	1,5 x D	0,3 x D	0,3 x D	72	–	120	90	–	150	fz	0,018	0,023	0,028	0,038	0,046	0,053	0,060	0,065	0,070	0,075	0,083
	5	1,5 x D	0,4 x D	0,75 x D	48	–	80	60	–	100	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
M	1	1,5 x D	0,4 x D	0,75 x D	72	–	92	90	–	115	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	2	1,5 x D	0,4 x D	0,75 x D	48	–	64	60	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
	3	1,5 x D	0,4 x D	0,75 x D	48	–	56	60	–	70	fz	0,014	0,017	0,021	0,029	0,034	0,040	0,044	0,048	0,052	0,055	0,060
K	1	1,5 x D	0,5 x D	1 x D	96	–	120	120	–	150	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	2	1,5 x D	0,4 x D	1 x D	88	–	112	110	–	140	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	3	1,5 x D	0,4 x D	1 x D	88	–	104	110	–	130	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
S	1	1,5 x D	0,4 x D	0,75 x D	40	–	72	50	–	90	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	3	1,5 x D	0,3 x D	0,3 x D	48	–	64	60	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
H	1	1,5 x D	0,3 x D	0,3 x D	64	–	112	80	–	140	fz	0,018	0,023	0,028	0,038	0,046	0,053	0,060	0,065	0,070	0,075	0,083

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
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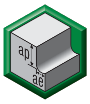
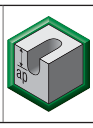
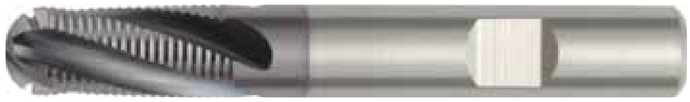
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4966







Material Group		Side Milling (A) and Slotting (B)			TiCN			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed – vc m/min			Cutting Speed – vc m/min				D1 – Diameter								
		ap	ae	ap	min		max	min		max	mm	5,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	120	–	160	150	–	200	fz	0,030	0,036	0,049	0,059	0,068	0,083	0,089	0,093	0,101
P	1	1,5 x D	0,5 x D	1 x D	120	–	160	150	–	200	fz	0,030	0,036	0,049	0,059	0,068	0,083	0,089	0,093	0,101
P	2	1,5 x D	0,5 x D	1 x D	112	–	152	140	–	190	fz	0,030	0,036	0,049	0,059	0,068	0,083	0,089	0,093	0,101
P	3	1,5 x D	0,4 x D	0,75 x D	96	–	128	120	–	160	fz	0,024	0,030	0,041	0,050	0,058	0,072	0,077	0,083	0,093
P	4	1,5 x D	0,3 x D	0,5 x D	72	–	120	90	–	150	fz	0,022	0,027	0,037	0,044	0,051	0,063	0,068	0,072	0,080
P	5	1,5 x D	0,4 x D	0,75 x D	48	–	80	60	–	100	–	0,020	0,024	0,033	0,040	0,046	0,057	0,062	0,066	0,075
M	1	1,5 x D	0,4 x D	0,75 x D	72	–	92	90	–	115	fz	0,024	0,030	0,041	0,050	0,058	0,072	0,077	0,083	0,093
M	2	1,5 x D	0,4 x D	0,75 x D	48	–	64	60	–	80	fz	0,020	0,024	0,033	0,040	0,046	0,057	0,062	0,066	0,075
M	3	1,5 x D	0,4 x D	0,75 x D	48	–	56	60	–	70	fz	0,017	0,020	0,028	0,033	0,038	0,047	0,050	0,053	0,058
K	1	1,5 x D	0,5 x D	1 x D	96	–	120	120	–	150	fz	0,030	0,036	0,049	0,059	0,068	0,083	0,089	0,093	0,101
K	2	1,5 x D	0,4 x D	1 x D	88	–	112	110	–	140	fz	0,024	0,030	0,041	0,050	0,058	0,072	0,077	0,083	0,093
K	3	1,5 x D	0,4 x D	1 x D	88	–	104	110	–	130	fz	0,020	0,024	0,033	0,040	0,046	0,057	0,062	0,066	0,075
S	1	1,5 x D	0,4 x D	0,75 x D	40	–	72	50	–	90	fz	0,024	0,030	0,041	0,050	0,058	0,072	0,077	0,083	0,093
S	3	1,5 x D	0,4 x D	0,75 x D	48	–	64	60	–	80	fz	0,020	0,024	0,033	0,040	0,046	0,057	0,062	0,066	0,075
H	1	1,5 x D	0,3 x D	0,5 x D	64	–	112	80	–	140	fz	0,022	0,027	0,037	0,044	0,051	0,063	0,068	0,072	0,080

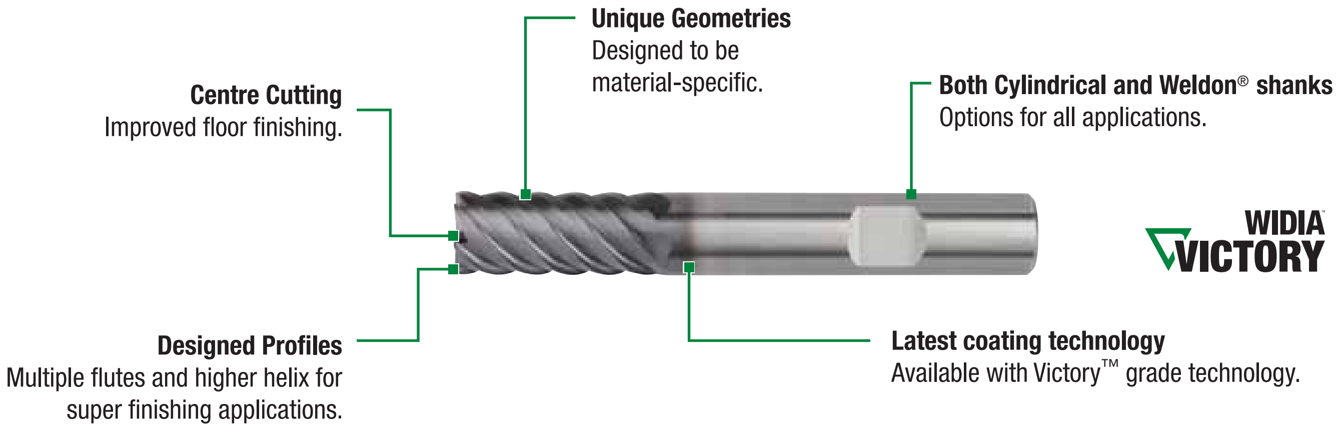
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

High-Performance Finishing
Solid Carbide End Mills

HP Finishers

Only the finest carbide substrates with market-leading geometries and state-of-the-art surface technology are used to ensure the very best quality finishing end mills are produced. These tools are fully compliant with NAS, DIN, and JIS specifications. Whether you require higher metal removal rates, improved surface finishes, fewer passes, or longer tool life, WIDIA-Hanita™ high-performance finishing end mills deliver the reliability and consistency you can depend on during your critical finishing operations.

- Specific geometries targeted for steels, stainless steels, high-temperature alloys, and titanium.
- Stub, regular, long, and extra long lengths for all applications.
- Special designs with higher number of flutes and increased helix angles for super finishing applications.
- Latest coating technology, including Victory™ grades.



WIDIA VICTORY

High-Performance Solid Carbide Finishing

- Specifically designed geometries for finishing in a wide range of materials.
- Higher number of flutes and higher helix angles for super finishing applications.
- High Metal Removal Rates (MRR) requiring fewer passes and longer tool life while providing superior surface finishes.

4001 JJ Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- JIS.
- Victory™ grade WP15PE™.

D503 D513 Series

- Centre cutting.
- 3-flute.
- 45° helix.
- DIN 6527.

DC03 Series

- Centre cutting.
- 3-flute.
- 35° helix.
- Corner radius.
- DIN 6527.

4503 JJ Series

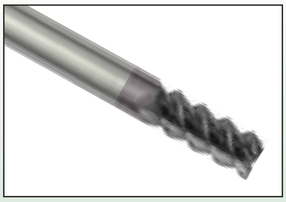
- Centre cutting.
- 3-flute.
- 45° helix.
- JIS.
- Victory grade WP15PE.

422802/322802/022802 Series

- Centre cutting.
- 3-flute.
- 45° helix.
- Chamfered corner.
- DIN 6527.
- Universal application.

4603 Series

- Centre cutting.
- 3-flute.
- 60° helix.
- Light finishing.



D507 D517 Series

- Centre cutting.
- 6-flute.
- 45° helix.
- DIN 6527.
- Light finishing.

422826 422822 Series

- Non-centre cutting.
- 6- and 8-flutes.
- 45° helix.
- DIN 6527.
- Light finishing.

422827 Series

- Non-centre cutting.
- 6- and 8-flutes.
- 45° helix.
- Chamfered corner.

D518 Series

- Centre cutting.
- 4-, 6-, and 8-flutes.
- 50° helix.
- DIN 6527.
- Super finishing applications.

026621 Series

- Non-centre cutting.
- 4-, 6-, and 8-flutes.
- 45° helix.
- Chamfer corner.
- DIN 6527.
- Finishing of steels and cast irons.
- Cermet construction.

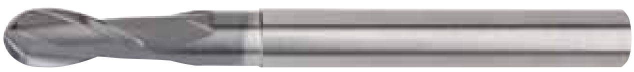
024112 Series

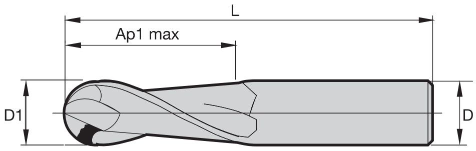
- Centre cutting.
- 2-flute.
- 20° helix.
- Torus style.
- Diamond coating.
- Non-ferrous applications.

024111 Series

- Centre cutting.
- 2-flute.
- 20° helix.
- Ball nose.
- Diamond coating.
- Non-ferrous applications.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 4001 JJ • Victory Grades

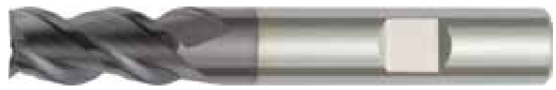
P	●
M	○
K	○
N	
S	
H	

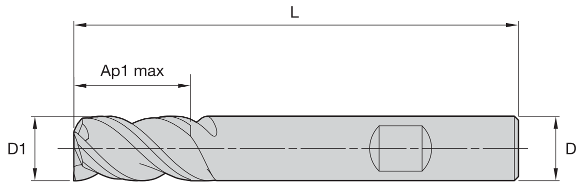
● first choice
○ alternate choice

grade WP15PE AlTiN

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
5559146	400101001T	1,0	4	—	3,00	3	50
5559147	400101501T	1,5	4	—	3,00	3	50
5559148	400102001T	2,0	4	—	3,00	3	50
5559149	400103002T	3,0	6	—	9,50	10	58
5559160	400104002T	4,0	6	—	12,00	12	76
5559161	400105002T	5,0	6	—	14,00	14	76
5559162	400106002T	6,0	6	5,6	16,00	40	100
5559163	400108003T	8,0	8	7,5	20,00	40	100
5559164	400110004T	10,0	10	9,4	22,00	35	100
5559165	400112005T	12,0	12	11,3	25,00	50	125
5559166	400114005T	14,0	14	13,2	32,00	57	125
5559167	400116006T	16,0	16	15,0	32,00	60	150
5559168	400118006T	18,0	18	16,9	38,00	60	150
5559169	400120007T	20,0	20	18,8	38,00	60	150

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

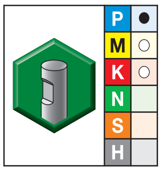


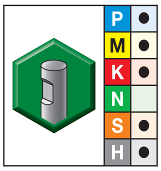


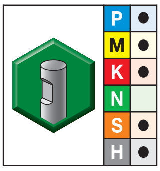
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series D503 D513



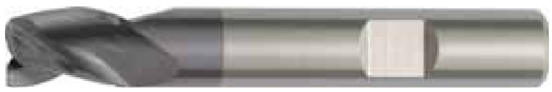


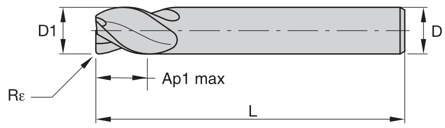


● first choice
○ alternate choice

grade UNCOATED-WW		grade TiCN-CW TiCN		grade TiAlN-RW TiAlN					
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
1661576	D50302002WW	1661573	D50302002CW	1661574	D50302002RW	2,0	6	3,00	50
1661580	D50303002WW	1661577	D50303002CW	1661578	D50303002RW	3,0	6	4,00	50
1661682	D51303002WW	–		1661680	D51303002RW	3,0	6	7,00	57
1661585	D50304002WW	1661582	D50304002CW	1661583	D50304002RW	4,0	6	5,00	54
1661686	D51304002WW	–		1661684	D51304002RW	4,0	6	8,00	57
1661590	D50305002WW	1661587	D50305002CW	1661588	D50305002RW	5,0	6	6,00	54
1661690	D51305002WW	–		1661688	D51305002RW	5,0	6	10,00	57
1661595	D50306002WW	1661592	D50306002CW	1661593	D50306002RW	6,0	6	7,00	54
1661694	D51306002WW	–		1661692	D51306002RW	6,0	6	10,00	57
1661605	D50308003WW	1661601	D50308003CW	1661603	D50308003RW	8,0	8	9,00	58
1661703	D51308003WW	–		1661701	D51308003RW	8,0	8	16,00	63
1661614	D50310004WW	1661611	D50310004CW	1661612	D50310004RW	10,0	10	11,00	66
1661712	D51310004WW	–		1661710	D51310004RW	10,0	10	19,00	72
1661619	D50312005WW	–		1661617	D50312005RW	12,0	12	12,00	73
1661717	D51312005WW	–		1661715	D51312005RW	12,0	12	22,00	83
–		–		1661622	D50314014RW	14,0	14	14,00	75
–		–		1661720	D51314014RW	14,0	14	22,00	83
1661629	D50316006WW	–		1661627	D50316006RW	16,0	16	16,00	82
1661727	D51316006WW	–		1661725	D51316006RW	16,0	16	26,00	92
1661732	D51318018WW	–		1661730	D51318018RW	18,0	18	26,00	92
–		–		1661636	D50320007RW	20,0	20	20,00	92
1661737	D51320007WW	–		1661735	D51320007RW	20,0	20	32,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

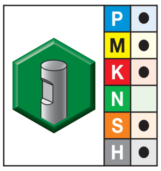




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

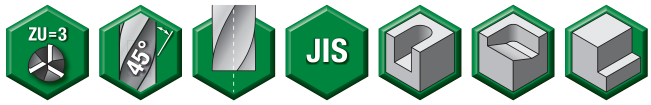
Series DC03

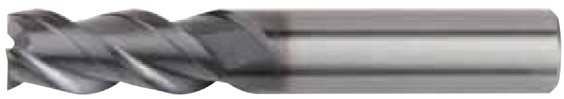


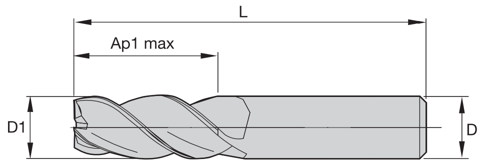
● first choice
○ alternate choice

grade TiAlN-LW TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
1661856	DC0303002LW	3,0	6	4,00	50	0,25
1661858	DC0304002LW	4,0	6	5,00	54	0,25
1661860	DC0305002LW	5,0	6	6,00	54	0,25
1661862	DC0306002LW	6,0	6	7,00	54	0,45
1661866	DC0308003LW	8,0	8	9,00	58	0,45
1661868	DC0310004LW	10,0	10	11,00	66	0,45
1661870	DC0312005LW	12,0	12	12,00	73	0,45
1661872	DC0314014LW	14,0	14	14,00	75	0,45
1661874	DC0316006LW	16,0	16	16,00	82	0,45
1661876	DC0318018LW	18,0	18	18,00	84	0,45
1661878	DC0320007LW	20,0	20	20,00	92	0,45

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





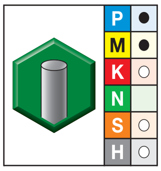


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 4503 JJ • Victory Grades

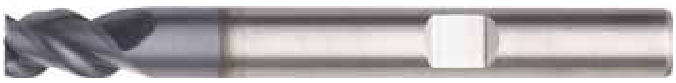


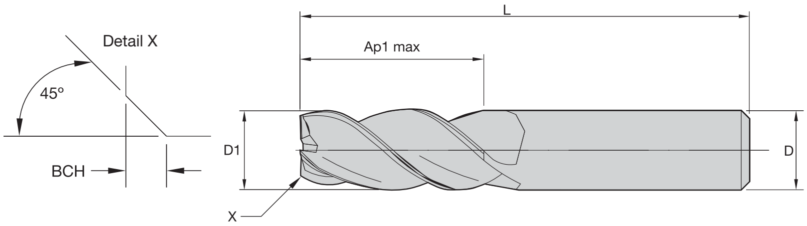
● first choice
○ alternate choice

grade WP15PE AlTiN

order #	catalogue #	D1	D	length of cut Ap1 max	length L
5559170	450301001T	1,0	4	3,00	50
5559171	450301501T	1,5	4	3,00	50
5559172	450302001T	2,0	4	3,00	50
5559173	450302501T	2,5	4	4,00	50
5559174	450302511T	2,5	4	5,00	50
5559175	450303002T	3,0	6	8,00	50
5559176	450303502T	3,5	6	12,00	50
5559177	450304002T	4,0	6	12,00	50
5559178	450304502T	4,5	6	14,00	50
5559179	450305002T	5,0	6	14,00	50
5559180	450306002T	6,0	6	16,00	50
5559181	450308003T	8,0	8	20,00	63
5559182	450310004T	10,0	10	22,00	76
5559183	450312005T	12,0	12	25,00	76
5559184	450316006T	16,0	16	32,00	89
5559185	450320007T	20,0	20	38,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

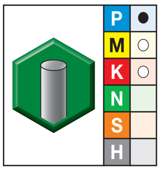


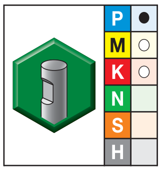


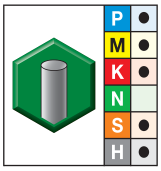
End Mill Tolerances

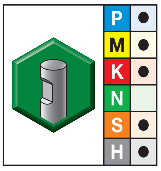
D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 022801 022804 022802 322806 322801 322804 322802 422806









● first choice
○ alternate choice

grade K30F uncoated		grade K30F uncoated		grade K30F-TiCN TiCN		grade K30F-TiCN TiCN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2332115	022801-000020	2332132	022802-000020	2335347	322801-000020	2335365	322802-000020	2,0	6	3,00	50	0,10
3048459	022804-000020	3048480	022806-000020	3048485	322804-000020	3048488	322806-000020	2,0	6	6,00	57	0,10
2332116	022801-000025	2332133	022802-000025	2335348	322801-000025	2335366	322802-000025	2,5	6	3,00	50	0,10
3048461	022804-000025	3048483	022806-000025	3048486	322804-000025	3048489	322806-000025	2,5	6	7,00	57	0,10
2332117	022801-000030	2332135	022802-000030	2335349	322801-000030	2335368	322802-000030	3,0	6	4,00	50	0,10
2332153	022804-000030	2345784	022806-000030	2335388	322804-000030	2335403	322806-000030	3,0	6	7,00	57	0,10
2332118	022801-000035	2332136	022802-000035	2335350	322801-000035	2335369	322802-000035	3,5	6	4,00	50	0,10
2332154	022804-000035	2332170	022806-000035	2335389	322804-000035	2335404	322806-000035	3,5	6	7,00	57	0,10
2332119	022801-000040	2332137	022802-000040	2335351	322801-000040	2335370	322802-000040	4,0	6	5,00	54	0,10
2332155	022804-000040	2332171	022806-000040	2335390	322804-000040	2335406	322806-000040	4,0	6	8,00	57	0,10
–		2332138	022802-000045	2335352	322801-000045	2335371	322802-000045	4,5	6	5,00	54	0,10
2332156	022804-000045	2332172	022806-000045	2335391	322804-000045	2335407	322806-000045	4,5	6	8,00	57	0,10
2332121	022801-000050	2332139	022802-000050	2335353	322801-000050	2335372	322802-000050	5,0	6	6,00	54	0,10
2332157	022804-000050	2332173	022806-000050	2335392	322804-000050	2335408	322806-000050	5,0	6	10,00	57	0,10
2332122	022801-000060	2332140	022802-000060	2335354	322801-000060	2335374	322802-000060	6,0	6	7,00	54	0,10
2332158	022804-000060	2332174	022806-000060	2335393	322804-000060	2335409	322806-000060	6,0	6	10,00	57	0,10
2332123	022801-000070	–		2335355	322801-000070	2335376	322802-000070	7,0	8	8,00	58	0,20
2332159	022804-000070	2332175	022806-000070	2335394	322804-000070	2335410	322806-000070	7,0	8	13,00	63	0,20
2332124	022801-000080	–		2335356	322801-000080	2335378	322802-000080	8,0	8	9,00	58	0,20
2332160	022804-000080	2332176	022806-000080	2335395	322804-000080	2335411	322806-000080	8,0	8	16,00	63	0,20

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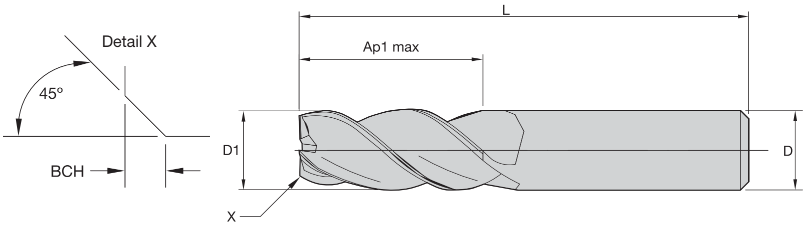
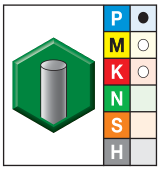
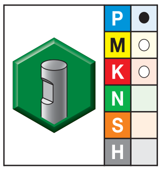
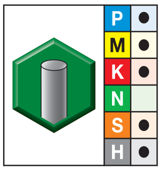
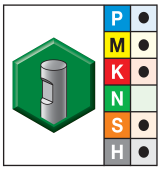
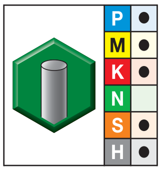
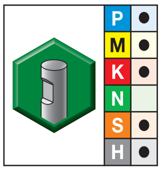
(Series 022801 022804 022802 322806 322801 322804 322802 422806 — continued)



 grade K30F uncoated		 grade K30F uncoated		 grade K30F-TiCN TiCN		 grade K30F-TiCN TiCN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2332125	022801-000090	2332143	022802-000090	2335357	322801-000090	2335379	322802-000090	9,0	10	10,00	66	0,20
2332161	022804-000090	2332177	022806-000090	2335396	322804-000090	2335412	322806-000090	9,0	10	16,00	72	0,20
–		2332144	022802-000100	2335358	322801-000100	2335381	322802-000100	10,0	10	11,00	66	0,30
2332162	022804-000100	2332178	022806-000100	2335397	322804-000100	2335413	322806-000100	10,0	10	19,00	72	0,30
2332127	022801-000120	–		2335360	322801-000120	2335383	322802-000120	12,0	12	12,00	73	0,30
2332163	022804-000120	2332179	022806-000120	2335398	322804-000120	2335415	322806-000120	12,0	12	22,00	83	0,30
–		2332147	022802-000140	2335361	322801-000140	2335384	322802-000140	14,0	14	14,00	75	0,30
2332164	022804-000140	2332180	022806-000140	2335399	322804-000140	2335417	322806-000140	14,0	14	22,00	83	0,30
–		–		2335362	322801-000160	2335385	322802-000160	16,0	16	16,00	82	0,40
2332165	022804-000160	2332181	022806-000160	2335400	322804-000160	2335420	322806-000160	16,0	16	26,00	92	0,40
–		–		2335363	322801-000180	2335386	322802-000180	18,0	18	18,00	84	0,40
–		2332182	022806-000180	2335401	322804-000180	2335421	322806-000180	18,0	18	26,00	92	0,40
2332131	022801-000200	2332150	022802-000200	2335364	322801-000200	2335387	322802-000200	20,0	20	20,00	92	0,40
2332167	022804-000200	2332183	022806-000200	2335402	322804-000200	2335422	322806-000200	20,0	20	32,00	104	0,40

■ Series 422801 422804 422802 422806

● first choice
○ alternate choice

 grade K30F-DCF TiAlN		 grade K30F-DCF TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2341532	422801-000020	2341566	422802-000020	2,0	6	3,00	50	0,10
3048490	422804-000020	3048492	422806-000020	2,0	6	6,00	57	0,10
2341534	422801-000025	2341568	422802-000025	2,5	6	3,00	50	0,10
3048491	422804-000025	3048503	422806-000025	2,5	6	7,00	57	0,10
2341536	422801-000030	2341570	422802-000030	3,0	6	4,00	50	0,10
2341603	422804-000030	2341634	422806-000030	3,0	6	7,00	57	0,10
2341538	422801-000035	2341573	422802-000035	3,5	6	4,00	50	0,10
2341606	422804-000035	2341636	422806-000035	3,5	6	7,00	57	0,10

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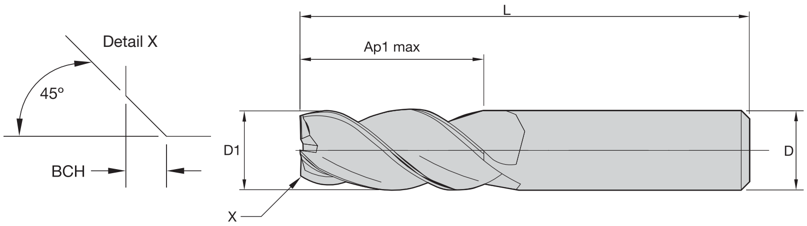
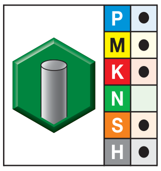
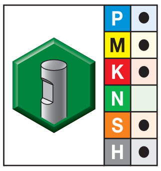
(Series 422801 422804 422802 422806 — continued)





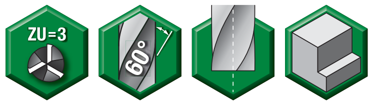


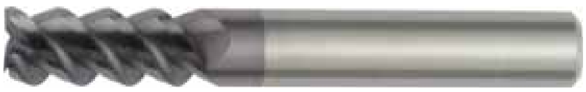
● first choice
○ alternate choice

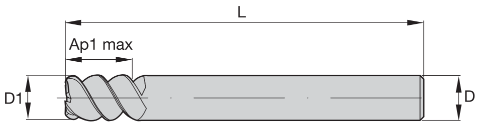
grade K30F-DCF TiAlN		grade K30F-DCF TiAlN						
order #	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**length of cut Ap1 max**	**length L**	**BCH**
2341540	422801-000040	2341575	422802-000040	4,0	6	5,00	54	0,10
2341608	422804-000040	2341638	422806-000040	4,0	6	8,00	57	0,10
2341542	422801-000045	2341577	422802-000045	4,5	6	5,00	54	0,10
2341610	422804-000045	2341640	422806-000045	4,5	6	8,00	57	0,10
2341544	422801-000050	2341579	422802-000050	5,0	6	6,00	54	0,10
2341612	422804-000050	2341642	422806-000050	5,0	6	10,00	57	0,10
2341546	422801-000060	2341581	422802-000060	6,0	6	7,00	54	0,10
2341614	422804-000060	2341644	422806-000060	6,0	6	10,00	57	0,10
2341548	422801-000070	2341583	422802-000070	7,0	8	8,00	58	0,20
2341616	422804-000070	2341646	422806-000070	7,0	8	13,00	63	0,20
2341550	422801-000080	2341587	422802-000080	8,0	8	9,00	58	0,20
2341618	422804-000080	2341648	422806-000080	8,0	8	16,00	63	0,20
2341553	422801-000090	2341589	422802-000090	9,0	10	10,00	66	0,20
2341620	422804-000090	2341650	422806-000090	9,0	10	16,00	72	0,20
2341555	422801-000100	2341591	422802-000100	10,0	10	11,00	66	0,30
2341622	422804-000100	2341653	422806-000100	10,0	10	19,00	72	0,30
2341557	422801-000120	2341593	422802-000120	12,0	12	12,00	73	0,30
2341624	422804-000120	2341657	422806-000120	12,0	12	22,00	83	0,30
2341559	422801-000140	2341595	422802-000140	14,0	14	14,00	75	0,30
2341626	422804-000140	2341659	422806-000140	14,0	14	22,00	83	0,30
2341561	422801-000160	2341597	422802-000160	16,0	16	16,00	82	0,40
2341628	422804-000160	2341661	422806-000160	16,0	16	26,00	92	0,40
2341562	422801-000180	2341599	422802-000180	18,0	18	18,00	84	0,40
2341630	422804-000180	2341663	422806-000180	18,0	18	26,00	92	0,40
2341564	422801-000200	2341601	422802-000200	20,0	20	20,00	92	0,40
2341632	422804-000200	2341665	422806-000200	20,0	20	32,00	104	0,40

Chamfer Data	Corner Chamfer	
D1 h10	**BCH**	**tolerance**
2–6,99	0,1	-0,05
7–9,99	0,2	-0,10
10–15,99	0,3	-0,10
16–20,00	0,4	-0,20

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



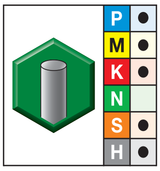




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

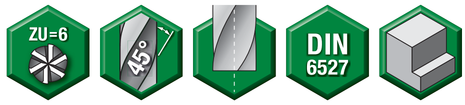
Series 4603

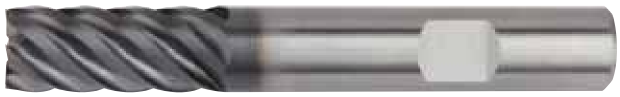


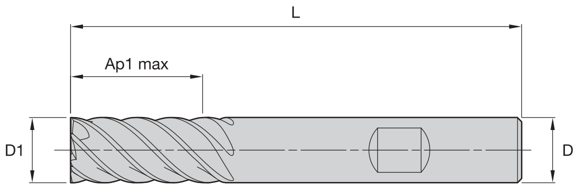
● first choice
○ alternate choice

grade TiAlN-RT TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L
1656750	**460303002RT**	3,0	6	8,00	57
1656758	**460304002RT**	4,0	6	11,00	57
1656765	**460305002RT**	5,0	6	13,00	57
1656773	**460306002RT**	6,0	6	13,00	57
1656781	**460308003RT**	8,0	8	19,00	63
1656791	**460310004RT**	10,0	10	22,00	72
1656799	**460312005RT**	12,0	12	26,00	83
1656807	**460316006RT**	16,0	16	32,00	92
1656815	**460320007RT**	20,0	20	38,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





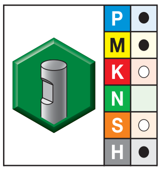


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series D507 D517 • Victory Grades

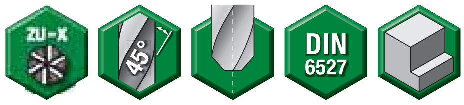


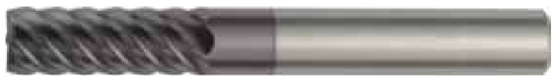
● first choice
○ alternate choice

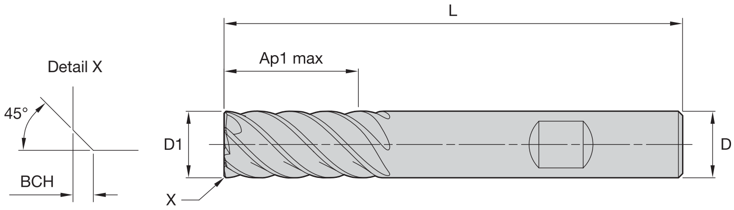
grade WP15PE AlTiN

order #	catalogue #	D1	D	length of cut Ap1 max	length L
5559100	D50706002W	6,0	6	10,00	54
5559108	D51706002W	6,0	6	13,00	57
5559101	D50708003W	8,0	8	12,00	58
5559109	D51708003W	8,0	8	19,00	63
5559102	D50710004W	10,0	10	14,00	66
5559110	D51710004W	10,0	10	22,00	72
5559103	D50712005W	12,0	12	16,00	73
5559111	D51712005W	12,0	12	26,00	83
5559104	D50714014W	14,0	14	18,00	75
5559112	D51714014W	14,0	14	26,00	83
5559105	D50716006W	16,0	16	22,00	82
5559113	D51716006W	16,0	16	32,00	92
5559106	D50718018W	18,0	18	24,00	84
5559114	D51718018W	18,0	18	32,00	92
5559107	D50720007W	20,0	20	26,00	92
5559115	D51720007W	20,0	20	38,00	104

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



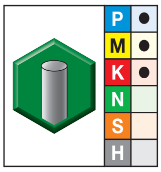


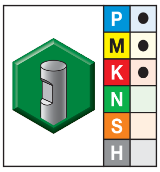


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 422822 422826

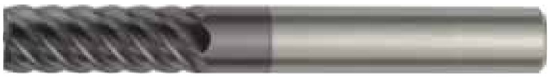


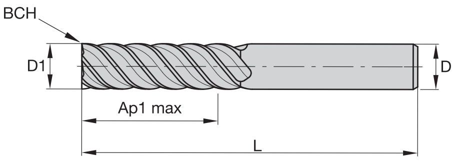


● first choice
○ alternate choice

grade K30F-DCHP AlTiN order #	grade K30F-DCHP AlTiN catalogue #	grade K30F-DCHP AlTiN order #	grade K30F-DCHP AlTiN catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
2342270	422822-000060	2342341	422826-000060	6,0	6	13,00	57	0,10	6
2342272	422822-000080	2342343	422826-000080	8,0	8	19,00	63	0,20	6
2342274	422822-000100	2342345	422826-000100	10,0	10	22,00	72	0,30	6
2342276	422822-000120	2342347	422826-000120	12,0	12	26,00	83	0,30	6
2342280	422822-000160	2342351	422826-000160	16,0	16	32,00	92	0,40	6
2342282	422822-000180	2342353	422826-000180	18,0	18	32,00	92	0,40	8
2342284	422822-000200	2342355	422826-000200	20,0	20	38,00	104	0,40	8
2342286	422822-000250	2342357	422826-000250	25,0	25	45,00	121	0,40	8

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

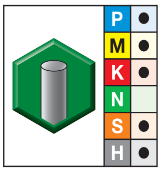




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 422827

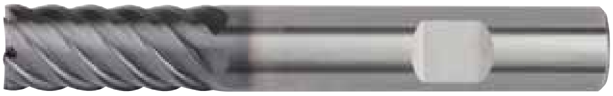


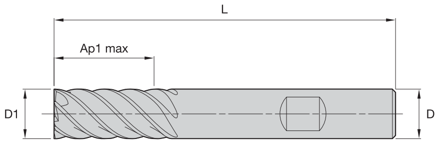
● first choice
○ alternate choice

grade K30F-DCHP AlTiN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
2342360	422827-000060	6,0	6	18,00	62	0,10	6
2342362	422827-000080	8,0	8	24,00	68	0,20	6
2342364	422827-000100	10,0	10	30,00	80	0,30	6
2342366	422827-000120	12,0	12	36,00	93	0,30	6
2342368	422827-000160	16,0	16	48,00	108	0,30	6
2342370	422827-000200	20,0	20	60,00	126	0,40	8
2342372	422827-000250	25,0	25	75,00	150	0,40	8

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



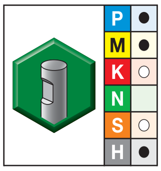


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

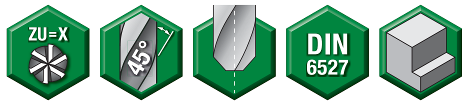
Series D518 • Vision Plus • Victory Grades

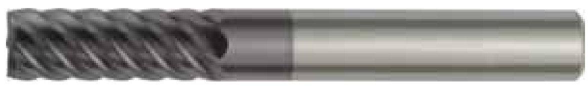


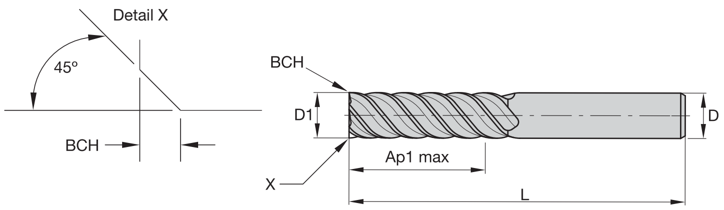
● first choice
○ alternate choice

grade WP15PE AlTiN order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
5559116	D51804002W	4,0	6	11,00	57	4
5559117	D51805002W	5,0	6	13,00	57	4
5559118	D51806002W	6,0	6	13,00	57	6
5559119	D51807003W	7,0	8	16,00	63	6
5559120	D51808003W	8,0	8	19,00	63	6
5559121	D51809004W	9,0	10	19,00	72	6
5559122	D51810004W	10,0	10	22,00	72	6
5559123	D51812005W	12,0	12	26,00	83	6
5559124	D51814014W	14,0	14	26,00	83	6
5559125	D51816006W	16,0	16	32,00	92	8
5559126	D51818018W	18,0	18	32,00	92	8
5559127	D51820007W	20,0	20	38,00	104	8
5559128	D51825008W	25,0	25	45,00	121	8

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



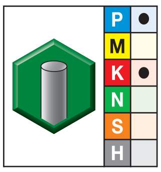




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 026621 • Cermet End Mill

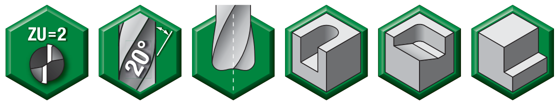


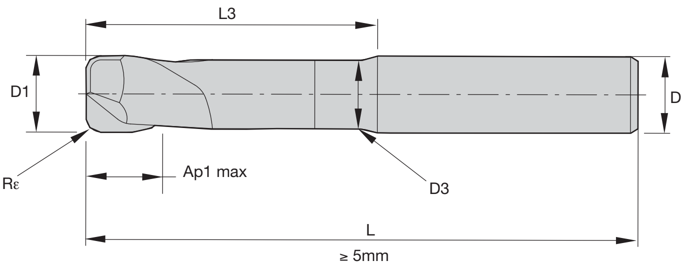
grade UNCOATED

● first choice
○ alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
2333138	**026621-000080**	8,0	8	19,00	63	0,20	4
2333140	**026621-000120**	12,0	12	26,00	83	0,30	6
2333143	**026621-000160**	16,0	16	32,00	92	0,40	8
2333145	**026621-000200**	20,0	20	38,00	104	0,40	8

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

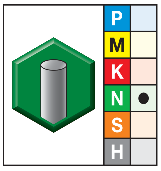




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

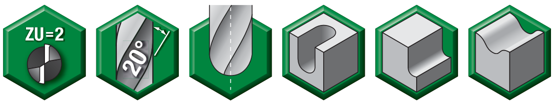
Series 024112

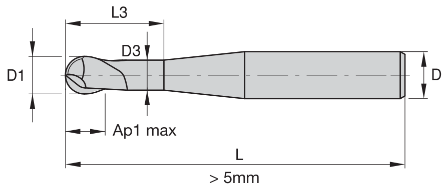


● first choice
○ alternate choice

grade K10F-DIA DIAMOND order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2333112	024112-006005	6,0	6	5,80	6,00	42,00	80	0,50
2333113	024112-008010	8,0	8	7,80	8,00	50,00	90	1,00
2333114	024112-010020	10,0	10	9,70	10,00	56,00	100	2,00

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

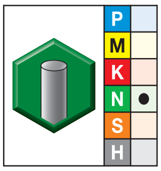




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 024111



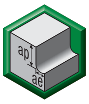
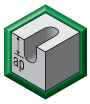
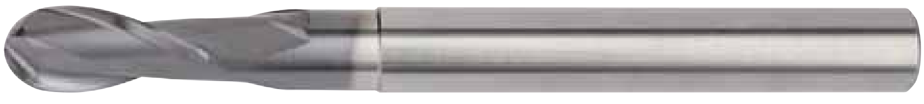
● first choice
○ alternate choice

grade K10F-DIA DIAMOND

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
2333099	024111-000020	2,0	6	1,90	2,00	17,50	70
2333100	024111-000030	3,0	6	2,90	3,00	18,50	70
2333101	024111-000040	4,0	6	3,80	4,00	19,50	80
2333102	024111-000050	5,0	6	4,80	5,00	39,00	80
2333103	024111-000060	6,0	6	5,80	6,00	42,00	80
2333104	024111-000080	8,0	8	7,80	8,00	52,00	90
2333105	024111-000100	10,0	10	9,70	10,00	58,00	100
2333106	024111-000120	12,0	12	11,70	12,00	63,00	110

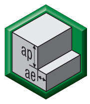
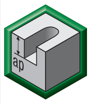
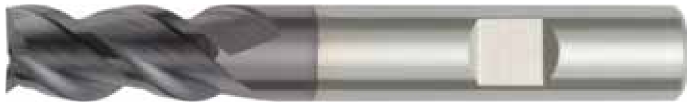
Series 4001 JJ • Victory Grades

WIDIA VICTORY

Material Group																					
		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.													
		A		B	Cutting Speed — vc m/min				D1 — Diameter												
		ap	ae	ap	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,25 x D	0,25 x D	0,5 x D	150	–	200	fz	0,012	0,019	0,026	0,032	0,039	0,054	0,065	0,075	0,083	0,091	0,097	0,103	0,111
P	1	1,25 x D	0,25 x D	0,5 x D	150	–	200	fz	0,012	0,019	0,026	0,032	0,039	0,054	0,065	0,075	0,083	0,091	0,097	0,103	0,111
P	2	1,25 x D	0,25 x D	0,5 x D	140	–	190	fz	0,012	0,019	0,026	0,032	0,039	0,054	0,065	0,075	0,083	0,091	0,097	0,103	0,111
P	3	1,25 x D	0,25 x D	0,5 x D	120	–	160	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,063	0,071	0,078	0,085	0,091	0,102
P	4	1,25 x D	0,25 x D	0,3 x D	90	–	150	fz	0,009	0,014	0,019	0,024	0,030	0,040	0,049	0,056	0,063	0,069	0,075	0,079	0,088
M	1	1,25 x D	0,25 x D	0,5 x D	90	–	115	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,063	0,071	0,078	0,085	0,091	0,102
M	2	1,25 x D	0,25 x D	0,5 x D	60	–	80	fz	0,008	0,013	0,017	0,022	0,026	0,036	0,044	0,051	0,057	0,063	0,068	0,073	0,082
K	1	1,25 x D	0,25 x D	0,5 x D	120	–	150	fz	0,012	0,019	0,026	0,032	0,039	0,054	0,065	0,075	0,083	0,091	0,097	0,103	0,111
K	2	1,25 x D	0,25 x D	0,5 x D	110	–	140	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,063	0,071	0,078	0,085	0,091	0,102
N	1	1,25 x D	0,25 x D	0,5 x D	500	–	2000	fz	0,018	0,027	0,036	0,045	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180	0,225
N	2	1,25 x D	0,25 x D	0,5 x D	500	–	1500	fz	0,016	0,024	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,146	0,162	0,203
N	3	1,25 x D	0,25 x D	0,5 x D	250	–	1000	fz	0,016	0,024	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,146	0,162	0,203
N	4	1,25 x D	0,25 x D	0,5 x D	100	–	750	fz	0,018	0,027	0,036	0,045	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180	0,225

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

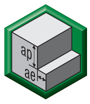
Series D503

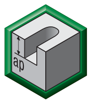
  

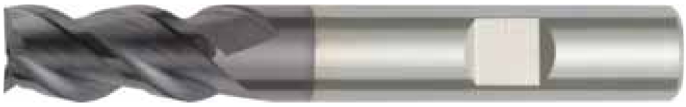
Material Group		Side Milling (A) and Slotting (B) A		B	uncoated Cutting Speed — vc m/min			TiAlN Cutting Speed — vc m/min				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%. D1 — Diameter											
		ap	ae	ap	min		max	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	0,75 x D	0,4 x D	0,5 x D	60	–	80	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	1	0,75 x D	0,4 x D	0,5 x D	60	–	80	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	2	0,75 x D	0,4 x D	0,5 x D	56	–	76	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	3	0,75 x D	0,4 x D	0,5 x D	48	–	64	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
P	4	0,75 x D	0,4 x D	0,3 x D	–	–	–	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
P	5	0,75 x D	0,4 x D	0,5 x D	–	–	–	60	–	100	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
P	6	0,75 x D	0,4 x D	0,3 x D	–	–	–	50	–	75	fz	0,008	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	0,75 x D	0,4 x D	0,5 x D	36	–	46	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
M	2	0,75 x D	0,4 x D	0,5 x D	–	–	–	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
M	3	0,75 x D	0,4 x D	0,5 x D	–	–	–	60	–	70	fz	0,008	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	0,75 x D	0,4 x D	0,5 x D	48	–	60	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
K	2	0,75 x D	0,4 x D	0,5 x D	–	–	–	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
K	3	0,75 x D	0,4 x D	0,5 x D	–	–	–	110	–	130	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	0,75 x D	0,4 x D	0,3 x D	–	–	–	50	–	90	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
S	2	0,75 x D	0,4 x D	0,3 x D	–	–	–	25	–	40	fz	0,006	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054
S	3	0,75 x D	0,4 x D	0,3 x D	–	–	–	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	4	0,75 x D	0,4 x D	0,5 x D	–	–	–	50	–	60	fz	0,007	0,011	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	0,75 x D	0,4 x D	0,3 x D	–	–	–	80	–	140	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D513



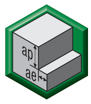


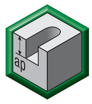


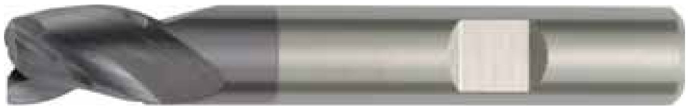
Material Group		Side Milling (A) and Slotting (B)			uncoated			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter											
		ap	ae	ap	min		max	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	1,25 x D	0,2 x D	0,25 x D	60	–	80	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	1,25 x D	0,2 x D	0,25 x D	60	–	80	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1,25 x D	0,2 x D	0,25 x D	56	–	76	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	1,25 x D	0,2 x D	0,25 x D	48	–	64	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	1,25 x D	0,2 x D	0,25 x D	–	–	–	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
	5	1,25 x D	0,2 x D	0,25 x D	–	–	–	60	–	100	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	6	1,25 x D	0,2 x D	0,25 x D	–	–	–	50	–	75	fz	0,008	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	1,25 x D	0,2 x D	0,25 x D	36	–	46	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1,25 x D	0,2 x D	0,25 x D	–	–	–	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	1,25 x D	0,2 x D	0,25 x D	–	–	–	60	–	70	fz	0,008	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	1,25 x D	0,2 x D	0,25 x D	48	–	60	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1,25 x D	0,2 x D	0,25 x D	–	–	–	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	3	1,25 x D	0,2 x D	0,25 x D	–	–	–	110	–	130	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	1,25 x D	0,2 x D	0,25 x D	–	–	–	50	–	90	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1,25 x D	0,2 x D	0,25 x D	–	–	–	25	–	40	fz	0,006	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054
	3	1,25 x D	0,2 x D	0,25 x D	–	–	–	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	4	1,25 x D	0,2 x D	0,25 x D	–	–	–	50	–	60	fz	0,007	0,011	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	1,25 x D	0,2 X D	0,25 x D	–	–	–	80	–	140	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series DC03





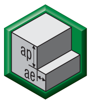


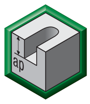
Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	0,75 x D	0,4 x D	0,5 x D	150	–	200	fz	0,021	0,028	0,028	0,028	0,028	0,044	0,060	0,072	0,083	0,101	0,114
P	1	0,75 x D	0,4 x D	0,5 x D	150	–	200	fz	0,021	0,028	0,028	0,028	0,028	0,044	0,060	0,072	0,083	0,101	0,114
P	2	0,75 x D	0,4 x D	0,5 x D	140	–	190	fz	0,018	0,023	0,023	0,023	0,023	0,036	0,050	0,061	0,070	0,087	0,101
P	3	0,75 x D	0,4 x D	0,5 x D	120	–	160	fz	0,016	0,021	0,021	0,021	0,021	0,033	0,045	0,054	0,062	0,077	0,088
P	4	0,75 x D	0,4 x D	0,3 x D	90	–	150	fz	0,014	0,019	0,019	0,019	0,019	0,029	0,040	0,048	0,056	0,070	0,081
P	5	0,75 x D	0,4 x D	0,5 x D	60	–	100	fz	0,014	0,019	0,019	0,019	0,019	0,029	0,040	0,048	0,056	0,070	0,081
P	6	0,75 x D	0,4 x D	0,3 x D	50	–	75	fz	0,012	0,016	0,016	0,016	0,016	0,025	0,034	0,040	0,047	0,057	0,065
M	1	0,75 x D	0,4 x D	0,5 x D	90	–	115	fz	0,018	0,023	0,023	0,023	0,023	0,036	0,050	0,061	0,070	0,087	0,101
M	2	0,75 x D	0,4 x D	0,5 x D	60	–	80	fz	0,014	0,019	0,019	0,019	0,019	0,029	0,040	0,048	0,056	0,070	0,081
M	3	0,75 x D	0,4 x D	0,5 x D	60	–	70	fz	0,012	0,016	0,016	0,016	0,016	0,025	0,034	0,040	0,047	0,057	0,065
K	1	0,75 x D	0,4 x D	0,5 x D	120	–	150	fz	0,021	0,028	0,028	0,028	0,028	0,044	0,060	0,072	0,083	0,101	0,114
K	2	0,75 x D	0,4 x D	0,5 x D	110	–	140	fz	0,018	0,023	0,023	0,023	0,023	0,036	0,050	0,061	0,070	0,087	0,101
K	3	0,75 x D	0,4 x D	0,5 x D	110	–	130	fz	0,014	0,019	0,019	0,019	0,019	0,029	0,040	0,048	0,056	0,070	0,081
S	1	0,75 x D	0,4 x D	0,3 x D	50	–	90	fz	0,018	0,023	0,023	0,023	0,023	0,036	0,050	0,061	0,070	0,087	0,101
S	2	0,75 x D	0,4 x D	0,3 x D	25	–	40	fz	0,010	0,013	0,013	0,013	0,013	0,019	0,026	0,032	0,037	0,046	0,054
S	3	0,75 x D	0,4 x D	0,3 x D	60	–	80	fz	0,014	0,019	0,019	0,019	0,019	0,029	0,040	0,048	0,056	0,070	0,081
S	4	0,75 x D	0,4 x D	0,5 x D	50	–	60	fz	0,012	0,016	0,016	0,016	0,016	0,026	0,037	0,045	0,052	0,064	0,074
H	1	0,75 x D	0,4 x D	0,3 x D	80	–	140	fz	0,016	0,021	0,021	0,021	0,021	0,033	0,045	0,054	0,062	0,077	0,088

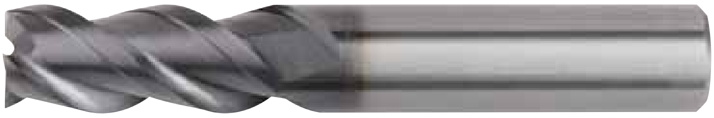
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4503 JJ • Victory Grades

WIDIA VICTORY



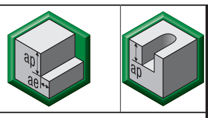
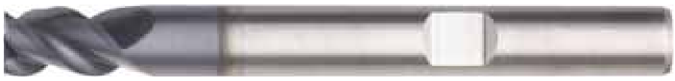




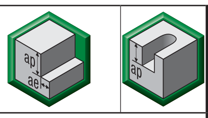
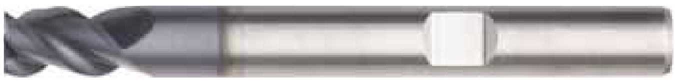
Material Group		Side Milling (A) and Slotting (B): A		B	WP15PE: Cutting Speed — vc m/min			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.	D1 — Diameter															
		ap	ae	ap	min		max	mm	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0
P	0	1,5 x D	0,3 x D	0,5 x D	150	–	200	fz	0,007	0,010	0,014	0,017	0,021	0,025	0,028	0,032	0,036	0,044	0,060	0,072	0,083	0,101	0,108	0,114
P	1	1,5 x D	0,3 x D	0,5 x D	150	–	200	fz	0,007	0,010	0,014	0,017	0,021	0,025	0,028	0,032	0,036	0,044	0,060	0,072	0,083	0,101	0,108	0,114
P	2	1,5 x D	0,3 x D	0,5 x D	140	–	190	fz	0,007	0,010	0,014	0,017	0,021	0,025	0,028	0,032	0,036	0,044	0,060	0,072	0,083	0,101	0,108	0,114
P	3	1,5 x D	0,3 x D	0,5 x D	120	–	160	fz	0,006	0,008	0,011	0,014	0,017	0,020	0,023	0,027	0,030	0,036	0,050	0,061	0,070	0,087	0,095	0,101
P	4	1,5 x D	0,3 x D	0,3 x D	90	–	150	fz	0,005	0,008	0,010	0,013	0,016	0,019	0,021	0,024	0,027	0,033	0,045	0,054	0,062	0,077	0,083	0,088
P	5	1,5 x D	0,3 x D	0,5 x D	60	–	100	fz	0,005	0,007	0,009	0,012	0,014	0,017	0,019	0,022	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
P	6	1,5 x D	0,3 x D	0,3 x D	50	–	75	fz	0,004	0,006	0,008	0,010	0,012	0,014	0,016	0,018	0,020	0,025	0,034	0,040	0,047	0,057	0,061	0,065
M	1	1,5 x D	0,3 x D	0,5 x D	90	–	115	fz	0,006	0,008	0,011	0,014	0,017	0,020	0,023	0,027	0,030	0,036	0,050	0,061	0,070	0,087	0,095	0,101
M	2	1,5 x D	0,3 x D	0,5 x D	60	–	80	fz	0,005	0,007	0,009	0,012	0,014	0,017	0,019	0,022	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
M	3	1,5 x D	0,3 x D	0,5 x D	60	–	70	fz	0,004	0,006	0,008	0,010	0,012	0,014	0,016	0,018	0,020	0,025	0,034	0,040	0,047	0,057	0,061	0,065
K	1	1,5 x D	0,3 x D	0,5 x D	120	–	150	fz	0,007	0,010	0,014	0,017	0,021	0,025	0,028	0,032	0,036	0,044	0,060	0,072	0,083	0,101	0,108	0,114
K	2	1,5 x D	0,3 x D	0,5 x D	110	–	140	fz	0,006	0,008	0,011	0,014	0,017	0,020	0,023	0,027	0,030	0,036	0,050	0,061	0,070	0,087	0,095	0,101
K	3	1,5 x D	0,3 x D	0,5 x D	110	–	130	fz	0,005	0,007	0,009	0,012	0,014	0,017	0,019	0,022	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,006	0,008	0,011	0,014	0,017	0,020	0,023	0,027	0,030	0,036	0,050	0,061	0,070	0,087	0,095	0,101
S	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,003	0,005	0,006	0,008	0,009	0,011	0,013	0,014	0,016	0,019	0,026	0,032	0,037	0,046	0,050	0,054
S	3	1,5 x D	0,3 x D	0,5 x D	60	–	80	fz	0,005	0,007	0,009	0,012	0,014	0,017	0,019	0,022	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
S	4	1,5 x D	0,3 x D	0,5 x D	50	–	60	fz	0,003	0,005	0,007	0,009	0,011	0,014	0,016	0,018	0,021	0,026	0,037	0,045	0,052	0,064	0,069	0,074
H	1	1,5 x D	0,3 x D	0,3 x D	80	–	140	fz	0,005	0,008	0,010	0,013	0,016	0,019	0,021	0,024	0,027	0,033	0,045	0,054	0,062	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 022801 022804 322801 322804 422801 022806 022802 322806 322802 422802

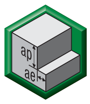
Material Group		Side Milling (A) and Slotting (B) A ap	A ae	B ap	K30F uncoated Cutting Speed – vc m/min min		max	K30F-TICN TiCN Cutting Speed – vc m/min min		max	K30F-DCF TiAlN Cutting Speed – vc m/min min		max	mm	2,0	3,0	4,0	5,0	6,0	7,0	8,0	9,0	10,0	12,0	16,0	18,0	20,0
															Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%. D1 – Diameter												
P	0	0,75 x D	0,4 x D	0,5 x D	60	–	80	120	–	160	150	–	200	fz	0,011	0,017	0,023	0,029	0,035	0,041	0,048	0,053	0,058	0,066	0,081	0,086	0,091
P	1	0,75 x D	0,4 x D	0,5 x D	60	–	80	120	–	160	150	–	200	fz	0,011	0,017	0,023	0,029	0,035	0,041	0,048	0,053	0,058	0,066	0,081	0,086	0,091
P	2	0,75 x D	0,4 x D	0,5 x D	56	–	76	112	–	152	140	–	190	fz	0,011	0,017	0,023	0,029	0,035	0,041	0,048	0,053	0,058	0,066	0,081	0,086	0,091
P	3	0,75 x D	0,4 x D	0,5 x D	48	–	64	96	–	128	120	–	160	fz	0,009	0,014	0,019	0,024	0,029	0,034	0,040	0,044	0,048	0,056	0,070	0,076	0,081
P	4	0,75 x D	0,4 x D	0,3 x D	–	–	–	72	–	120	90	–	150	fz	0,008	0,013	0,017	0,022	0,026	0,031	0,036	0,040	0,043	0,050	0,061	0,066	0,070
P	5	0,75 x D	0,4 x D	0,5 x D	–	–	–	48	–	80	60	–	100	fz	0,008	0,011	0,015	0,019	0,024	0,028	0,032	0,035	0,039	0,045	0,056	0,060	0,065
P	6	0,75 x D	0,4 x D	0,3 x D	–	–	–	40	–	60	50	–	75	fz	0,006	0,010	0,013	0,016	0,020	0,023	0,027	0,030	0,032	0,037	0,046	0,049	0,052
M	1	0,75 x D	0,4 x D	0,5 x D	36	–	46	72	–	92	90	–	115	fz	0,009	0,014	0,019	0,024	0,029	0,034	0,040	0,044	0,048	0,056	0,070	0,076	0,081
M	2	0,75 x D	0,4 x D	0,5 x D	–	–	–	48	–	64	60	–	80	fz	0,008	0,011	0,015	0,019	0,024	0,028	0,032	0,035	0,039	0,045	0,056	0,060	0,065
M	3	0,75 x D	0,4 x D	0,5 x D	–	–	–	48	–	56	60	–	70	fz	0,006	0,010	0,013	0,016	0,020	0,023	0,027	0,030	0,032	0,037	0,046	0,049	0,052
K	1	0,75 x D	0,4 x D	0,5 x D	48	–	60	96	–	120	120	–	150	fz	0,011	0,017	0,023	0,029	0,035	0,041	0,048	0,053	0,058	0,066	0,081	0,086	0,091
K	2	0,75 x D	0,4 x D	0,5 x D	–	–	–	88	–	112	110	–	140	fz	0,009	0,014	0,019	0,024	0,029	0,034	0,040	0,044	0,048	0,056	0,070	0,076	0,081
K	3	0,75 x D	0,4 x D	0,5 x D	–	–	–	88	–	104	110	–	130	fz	0,008	0,011	0,015	0,019	0,024	0,028	0,032	0,035	0,039	0,045	0,056	0,060	0,065
S	1	0,75 x D	0,4 x D	0,3 x D	–	–	–	40	–	72	50	–	90	fz	0,009	0,014	0,019	0,024	0,029	0,034	0,040	0,044	0,048	0,056	0,070	0,076	0,081
S	2	0,75 x D	0,4 x D	0,3 x D	–	–	–	20	–	32	25	–	40	fz	0,005	0,008	0,010	0,013	0,016	0,018	0,021	0,023	0,026	0,030	0,037	0,040	0,043
S	3	0,75 x D	0,4 x D	0,3 x D	–	–	–	48	–	64	60	–	80	fz	0,008	0,011	0,015	0,019	0,024	0,028	0,032	0,035	0,039	0,045	0,056	0,060	0,065
S	4	0,75 x D	0,4 x D	0,5 x D	–	–	–	40	–	48	50	–	60	fz	0,006	0,009	0,013	0,016	0,021	0,025	0,029	0,033	0,036	0,041	0,051	0,056	0,059
H	1	0,75 x D	0,4 x D	0,3 x D	–	–	–	64	–	112	80	–	140	fz	0,008	0,013	0,017	0,022	0,026	0,031	0,036	0,040	0,043	0,050	0,061	0,066	0,070

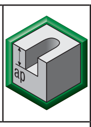



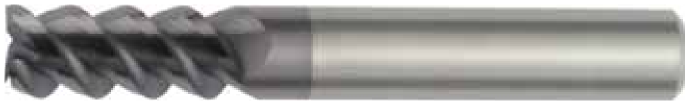
Material Group		Side Milling (A) and Slotting (B) A ap	A ae	B ap	K30F uncoated Cutting Speed – vc m/min min		max	K30F-TICN TiCN Cutting Speed – vc m/min min		max	K30F-DCF TiAlN Cutting Speed – vc m/min min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0
															Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%. D1 – Diameter										
P	0	1,5 x D	0,3 x D	0,5 x D	60	–	80	120	–	160	150	–	200	fz	0,011	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
P	1	1,5 x D	0,3 x D	0,5 x D	60	–	80	120	–	160	150	–	200	fz	0,011	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
P	2	1,5 x D	0,3 x D	0,5 x D	56	–	76	112	–	152	140	–	190	fz	0,011	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
P	3	1,5 x D	0,3 x D	0,5 x D	48	–	64	96	–	128	120	–	160	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
P	4	1,5 x D	0,3 x D	0,3 x D	–	–	–	72	–	120	90	–	150	fz	0,008	0,013	0,017	0,022	0,026	0,036	0,043	0,050	0,061	0,066	0,070
P	5	1,5 x D	0,3 x D	0,5 x D	–	–	–	48	–	80	60	–	100	fz	0,008	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
P	6	1,5 x D	0,3 x D	0,3 x D	–	–	–	40	–	60	50	–	75	fz	0,006	0,010	0,013	0,016	0,020	0,027	0,032	0,037	0,046	0,049	0,052
M	1	1,5 x D	0,3 x D	0,5 x D	36	–	46	72	–	92	90	–	115	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
M	2	1,5 x D	0,3 x D	0,5 x D	–	–	–	48	–	64	60	–	80	fz	0,008	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
M	3	1,5 x D	0,3 x D	0,5 x D	–	–	–	48	–	56	60	–	70	fz	0,006	0,010	0,013	0,016	0,020	0,027	0,032	0,037	0,046	0,049	0,052
K	1	1,5 x D	0,3 x D	0,5 x D	48	–	60	96	–	120	120	–	150	fz	0,011	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
K	2	1,5 x D	0,3 x D	0,5 x D	–	–	–	88	–	112	110	–	140	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
K	3	1,5 x D	0,3 x D	0,5 x D	–	–	–	88	–	104	110	–	130	fz	0,008	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
S	1	1,5 x D	0,3 x D	0,3 x D	–	–	–	40	–	72	50	–	90	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
S	2	1,5 x D	0,3 x D	0,3 x D	–	–	–	20	–	32	25	–	40	fz	0,005	0,008	0,010	0,013	0,016	0,021	0,026	0,030	0,037	0,040	0,043
S	3	1,5 x D	0,3 x D	0,3 x D	–	–	–	48	–	64	60	–	80	fz	0,008	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
S	4	1,5 x D	0,3 x D	0,5 x D	–	–	–	40	–	48	50	–	60	fz	0,006	0,009	0,013	0,016	0,021	0,029	0,036	0,041	0,051	0,056	0,059
H	1	1,5 x D	0,3 x D	0,3 x D	–	–	–	80	–	140	80	–	140	fz	0,008	0,013	0,017	0,022	0,026	0,036	0,043	0,050	0,061	0,066	0,070

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4603



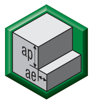
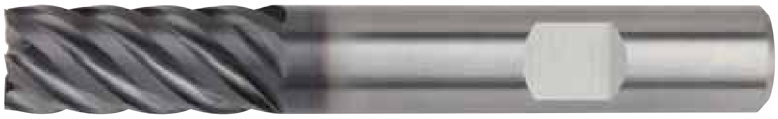




Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0
P	0	1,5 x D	0,3 x D	0,5 x D	150	–	200	fz	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
P	1	1,5 x D	0,3 x D	0,5 x D	150	–	200	fz	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
P	2	1,5 x D	0,3 x D	0,5 x D	140	–	190	fz	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
P	3	1,5 x D	0,3 x D	0,5 x D	120	–	160	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
P	4	1,5 x D	0,3 x D	0,3 x D	90	–	150	fz	0,013	0,017	0,022	0,026	0,036	0,043	0,050	0,061	0,066	0,070
P	5	1,5 x D	0,3 x D	0,5 x D	60	–	100	fz	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
P	6	1,5 x D	0,3 x D	0,3 x D	50	–	75	fz	0,010	0,013	0,016	0,020	0,027	0,032	0,037	0,046	0,049	0,052
M	1	1,5 x D	0,3 x D	0,5 x D	90	–	115	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
M	2	1,5 x D	0,3 x D	0,5 x D	60	–	80	fz	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
M	3	1,5 x D	0,3 x D	0,5 x D	60	–	70	fz	0,010	0,013	0,016	0,020	0,027	0,032	0,037	0,046	0,049	0,052
K	1	1,5 x D	0,3 x D	0,5 x D	120	–	150	fz	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
K	2	1,5 x D	0,3 x D	0,5 x D	110	–	140	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
K	3	1,5 x D	0,3 x D	0,5 x D	110	–	130	fz	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
S	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,008	0,010	0,013	0,016	0,021	0,026	0,030	0,037	0,040	0,043
S	3	1,5 x D	0,3 x D	0,3 x D	60	–	80	fz	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
S	4	1,5 x D	0,3 x D	0,5 x D	50	–	60	fz	0,009	0,013	0,016	0,021	0,029	0,036	0,041	0,051	0,056	0,059
H	1	1,5 x D	0,3 x D	0,3 x D	80	–	140	fz	0,013	0,017	0,022	0,026	0,036	0,043	0,050	0,061	0,066	0,070

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series D507 • Victory Grades

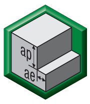



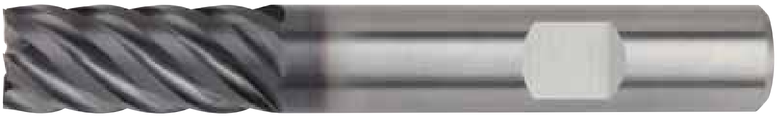
Material Group		Side Milling (A)		WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	4,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	1,0 x D	0,2 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	1	1,0 x D	0,2 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	2	1,0 x D	0,2 x D	140	–	190	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	3	1,0 x D	0,1 x D	120	–	160	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
P	4	1,0 x D	0,1 x D	90	–	150	fz	0,021	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
P	5	1,0 x D	0,1 x D	60	–	100	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
P	6	1,0 x D	0,1 x D	50	–	75	fz	0,016	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	1,0 x D	0,1 x D	90	–	115	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
M	2	1,0 x D	0,1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
M	3	1,0 x D	0,1 x D	60	–	70	fz	0,016	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	1,0 x D	0,1 x D	120	–	150	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
K	2	1,0 x D	0,1 x D	110	–	140	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
K	3	1,0 x D	0,1 x D	110	–	130	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	1,0 x D	0,1 x D	50	–	90	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
S	2	1,0 x D	0,1 x D	25	–	40	fz	0,013	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054
S	3	1,0 x D	0,15 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	4	1,0 x D	0,15 x D	50	–	60	fz	0,016	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	1,0 x D	0,1 x D	80	–	140	fz	0,021	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088

*NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.*

Series D517 • Victory Grades

WIDIA VICTORY

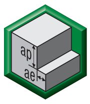


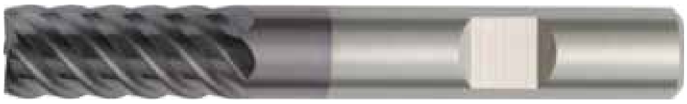


Material Group		Side Milling (A)		WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	4,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,05 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	1	Ap1 max	0,05 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	2	Ap1 max	0,05 x D	140	–	190	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	3	Ap1 max	0,05 x D	120	–	160	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
P	4	Ap1 max	0,05 x D	90	–	150	fz	0,021	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
P	5	Ap1 max	0,05 x D	60	–	100	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
P	6	Ap1 max	0,05 x D	50	–	75	fz	0,016	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	Ap1 max	0,05 x D	90	–	115	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
M	2	Ap1 max	0,05 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
M	3	Ap1 max	0,05 x D	60	–	70	fz	0,016	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	Ap1 max	0,05 x D	120	–	150	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
K	2	Ap1 max	0,05 x D	110	–	140	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
K	3	Ap1 max	0,05 x D	110	–	130	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	Ap1 max	0,04 x D	50	–	90	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
S	2	Ap1 max	0,04 x D	25	–	40	fz	0,013	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054
S	3	Ap1 max	0,05 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	4	Ap1 max	0,05 x D	50	–	60	fz	0,016	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	Ap1 max	0,04 x D	80	–	140	fz	0,021	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 422822 422826



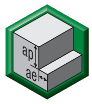


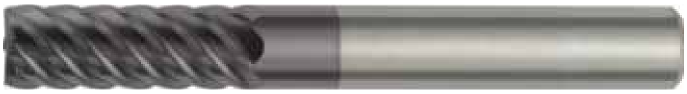
Material Group		Side Milling (A) and Slotting (B)		K30F-DCF AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min	–	max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,05 x D	165	–	165	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	1	1,5 x D	0,05 x D	165	–	165	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	2	1,5 x D	0,05 x D	154	–	154	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	3	1,5 x D	0,05 x D	132	–	132	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
P	4	1,5 x D	0,05 x D	99	–	99	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
P	5	1,5 x D	0,05 x D	66	–	66	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
P	6	1,5 x D	0,04 x D	55	–	55	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,05 x D	99	–	99	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
M	2	1,5 x D	0,05 x D	66	–	66	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
M	3	1,5 x D	0,05 x D	66	–	66	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,05 x D	132	–	132	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
K	2	1,5 x D	0,05 x D	121	–	121	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
K	3	1,5 x D	0,05 x D	121	–	121	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
N	1	1,5 x D	0,05 x D	275	–	275	fz	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180	0,225
S	1	1,5 x D	0,04 x D	55		55	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
S	2	1,5 x D	0,04 x D	27.5		27.5	fz	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
S	3	1,5 x D	0,05 x D	66		66	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	4	1,5 x D	0,05 x D	55		55	fz	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,04 x D	88	–	88	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 422827 • Vision Plus

WIDIA VICTORY



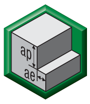


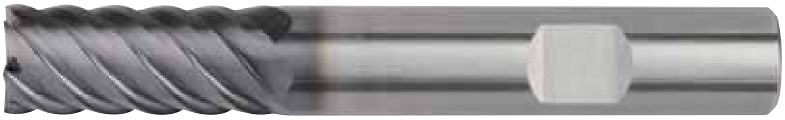
Material Group		Side Milling (A) ap	Side Milling (A) ae	K30F-DCHP AlTiN Cutting Speed — vc m/min min	–	max	mm	Recommended feed per tooth (fz = mm/th) for side milling (A). D1 — Diameter 6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	3 x D	0,05 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	3 x D	0,05 x D	140	–	190	fz	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	3	3 x D	0,05 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	4	3 x D	0,05 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098
	5	3 x D	0,05 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	6	3 x D	0,05 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
M	1	3 x D	0,05 x D	80	–	100	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	3 x D	0,05 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	3	3 x D	0,05 x D	60	–	80	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
K	1	3 x D	0,05 x D	120	–	160	fz	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	3 x D	0,05 x D	110	–	140	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	3	3 x D	0,05 x D	100	–	130	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
S	1	3 x D	0,05 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	3 x D	0,05 x D	20	–	40	fz	0,019	0,026	0,032	0,037	0,046	0,054	0,061
	3	3 x D	0,05 x D	50	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	4	3 x D	0,05 x D	45	–	65	fz	0,026	0,037	0,045	0,052	0,064	0,074	0,084
H	1	3 x D	0,05 x D	100	–	140	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098

NOTE: Lower value of cutting speed is used for high-stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D518 • Vision Plus • Victory Grades

WIDIA VICTORY



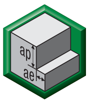
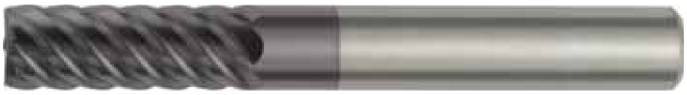


Material Group		Side Milling (A) ap	A ae	WP15PE Cutting Speed — vc m/min min		max	mm	D1 — Diameter 4,0	5,0	6,0	7,0	8,0	9,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	Ap1 max	0,05 x D	150	–	200	fz	0,028	0,036	0,044	0,052	0,060	0,066	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	1	Ap1 max	0,05 x D	150	–	200	fz	0,028	0,036	0,044	0,052	0,060	0,066	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	2	Ap1 max	0,05 x D	140	–	190	fz	0,028	0,036	0,044	0,052	0,060	0,066	0,072	0,083	0,092	0,101	0,108	0,114	0,124
P	3	Ap1 max	0,05 x D	120	–	160	fz	0,023	0,030	0,036	0,043	0,050	0,055	0,061	0,070	0,079	0,087	0,095	0,101	0,114
P	4	Ap1 max	0,05 x D	90	–	150	fz	0,021	0,027	0,033	0,039	0,045	0,050	0,054	0,062	0,070	0,077	0,083	0,088	0,098
P	5	Ap1 max	0,05 x D	60	–	100	fz	0,019	0,024	0,029	0,035	0,040	0,044	0,048	0,056	0,063	0,070	0,076	0,081	0,091
P	6	Ap1 max	0,04 x D	50	–	75	fz	0,016	0,020	0,025	0,029	0,034	0,037	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	Ap1 max	0,05 x D	90	–	115	fz	0,023	0,030	0,036	0,043	0,050	0,055	0,061	0,070	0,079	0,087	0,095	0,101	0,114
M	2	Ap1 max	0,05 x D	60	–	80	fz	0,019	0,024	0,029	0,035	0,040	0,044	0,048	0,056	0,063	0,070	0,076	0,081	0,091
M	3	Ap1 max	0,05 x D	60	–	70	fz	0,016	0,020	0,025	0,029	0,034	0,037	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	Ap1 max	0,05 x D	120	–	150	fz	0,028	0,036	0,044	0,052	0,060	0,066	0,072	0,083	0,092	0,101	0,108	0,114	0,124
K	2	Ap1 max	0,05 x D	110	–	140	fz	0,023	0,030	0,036	0,043	0,050	0,055	0,061	0,070	0,079	0,087	0,095	0,101	0,114
K	3	Ap1 max	0,05 x D	110	–	130	fz	0,019	0,024	0,029	0,035	0,040	0,044	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	Ap1 max	0,04 x D	50	–	90	fz	0,023	0,030	0,036	0,043	0,050	0,055	0,061	0,070	0,079	0,087	0,095	0,101	0,114
S	2	Ap1 max	0,04 x D	25	–	40	fz	0,013	0,016	0,019	0,023	0,026	0,029	0,032	0,037	0,042	0,046	0,050	0,054	0,061
S	3	Ap1 max	0,05 x D	60	–	80	fz	0,019	0,024	0,029	0,035	0,040	0,044	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	4	Ap1 max	0,05 x D	50	–	60	fz	0,016	0,021	0,026	0,031	0,037	0,041	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	Ap1 max	0,04 x D	80	–	140	fz	0,021	0,027	0,033	0,039	0,045	0,050	0,054	0,062	0,070	0,077	0,083	0,088	0,098
H	2	Ap1 max	0,05 x D	70	–	120	fz	0,016	0,020	0,025	0,029	0,034	0,037	0,040	0,047	0,052	0,057	0,061	0,065	0,071

Recommended feed per tooth (fz = mm/th) for side milling (A).

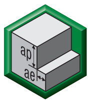
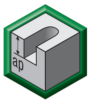
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 026621 • Cermet End Mill

Material Group															
		Side Milling (A)		Cermet			Recommended feed per tooth (fz = mm/th) for side milling (A).								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,05 x D	225	–	300	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	1	Ap1 max	0,05 x D	225	–	300	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	2	Ap1 max	0,05 x D	210	–	285	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	3	Ap1 max	0,05 x D	180	–	240	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
P	4	Ap1 max	0,05 x D	135	–	225	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
P	5	Ap1 max	0,05 x D	90	–	150	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
P	6	Ap1 max	0,04 x D	75	–	112,5	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	Ap1 max	0,05 x D	135	–	172,5	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
M	2	Ap1 max	0,05 x D	90	–	120	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
M	3	Ap1 max	0,05 x D	90	–	105	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	Ap1 max	0,05 x D	180	–	225	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
K	2	Ap1 max	0,05 x D	165	–	210	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
K	3	Ap1 max	0,05 x D	165	–	195	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
N	1	Ap1 max	0,05 x D	750	–	3000	fz	0,060	0,080	0,100	0,120	0,140	0,160	0,180	0,200
N	2	Ap1 max	0,05 x D	750	–	2250	fz	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180
N	3	Ap1 max	0,05 x D	750	–	2250	fz	0,042	0,056	0,070	0,084	0,098	0,112	0,126	0,140
N	4	Ap1 max	0,05 x D	600	–	1125	fz	0,048	0,064	0,080	0,096	0,112	0,128	0,144	0,160
N	5	Ap1 max	0,05 x D	375	–	1500	fz	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180
N	6	Ap1 max	0,05 x D	150	–	1125	fz	0,060	0,080	0,100	0,120	0,140	0,160	0,180	0,200
N	7	Ap1 max	0,05 x D	150	–	1125	fz	0,042	0,056	0,070	0,084	0,098	0,112	0,126	0,140
H	1	Ap1 max	0,04 x D	120	–	210	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
H	2	Ap1 max	0,05 x D	105	–	180	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065

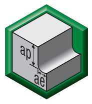
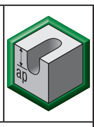
NOTE: No slotting for tools with 8 flutes; for 6 flutes ap 0,15 x D.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 024112

												
		Side Milling (A) and Slotting (B)			K10F-DIA							
					DIA			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.				
		A		B	Cutting Speed — vc m/min				D1 — Diameter			
Material Group		ap	ae	ap	min		max	mm	4,0	6,0	8,0	10,0
N	6	0,7 x D	0,5 x D	0,5 x D	100	–	750	fz	0,040	0,060	0,080	0,100

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Series 024111

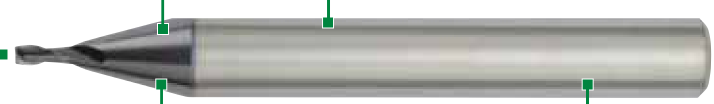
Material Group																
		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0
N	6	0,7 x D	0,5 x D	0,5 x D	100	–	750	fz	0,020	0,030	0,040	0,050	0,060	0,080	0,100	0,120

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Micro Solid Carbide End Mills

Micro solid carbide end mills offer plunging, slotting, profiling, and 3D milling for a wide range of materials and applications. They are designed to provide efficient machining in a wide range of steel, cast iron, copper and copper alloys, and aluminium materials. Micro square and ball nose tools, designed for the most demanding end users, offer exceptional tool life and precision at high speeds and feeds.

- 2-flute ball nose and 2–3 flute cutters with sharp corner.
- Micro tools for a wide range of materials.
- Roughing and finishing in one tool.
- Diameter range from 0.4–3mm.



Micro Solid Carbide End Mills

- Increases your manufacturing flexibility and cost efficiency.
- Suitable for roughing and finishing.
- Rigid shank gives extra toughness and strength.

423007 023007 Series

- Diameter range 0,4–3,0mm.
- Steels, stainless steels, cast iron, and non-ferrous.
- Centre cut ball nose.
- Available coated and uncoated.

4633 Series

- Wide range of diameters from 0,4–3mm.
- Medium steel, aluminium, copper, and cast iron.
- Centre cut.
- Available coated and uncoated.
- Rigid shank gives extra toughness and strength.

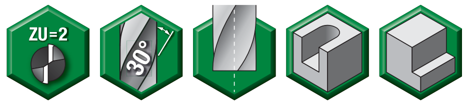
4632 Series

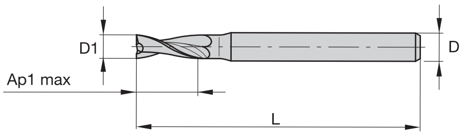
- Wide range of diameters from 0,4–2mm.
- Medium steel, aluminium, copper, and cast iron.
- Centre cut.
- Available coated and uncoated.

4651 Series

- Ball nose tool in range of diameter from 1–2mm with 3mm shank.
- Medium steel, aluminium, copper, and cast iron.
- Centre cut ball nose.
- Available coated and uncoated.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 023007 423007

grade K30F uncoated

P	●
M	○
K	○
N	
S	
H	

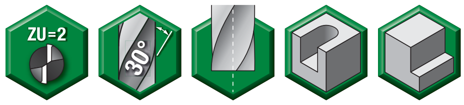
grade K30F-DCHP AlTiN

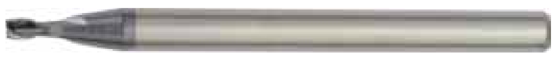
P	●
M	●
K	●
N	●
S	○
H	●

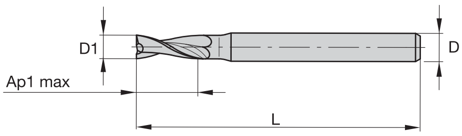
● first choice
○ alternate choice

grade K30F uncoated order #	grade K30F uncoated catalogue #	grade K30F-DCHP AlTiN order #	grade K30F-DCHP AlTiN catalogue #	D1	D	length of cut Ap1 max	length L
2333055	023007-000004	2343368	423007-000004	0,4	3	0,80	38
2333056	023007-000005	2343370	423007-000005	0,5	3	1,00	38
2333057	023007-000006	2343372	423007-000006	0,6	3	1,20	38
2333058	023007-000008	2343374	423007-000008	0,8	3	1,60	38
2333060	023007-000010	2343376	423007-000010	1,0	3	2,00	38
2333061	023007-000012	2343378	423007-000012	1,2	3	2,40	38
2333064	023007-000015	2343380	423007-000015	1,5	3	3,00	38
2333067	023007-000018	2343382	423007-000018	1,8	3	3,60	38
2333069	023007-000020	2343384	423007-000020	2,0	3	6,00	38
2333070	023007-000025	2343386	423007-000025	2,5	3	7,00	38
2333071	023007-000030	2343388	423007-000030	3,0	3	7,00	38

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



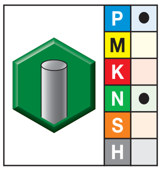


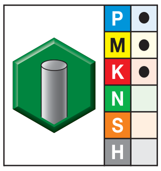


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

■ Series 4632

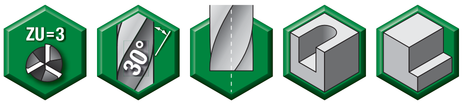


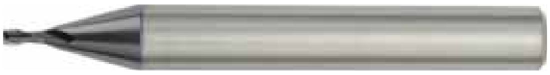


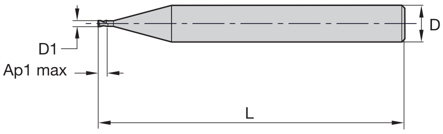
● first choice
○ alternate choice

grade UNCOATED order #	grade UNCOATED catalogue #	grade TiAlN-RT TiAlN order #	grade TiAlN-RT TiAlN catalogue #	D1	D	length of cut Ap1 max	length L
1656841	463200400..	1602266	463200400RT	0,4	3	1,50	38
1656844	463200500..	1602268	463200500RT	0,5	3	1,50	38
1656849	463200600..	1602270	463200600RT	0,6	3	1,50	38
1656853	463200800..	1602273	463200800RT	0,8	3	1,50	38
1656858	463201000..	1602274	463201000RT	1,0	3	2,00	38
1656863	463201500..	1602275	463201500RT	1,5	3	2,00	38
1656867	463202000..	–		2,0	3	8,00	38

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



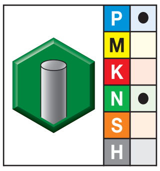


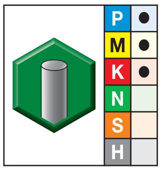


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4633

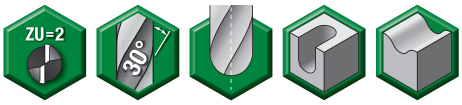


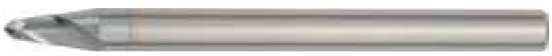


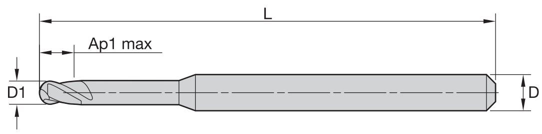
● first choice
○ alternate choice

grade UNCOATED order #	grade UNCOATED catalogue #	grade TiAlN-RT TiAlN order #	grade TiAlN-RT TiAlN catalogue #	D1	D	length of cut Ap1 max	length L
1656873	463300400..	1656875	463300400RT	0,4	3	1,50	38
1656878	463300500..	1656880	463300500RT	0,5	3	1,50	38
1656883	463300600..	1656885	463300600RT	0,6	3	1,50	38
1656888	463300800..	1656890	463300800RT	0,8	3	1,50	38
1656893	463301000..	1656895	463301000RT	1,0	3	2,00	38
1656898	463301200..	1656900	463301200RT	1,2	3	2,00	38
1656901	463301500..	1656903	463301500RT	1,5	3	2,00	38
1656906	463301800..	1656908	463301800RT	1,8	3	2,00	38
1656909	463302000..	1656910	463302000RT	2,0	3	8,00	38
	–	1656913	463302500RT	2,5	3	9,00	38
	–	1656916	463303000RT	3,0	3	12,00	38

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.







End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

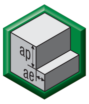
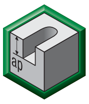
Series 4651

	grade UNCOATED	grade TiCN-CT TiCN	grade TiAlN-RT TiAlN
P	●	●	●
M		●	●
K		●	●
N	●	●	
S			
H			

● first choice
○ alternate choice

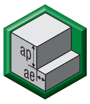
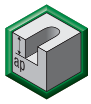
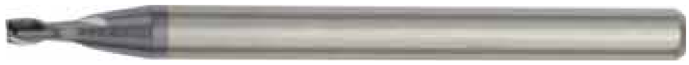
grade UNCOATED order #	grade UNCOATED catalogue #	grade TiCN-CT TiCN order #	grade TiCN-CT TiCN catalogue #	grade TiAlN-RT TiAlN order #	grade TiAlN-RT TiAlN catalogue #	D1	D	length of cut Ap1 max	length L
1656950	465101000..	1656951	465101000CT	1611066	465101000RT	1,0	3	2,00	38
1656952	465101200..	1656953	465101200CT	1656954	465101200RT	1,2	3	2,00	38
1656955	465101500..	1656956	465101500CT	1656957	465101500RT	1,5	3	2,00	38
	–	1656959	465101800CT	1656960	465101800RT	1,8	3	2,00	38
1656971	465102000..	1656972	465102000CT	1602538	465102000RT	2,0	3	2,00	38

Series 023007 423007

Material Group		Side Milling (A) and Slotting (B) 			K30F uncoated			K30F - DCHP AlTiN			 Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	min		max	mm	0,4	0,5	0,6	0,8	1,0	1,2	1,5	1,8	2,0	2,5	3,0
P	0	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,003	0,004	0,004	0,006	0,007	0,009	0,011	0,014	0,015	0,019	0,023
P	1	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,003	0,004	0,004	0,006	0,007	0,009	0,011	0,014	0,015	0,019	0,023
P	2	1 x D	0,1 x D	0,25 x D	70	–	95	140	–	190	fz	0,003	0,004	0,004	0,006	0,007	0,009	0,011	0,014	0,015	0,019	0,023
P	3	1 x D	0,1 x D	0,25 x D	60	–	80	120	–	160	fz	0,002	0,003	0,004	0,005	0,006	0,007	0,009	0,011	0,012	0,016	0,019
P	4	1 x D	0,1 x D	0,25 x D	–	–	–	90	–	150	fz	0,002	0,003	0,003	0,005	0,006	0,007	0,009	0,010	0,012	0,014	0,017
P	5	1 x D	0,1 x D	0,25 x D	–	–	–	60	–	100	fz	0,002	0,003	0,003	0,004	0,005	0,006	0,008	0,009	0,010	0,013	0,016
M	1	1 x D	0,1 x D	0,25 x D	45	–	57,5	90	–	115	fz	0,002	0,003	0,004	0,005	0,006	0,007	0,009	0,011	0,012	0,016	0,019
M	2	1 x D	0,1 x D	0,25 x D	–	–	–	60	–	80	fz	0,002	0,003	0,003	0,004	0,005	0,006	0,008	0,009	0,010	0,013	0,016
K	1	1 x D	0,1 x D	0,25 x D	60	–	75	120	–	150	fz	0,003	0,004	0,004	0,006	0,007	0,009	0,011	0,014	0,015	0,019	0,023
K	2	1 x D	0,1 x D	0,25 x D	–	–	–	110	–	140	fz	0,002	0,003	0,004	0,005	0,006	0,007	0,009	0,011	0,012	0,016	0,019
N	1	1 x D	0,1 x D	0,25 x D	250	–	1000	500	–	2000	fz	0,004	0,006	0,007	0,009	0,011	0,013	0,017	0,020	0,022	0,028	0,033
N	2	1 x D	0,1 x D	0,25 x D	250	–	750	500	–	1500	fz	0,004	0,005	0,006	0,008	0,010	0,012	0,015	0,018	0,020	0,025	0,030
N	5	1 x D	0,1 x D	0,25 x D	125	–	500	250	–	1000	fz	0,004	0,005	0,006	0,008	0,010	0,012	0,015	0,018	0,020	0,025	0,030
S	1	1 x D	0,1 x D	0,25 x D	–	–	–	50	–	90	fz	0,002	0,003	0,004	0,005	0,006	0,007	0,009	0,011	0,012	0,016	0,019
S	2	1 x D	0,1 x D	0,25 x D	–	–	–	25	–	40	fz	0,001	0,002	0,002	0,003	0,003	0,004	0,005	0,006	0,007	0,009	0,010
S	3	1 x D	0,1 x D	0,25 x D	–	–	–	60	–	80	fz	0,002	0,003	0,003	0,004	0,005	0,006	0,008	0,009	0,010	0,013	0,016
S	4	1 x D	0,1 x D	0,25 x D	–	–	–	50	–	60	fz	0,001	0,002	0,002	0,003	0,004	0,005	0,006	0,007	0,008	0,010	0,013
H	1	1 x D	0,1 x D	0,25 x D	–	–	–	80	–	140	fz	0,002	0,003	0,003	0,005	0,006	0,007	0,009	0,010	0,012	0,014	0,017

*NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.*

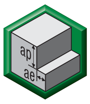
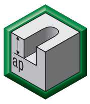
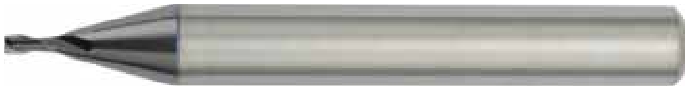
Series 4632

Material Group		Side Milling (A) and Slotting (B)			uncoated			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		 A		 B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	min		max	mm	0,4	0,5	0,6	0,8	1,0	1,5	2,0
P	0	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,003	0,004	0,004	0,006	0,007	0,011	0,015
P	1	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,003	0,004	0,004	0,006	0,007	0,011	0,015
P	2	1 x D	0,1 x D	0,25 x D	–	–	–	140	–	190	fz	0,003	0,004	0,004	0,006	0,007	0,011	0,015
P	3	1 x D	0,1 x D	0,25 x D	–	–	–	120	–	160	fz	0,002	0,003	0,004	0,005	0,006	0,009	0,012
P	4	1 x D	0,1 x D	0,25 x D	–	–	–	90	–	150	fz	0,002	0,003	0,003	0,005	0,006	0,009	0,012
M	1	1 x D	0,1 x D	0,25 x D	–	–	–	90	–	115	fz	0,002	0,003	0,004	0,005	0,006	0,009	0,012
M	2	1 x D	0,1 x D	0,25 x D	–	–	–	60	–	80	fz	0,002	0,003	0,003	0,004	0,005	0,008	0,010
K	1	1 x D	0,1 x D	0,25 x D	–	–	–	120	–	150	fz	0,003	0,004	0,004	0,006	0,007	0,011	0,015
K	2	1 x D	0,1 x D	0,25 x D	–	–	–	110	–	140	fz	0,002	0,003	0,004	0,005	0,006	0,009	0,012
N	1	1 x D	0,1 x D	0,25 x D	250	–	1000	500	–	2000	fz	0,004	0,006	0,007	0,009	0,011	0,017	0,022
N	2	1 x D	0,1 x D	0,25 x D	250	–	750	500	–	1500	fz	0,004	0,005	0,006	0,008	0,010	0,015	0,020
N	5	1 x D	0,1 x D	0,25 x D	125	–	400	250	–	1000	fz	0,004	0,005	0,006	0,008	0,010	0,015	0,020

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

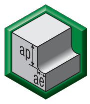
WIDIA HANITA

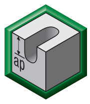
Series 4633

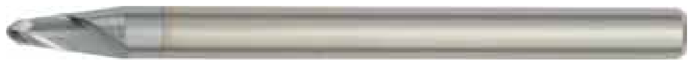
Material Group																						
		Side Milling (A) and Slotting (B)			uncoated			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	min		max	mm	0,4	0,5	0,6	0,8	1,0	1,2	1,5	1,8	2,0	2,5	3,0
P	0	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,030	0,037	0,045	0,060	0,075	0,090	0,113	0,136	0,152	0,191	0,231
	1	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,030	0,037	0,045	0,060	0,075	0,090	0,113	0,136	0,152	0,191	0,231
	2	1 x D	0,1 x D	0,25 x D	–	–	–	140	–	190	fz	0,030	0,037	0,045	0,060	0,075	0,090	0,113	0,136	0,152	0,191	0,231
	3	1 x D	0,1 x D	0,25 x D	–	–	–	120	–	160	fz	0,024	0,030	0,036	0,049	0,061	0,074	0,092	0,111	0,124	0,157	0,190
	4	1 x D	0,1 x D	0,25 x D	–	–	–	90	–	150	fz	0,023	0,028	0,034	0,045	0,057	0,069	0,086	0,104	0,115	0,145	0,175
M	1	1 x D	0,1 x D	0,25 x D	–	–	–	90	–	115	fz	0,024	0,030	0,036	0,049	0,061	0,074	0,092	0,111	0,124	0,157	0,190
	2	1 x D	0,1 x D	0,25 x D	–	–	–	60	–	80	fz	0,020	0,025	0,031	0,041	0,051	0,062	0,077	0,093	0,103	0,130	0,157
K	1	1 x D	0,1 x D	0,25 x D	–	–	–	120	–	150	fz	0,030	0,037	0,045	0,060	0,075	0,090	0,113	0,136	0,152	0,191	0,231
	2	1 x D	0,1 x D	0,25 x D	–	–	–	110	–	140	fz	0,024	0,030	0,036	0,049	0,061	0,074	0,092	0,111	0,124	0,157	0,190
N	1	1 x D	0,1 x D	0,25 x D	250	–	1000	500	–	2000	fz	0,044	0,055	0,066	0,088	0,110	0,132	0,165	0,198	0,220	0,275	0,330
	2	1 x D	0,1 x D	0,25 x D	250	–	750	500	–	1500	fz	0,040	0,050	0,059	0,079	0,099	0,119	0,149	0,178	0,198	0,248	0,297
	5	1 x D	0,1 x D	0,25 x D	125	–	400	250	–	1000	fz	0,040	0,050	0,059	0,079	0,099	0,119	0,149	0,178	0,198	0,248	0,297

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Series 4651







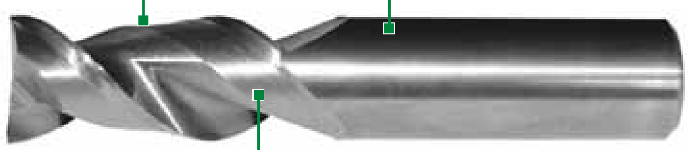
Material Group		Side Milling (A) and Slotting (B): A		B	uncoated: Cutting Speed — vc m/min			TiAlN: Cutting Speed — vc m/min			TiCN: Cutting Speed — vc m/min			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.	D1 — Diameter				
		ap	ae	ap	min		max	min		max	min		max	mm	1,0	1,2	1,5	1,8	2,0
P	0	0,5 x D	0,5 x D	0,5 x D	75	–	100	150	–	200	120	–	160	fz	0,007	0,009	0,011	0,014	0,015
P	1	0,5 x D	0,5 x D	0,5 x D	75	–	100	150	–	200	120	–	160	fz	0,007	0,009	0,011	0,014	0,015
P	2	0,5 x D	0,5 x D	0,5 x D	–	–	–	140	–	190	112	–	152	fz	0,007	0,009	0,011	0,014	0,015
P	3	0,3 x D	0,3 x D	0,3 x D	–	–	–	120	–	160	96	–	128	fz	0,006	0,007	0,009	0,011	0,012
P	4	0,3 x D	0,3 x D	0,3 x D	–	–	–	90	–	150	72	–	120	fz	0,006	0,007	0,009	0,010	0,012
M	1	0,3 x D	0,3 x D	0,3 x D	–	–	–	90	–	115	72	–	92	fz	0,006	0,007	0,009	0,011	0,012
M	2	0,3 x D	0,3 x D	0,3 x D	–	–	–	60	–	80	48	–	64	fz	0,005	0,006	0,008	0,009	0,010
K	1	0,5 x D	0,5 x D	0,5 x D	–	–	–	120	–	150	96	–	120	fz	0,007	0,009	0,011	0,014	0,015
K	2	0,5 x D	0,5 x D	0,5 x D	–	–	–	110	–	140	88	–	112	fz	0,006	0,007	0,009	0,011	0,012
N	1	0,5 x D	0,5 x D	0,5 x D	250	–	1000	500	–	2000	400	–	1600	fz	0,011	0,013	0,017	0,020	0,022
N	2	0,5 x D	0,5 x D	0,5 x D	250	–	750	500	–	1500	400	–	1200	fz	0,010	0,012	0,015	0,018	0,020
N	5	0,5 x D	0,5 x D	0,5 x D	125	–	400	250	–	1000	200	–	800	fz	0,010	0,012	0,015	0,018	0,020

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

AluSurf Aluminium

AluSurf provides extraordinary Metal Removal Rates (MRR) by combining roughing and finishing operations for any aluminium plunging, slotting, and profiling application. Its proprietary flute geometry is designed for rigidity and improved chip evacuation generating exceptional wall-to-floor perpendicularity, even in thin wall applications. To ensure a superior floor surface finish the AluSurf front geometry is equipped with a wiper facet grind.

- One tool for roughing and finishing operations.
- Slotting depths up to 1 x D and peripheral milling up to 1.5 x D axially at 0.5 x D radially.
- Unequal flute spacing for chatter-free performance, (3-flute series only).
- Multiple corner radii and extended neck configurations available as standard.

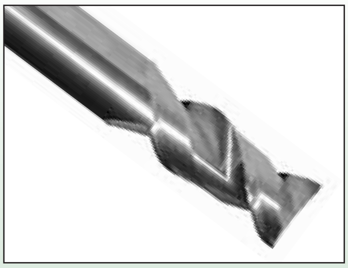


AluSurf™ Series

- Increase your output due to less tool changes and increased Metal Removal Rates (MRR).
- No specific tools for roughing and finishing necessary.
- Less passes due to 1 x D slotting capability.
- Perfect for MQL (Minimum Quantity Lubrication) methods.

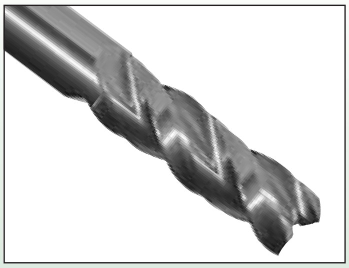
5102 Series

- 2-flute, 45° helix.
- Radii and sharp corner configuration.



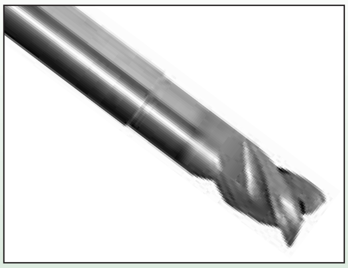
5103 Series

- 3-flute, 38° helix.
- Unequal flute spacing.
- Radii and sharp corner configuration.



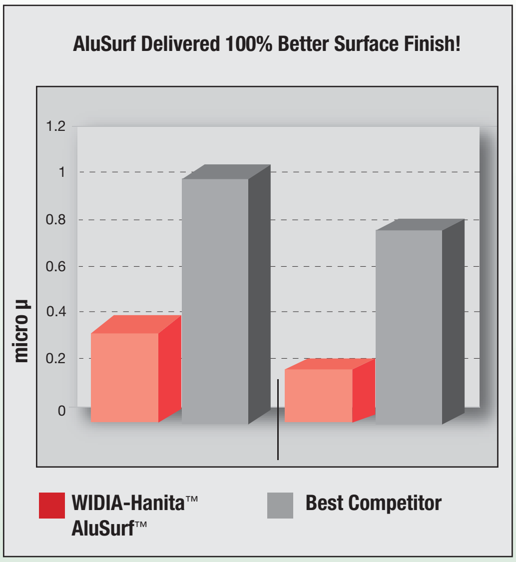
51N3 Series

- 3-flute, 38° helix.
- Unequal flute spacing.
- Extended neck for long-reach applications.
- Radii and sharp corner configuration.

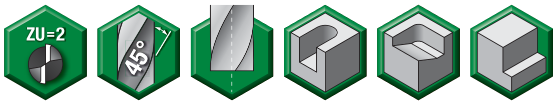


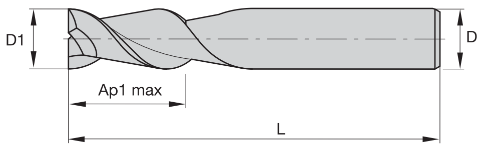
Operation Slotting
Customer: Aluminium Block
Material: 6061 Aluminium
Workpiece: AluSurf solid carbide end mill.
Results: 100% better surface finish on walls and floor.

	COMPETITOR	WIDIA-Hanita™
tool:	uncoated tools	uncoated tools
end mill:	16mm 3-flute	16mm 3-flute
material:	aluminium	aluminium
depth of cut (ap):	8mm	8mm
width of cut (ae):	8mm	8mm
speed (Vc):	610 m/min	610 m/min
RPM (N):	12,000 RPM	12,000 RPM
feed rate (Vf):	3,600 mm/min	3,600 mm/min
chip load per tooth (Fz):	0,1 mm/th	0,1 mm/th
metal removal rate:	230 cm³/min	230 cm³/min



- Centre cutting.
- Wiper facet design for improved floor finishes.
- Standard items listed. Additional styles and coatings made-to-order.

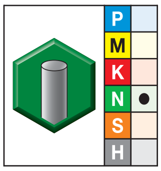




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	0/0,006	≤ 3	0/0,006
> 3–6	0/0,008	> 3–6	0/0,008
> 6–10	0/0,009	> 6–10	0/0,009
> 10–18	0/0,011	> 10–18	0/0,011
> 18–30	0/0,013	> 18–30	0/0,013

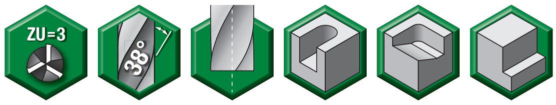
Series 5102 • AluSurf

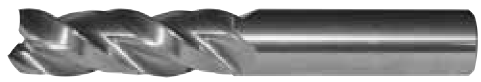


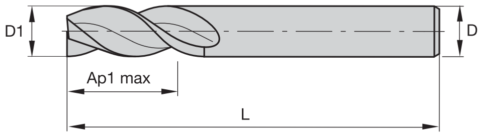
● first choice
○ alternate choice

grade UNCOATED					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
3484680	510201500..	1,5	3	6,00	38
3484681	510202000..	2,0	3	8,00	38
3484682	510202500..	2,5	3	9,00	38
3484683	510203000..	3,0	3	12,00	38
3107860	510204001..	4,0	4	12,00	50
3484684	510205001..	5,0	5	14,00	50
3484685	510205002..	5,0	6	14,00	50
3107859	510206002..	6,0	6	16,00	50
3484686	510208003..	8,0	8	20,00	63
3484687	510210004..	10,0	10	22,00	76
3484688	510212005..	12,0	12	25,00	76
3484689	510214014..	14,0	14	32,00	83
3484690	510216006..	16,0	16	32,00	89
3484691	510218018..	18,0	18	38,00	100
3484692	510220007..	20,0	20	38,00	104

- Centre cutting.
- Unequal flute spacing.
- Wiper facet design for improved floor finishes.
- Standard items listed. Additional styles and coatings made-to-order.



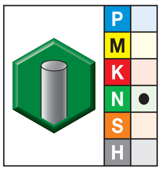




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	0/0,006	≤ 3	0/0,006
> 3–6	0/0,008	> 3–6	0/0,008
> 6–10	0/0,009	> 6–10	0/0,009
> 10–18	0/0,011	> 10–18	0/0,011
> 18–30	0/0,013	> 18–30	0/0,013

■ Series 5103 • AluSurf

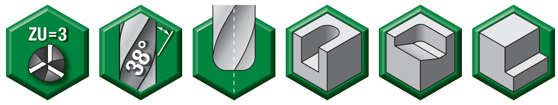


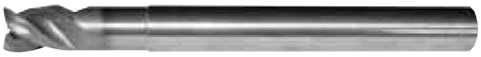
● first choice
○ alternate choice

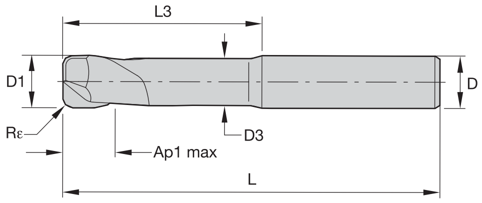
grade UNCOATED

order #	catalogue #	D1	D	length of cut Ap1 max	length L
3484693	510303000..	3,0	3	12,00	38
3484694	510304001..	4,0	4	12,00	50
3484695	510305001..	5,0	5	14,00	50
3484696	510306002..	6,0	6	16,00	50
3484697	510308003..	8,0	8	20,00	63
3484698	510310004..	10,0	10	22,00	76
3484699	510312005..	12,0	12	25,00	76
3484700	510314014..	14,0	14	32,00	83
3350935	510316006..	16,0	16	32,00	89
3484701	510318018..	18,0	18	38,00	100
3484702	510320007..	20,0	20	38,00	104

- Centre cutting.
- Unequal flute spacing.
- Wiper facet design for improved floor finishes.
- Standard items listed. Additional styles and coatings made-to-order.



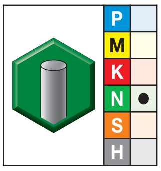




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	0/0,006	≤ 3	0/0,006
> 3–6	0/0,008	> 3–6	0/0,008
> 6–10	0/0,009	> 6–10	0/0,009
> 10–18	0/0,011	> 10–18	0/0,011
> 18–30	0/0,013	> 18–30	0/0,013

Series 51N3 • AluSurf

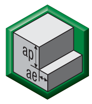


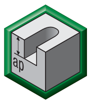
grade UNCOATED

● first choice
○ alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
3484705	**51N306022..**	6,0	6	5,40	9,00	18,00	63	0,20
3484703	**51N306002..**	6,0	6	5,40	9,00	18,00	63	0,50
3484704	**51N306012..**	6,0	6	5,40	9,00	18,00	63	1,00
3484708	**51N308023..**	8,0	8	7,20	12,00	24,00	76	0,20
3484706	**51N308003..**	8,0	8	7,20	12,00	24,00	76	0,50
3484707	**51N308013..**	8,0	8	7,20	12,00	24,00	76	1,00
3484711	**51N310024..**	10,0	10	9,00	15,00	30,00	89	0,20
3484709	**51N310004..**	10,0	10	9,00	15,00	30,00	89	0,50
3484710	**51N310014..**	10,0	10	9,00	15,00	30,00	89	1,50
3484714	**51N312025..**	12,0	12	10,80	18,00	36,00	100	0,20
3484712	**51N312005..**	12,0	12	10,80	18,00	36,00	100	0,50
3484713	**51N312015..**	12,0	12	10,80	18,00	36,00	100	1,50
3484718	**51N316036..**	16,0	16	14,40	24,00	48,00	110	0,20
3484715	**51N316006..**	16,0	16	14,40	24,00	48,00	110	0,50
3484716	**51N316016..**	16,0	16	14,40	24,00	48,00	110	1,00
3484717	**51N316026..**	16,0	16	14,40	24,00	48,00	110	2,00
3484722	**51N320037..**	20,0	20	18,80	30,00	60,00	125	0,20
3484719	**51N320007..**	20,0	20	18,80	30,00	60,00	125	0,50
3484720	**51N320017..**	20,0	20	18,80	30,00	60,00	125	1,50
3484721	**51N320027..**	20,0	20	18,80	30,00	60,00	125	4,00

Series 5102 • AluSurf



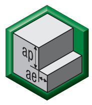


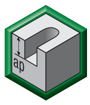
Material Group		For Side Milling (A) and Slotting (B)			uncoated				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	1,5	2,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,014	0,018	0,036	0,054	0,072	0,090	0,108	0,144	0,180
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,012	0,016	0,032	0,049	0,065	0,081	0,097	0,130	0,162

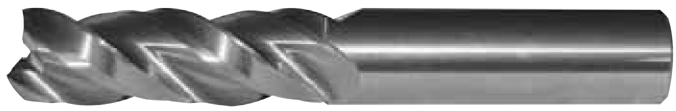
NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Application Data • Series 5103 • AluSurf™

Series 5103 • AluSurf





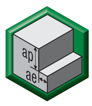


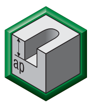
Material Group		For Side Milling (A) and Slotting (B)			uncoated				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	3,0	6,0	8,0	10,0	12,0	16,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,027	0,054	0,072	0,090	0,108	0,144	0,180
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,024	0,049	0,065	0,081	0,097	0,130	0,162

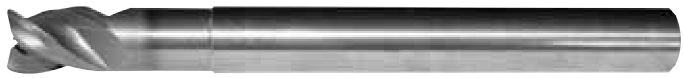
NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Application Data • Series 51N3 • AluSurf™

Series 51N3 • AluSurf







Material Group		For Side Milling (A) and Slotting (B)			uncoated				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.					
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
N	1	1 x D	0,5 x D	1 x D	500	–	2000	fz	0,060	0,080	0,100	0,120	0,160	0,200
	2	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,054	0,072	0,090	0,108	0,144	0,180

NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

HP Aluminium End Mills Series

WIDIA™ solid carbide end mills provide maximum Metal Removal Rates (MRR) and superior surface quality while reducing machining time in aluminium. The centre cutting design allows for plunging, slotting, and profiling applications in any type of aluminium workpiece materials. The proprietary flute geometry is designed to deliver exceptional chip evacuation while generating floor-to-wall straightness, especially thin wall applications. With many styles to choose from, you can be sure WIDIA will have a solution for your non-ferrous applications.

- One tool for roughing and finishing operations.
- Capable of slotting depths up to 1 x D and side milling up to 1.5 x D axially at 0.5 x D radially (please follow application data for specific tool).
- Multiple corner radii and extended neck configurations available as standard.

HP Aluminium End Mills Series

- Increase your output due to less tool changes and increased Metal Removal Rates (MRR).
- No specific tools for roughing and finishing necessary.
- Less passes due to 1 x D slotting capability.
- Perfect for MQL (Minimum Quantity Lubrication) applications.

524149/022849 Series

- 1-flute, 30° helix.
- DLC coated option for abrasive aluminium and carbon.
- Uncoated for aluminium.
- Sharp corner configuration.

D502 Series

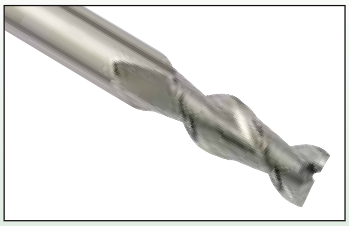
- 2-flute, 30° helix.
- TiAlN coated.
- Sharp corner configuration.

022814/422814/022817/422817 Series

- 2-flute, 45° helix.
- TiAlN coated option.
- Sharp corner configuration.

4102 Series

- 2-flute, 45° helix.
- Sharp corner configuration.



022852/524152 Series

- 2-flute, 45° helix.
- Unequal-flute spacing.
- DLC coated option for abrasive aluminium and carbon.
- Extended neck for long-reach applications.

024101 Series

- 2-flute, 0° helix.
- PCD tipped for aluminium, copper and carbon/graphite compositions.
- Sharp corner configuration.

4103 Series

- 3-flute, 37° helix.
- TiCN coated option.
- Sharp corner configuration.

4909 Series

- 3-flute, 40° helix.
- Coarse cord style roughing profile.
- Protective chamfer configuration.

4979 Series

- 3-flute, 40° helix.
- TiCN coated option.
- Chamfer pitch roughing profile.
- Protective chamfer configuration.

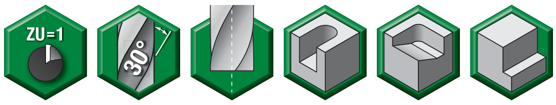
49N9 Series

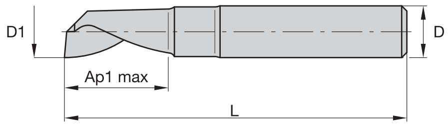
- 3-flute, 40° helix.
- Coarse cord style roughing profile.
- Protective chamfer configuration.
- Extended neck for long-reach applications.

49G9 Series

- 3-flute, 40° helix.
- TiCN coated option.
- Coarse cord style roughing profile.
- Protective chamfer configuration.
- Internal coolant for improved chip evacuation and higher tool life.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

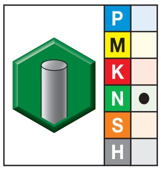




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

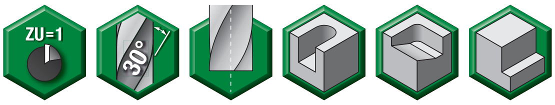
Series 524149

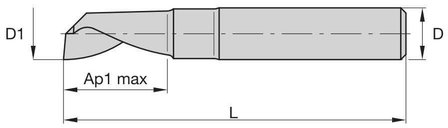


● first choice
○ alternate choice

grade K10F-DCL DLC order #	catalogue #	D1	D	length of cut Ap1 max	length L
2651100	524149-000030	3,0	6	12,00	50
2651314	524149-000040	4,0	6	15,00	60
2651317	524149-000050	5,0	6	17,00	60
2651318	524149-000060	6,0	6	20,00	60
2651319	524149-000080	8,0	10	25,00	75
2651320	524149-000100	10,0	8	25,00	75
2651321	524149-000120	12,0	12	25,00	75

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

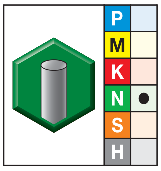




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

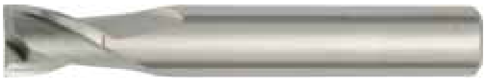
Series 022849

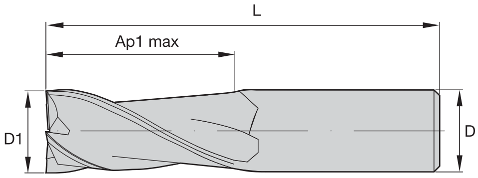


● first choice
○ alternate choice

grade K10F uncoated order #	catalogue #	D1	D	length of cut Ap1 max	length L
2281545	022849-000020	2,0	2	10,00	40
2281546	022849-000030	3,0	3	10,00	40
2281547	022849-000040	4,0	4	14,00	50
2281548	022849-000050	5,0	5	16,00	60
2281549	022849-000060	6,0	6	20,00	60
2281550	022849-000080	8,0	8	25,00	75
2281551	022849-000100	10,0	10	25,00	75
2281552	022849-000120	12,0	12	25,00	75

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

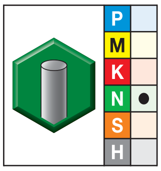


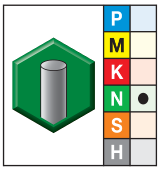


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D502

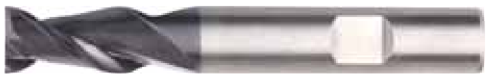


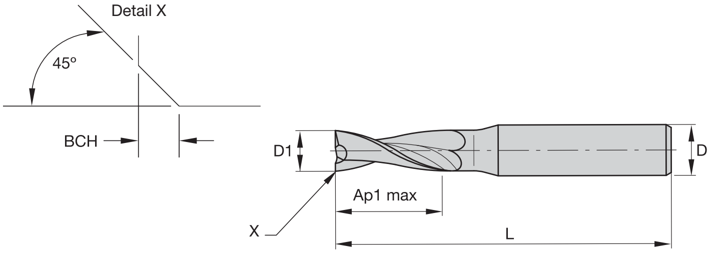


● first choice
○ alternate choice

grade UNCOATED order #	grade UNCOATED catalogue #	grade TiAlN-RT TiAlN order #	grade TiAlN-RT TiAlN catalogue #	D1	D	length of cut Ap1 max	length L
1661526	D50203002..	1602233	D50203002RT	3,0	6	4,00	50
1661530	D50204002..	1602235	D50204002RT	4,0	6	5,00	54
1661534	D50205002..	1602236	D50205002RT	5,0	6	6,00	54
1661538	D50206002..	1661540	D50206002RT	6,0	6	7,00	54
1661543	D50208003..	1602239	D50208003RT	8,0	8	9,00	58
1661547	D50210004..	1602240	D50210004RT	10,0	10	11,00	66
1661551	D50212005..	1602251	D50212005RT	12,0	12	12,00	73
1661555	D50214014..		–	14,0	14	14,00	75
1661560	D50216006..	1602252	D50216006RT	16,0	16	16,00	82
1661569	D50220007..		–	20,0	20	20,00	92

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

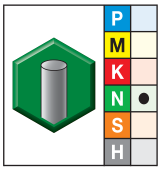


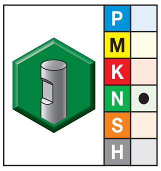


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 022814 022817



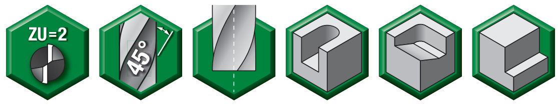


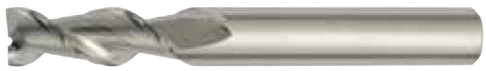
● first choice
○ alternate choice

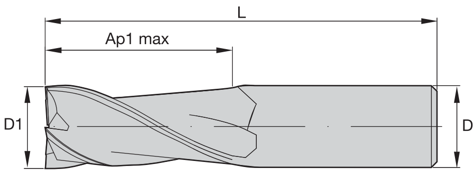
grade K10F uncoated		grade K10F uncoated						
order #	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**length of cut Ap1 max**	**length L**	**BCH**
2332369	022814-000040	2332410	022817-000040	4,0	6	8,00	57	0,10
2332370	022814-000050	2332411	022817-000050	5,0	6	10,00	57	0,10
2332371	022814-000060	2332412	022817-000060	6,0	6	10,00	57	0,10
2332372	022814-000080	2332413	022817-000080	8,0	8	16,00	63	0,10
2332373	022814-000100	2332414	022817-000100	10,0	10	19,00	72	0,10
2332374	022814-000120	2332415	022817-000120	12,0	12	22,00	83	0,20
2332375	022814-000140	2332416	022817-000140	14,0	14	22,00	83	0,20
2332376	022814-000160	2332417	022817-000160	16,0	16	26,00	92	0,20
2332377	022814-000180	2332418	022817-000180	18,0	18	26,00	92	0,20
2332378	022814-000200	2332419	022817-000200	20,0	20	32,00	104	0,20

WIDIA HANITA

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



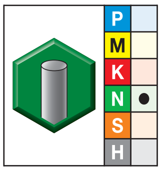




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	0/0,006	≤ 3	0/0,006
> 3–6	0/0,008	> 3–6	0/0,008
> 6–10	0/0,009	> 6–10	0/0,009
> 10–18	0/0,011	> 10–18	0/0,011
> 18–30	0/0,013	> 18–30	0/0,013

Series 4102

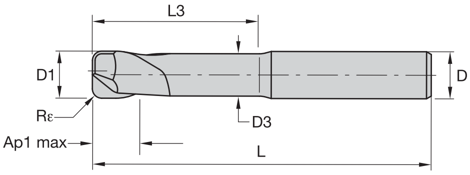


grade UNCOATED

● first choice
○ alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L
1656432	**410201000..**	1,0	3	4,00	38
1656436	**410201500..**	1,5	3	6,00	38
1656440	**410202000..**	2,0	3	8,00	38
1656444	**410202500..**	2,5	3	9,00	38
1656448	**410203000..**	3,0	3	12,00	38
1656454	**410204001..**	4,0	4	12,00	50
1656458	**410205001..**	5,0	5	14,00	50
1656459	**410205002..**	5,0	6	14,00	50
1656464	**410206002..**	6,0	6	16,00	50
1656468	**410208003..**	8,0	8	20,00	63
1656473	**410210004..**	10,0	10	22,00	76
1656478	**410212005..**	12,0	12	25,00	76
1656484	**410214014..**	14,0	14	32,00	83
1656488	**410216006..**	16,0	16	32,00	89
1656492	**410218018..**	18,0	18	38,00	100
1656496	**410220007..**	20,0	20	38,00	104

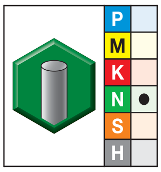
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

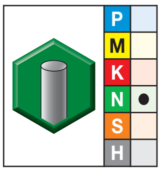


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 022852 524152

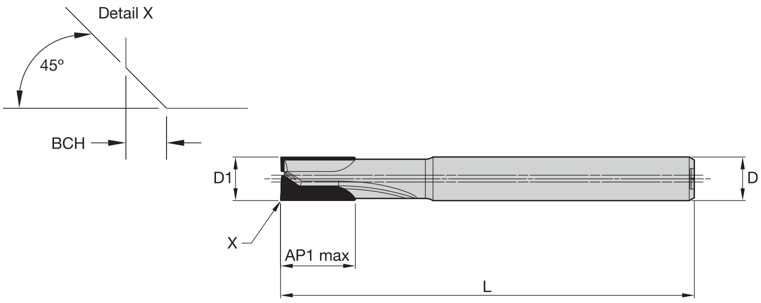




● first choice
○ alternate choice

grade K10F uncoated order #	grade K10F uncoated catalogue #	grade K10F-DCL DLC order #	grade K10F-DCL DLC catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2635004	022852-003005	2635131	524152-003005	3,0	6	2,80	7,00	16,00	57	0,50
2635006	022852-004005	2635153	524152-004005	4,0	6	3,80	8,00	16,00	57	0,50
2635010	022852-004010	2635155	524152-004010	4,0	6	3,80	8,00	16,00	57	1,00
2635063	022852-005005	2635156	524152-005005	5,0	6	4,70	10,00	16,00	57	0,50
2635065	022852-005010	2635157	524152-005010	5,0	6	4,70	10,00	16,00	57	1,00
2635068	022852-006005	2635158	524152-006005	6,0	6	5,70	10,00	19,00	57	0,50
2635072	022852-006010	2635161	524152-006010	6,0	6	5,70	10,00	19,00	57	1,00
2635094	022852-006020	2635162	524152-006020	6,0	6	5,70	10,00	19,00	57	2,00
2635097	022852-008005	2635173	524152-008005	8,0	8	7,70	16,00	25,00	63	0,50
2635100	022852-008010	2635175	524152-008010	8,0	8	7,70	16,00	25,00	63	1,00
2635101	022852-008020	2635176	524152-008020	8,0	8	7,70	16,00	25,00	63	2,00
2635103	022852-010005	2635180	524152-010005	10,0	10	9,70	19,00	30,00	72	0,50
2635104	022852-010010	2635181	524152-010010	10,0	10	9,70	19,00	30,00	72	1,00
2635107	022852-010020	2635193	524152-010020	10,0	10	9,70	19,00	30,00	72	2,00
2635109	022852-012005	2635344	524152-012005	12,0	12	11,70	22,00	36,00	83	0,50
2635110	022852-012010	–		12,0	12	11,70	22,00	36,00	83	1,00
2635124	022852-012020	2635348	524152-012020	12,0	12	11,70	22,00	36,00	83	2,00
2635127	022852-016005	2635349	524152-016005	16,0	16	15,70	26,00	42,00	92	0,50
2635128	022852-016010	2635350	524152-016010	16,0	16	15,70	26,00	42,00	92	1,00
2635129	022852-016020	2635351	524152-016020	16,0	16	15,70	26,00	42,00	92	2,00
2635130	022852-016030	2635383	524152-016030	16,0	16	15,70	26,00	42,00	92	3,00

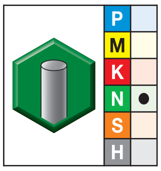
- Centre cutting.
- PCD tipped.
- Through coolant.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
All	+0,03/-0,03	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 024101

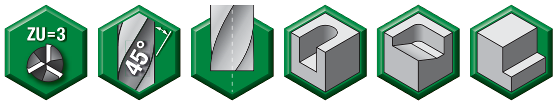


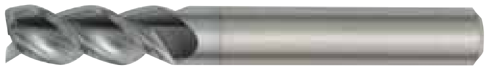
	P	M	K	N	S	H
grade UNCOATED Diamond				●		

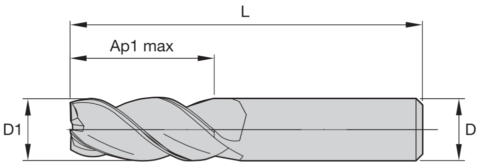
● first choice
○ alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2333086	024101-000060	6,0	6	10,00	57	0,08
2333087	024101-000080	8,0	8	15,00	63	0,10
2333088	024101-000100	10,0	10	15,00	72	0,12

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



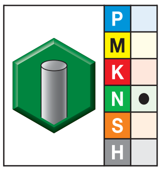


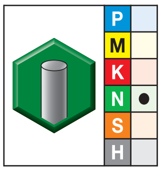


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	0/0,006	≤ 3	0/0,006
> 3–6	0/0,008	> 3–6	0/0,008
> 6–10	0/0,009	> 6–10	0/0,009
> 10–18	0/0,011	> 10–18	0/0,011
> 18–30	0/0,013	> 18–30	0/0,013

Series 4103



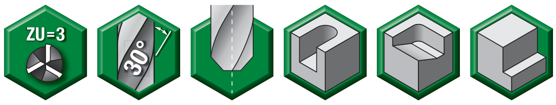


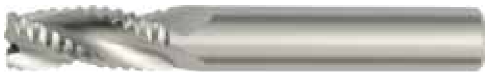
● first choice
○ alternate choice

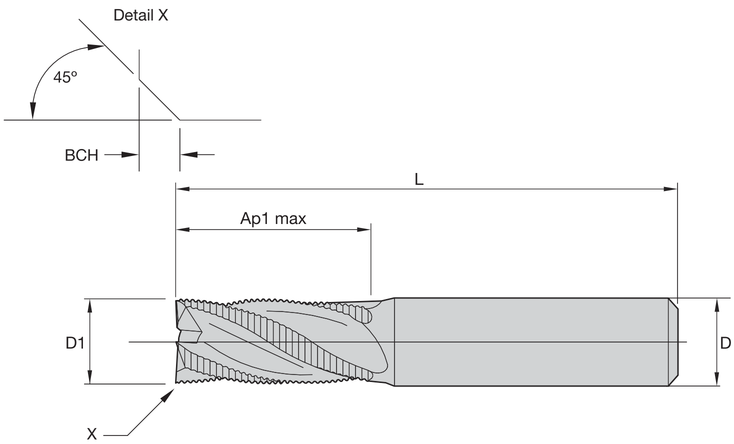
grade UNCOATED order #	grade UNCOATED catalogue #	grade TiCN-CT TiCN order #	grade TiCN-CT TiCN catalogue #	D1	D	length of cut Ap1 max	length L
1656500	410303000..	1902322	410303000CT	3,0	3	12,00	38
1656501	410304001..	1656502	410304001CT	4,0	4	12,00	50
1656503	410304002..	–		4,0	6	12,00	50
1656504	410305001..	1902576	410305001CT	5,0	5	14,00	50
1656505	410305002..	1905949	410305002CT	5,0	6	14,00	50
1656506	410306002..	1656507	410306002CT	6,0	6	16,00	50
1656508	410308003..	1656509	410308003CT	8,0	8	20,00	63
1656510	410310004..	1902578	410310004CT	10,0	10	22,00	76
1656511	410312005..	1902579	410312005CT	12,0	12	25,00	76
1656512	410314014..	1902593	410314014CT	14,0	14	32,00	83
1656513	410316006..	1902594	410316006CT	16,0	16	32,00	89
1656514	410318018..	1902595	410318018CT	18,0	18	38,00	100
1656515	410320007..	1902596	410320007CT	20,0	20	38,00	104

WIDIA HANITA

- Centre cutting.
- Coarse pitch.
- Standard items listed. Additional styles and coatings made-to-order.



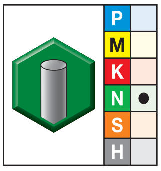


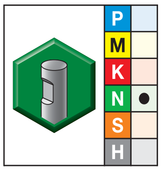


End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3–6	-0,030/-0,105	> 3–6	0/0,008
> 6–10	-0,040/-0,130	> 6–10	0/0,009
> 10–18	-0,050/-0,160	> 10–18	0/0,011
> 18–30	-0,065/-0,195	> 18–30	0/0,013

Series 4909

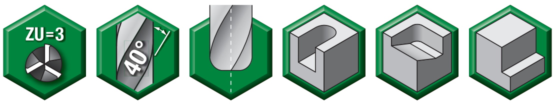


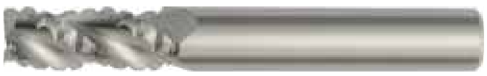


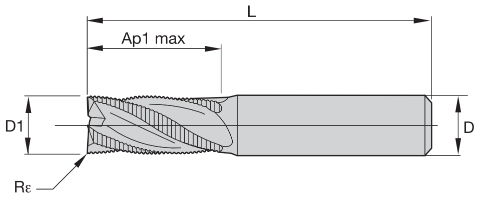
● first choice
○ alternate choice

grade UNCOATED order #	grade UNCOATED catalogue #	grade UNCOATED-WW order #	grade UNCOATED-WW catalogue #	D1	D	length of cut Ap1 max	length L	BCH
1657125	490906002..	1657126	490906002WW	6,0	6	13,00	57	0,06
1657127	490908003..	1657128	490908003WW	8,0	8	16,00	63	0,06
1657129	490910004..	1657131	490910004WW	10,0	10	22,00	72	0,06
1657132	490912005..	1657134	490912005WW	12,0	12	26,00	83	1,00
1657136	490914014..	1657137	490914014WW	14,0	14	26,00	83	1,00
1657138	490916006..	1657140	490916006WW	16,0	16	32,00	92	1,00
1657142	490918018..	1657143	490918018WW	18,0	18	32,00	92	1,00
1657144	490920007..	1657145	490920007WW	20,0	20	38,00	104	1,00
1657146	490925008..	1657148	490925008WW	25,0	25	45,00	121	1,00

- Centre cutting.
- Chamfered pitch.
- Standard items listed. Additional styles and coatings made-to-order.



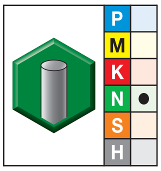


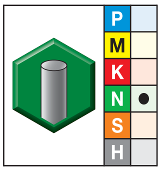


End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3–6	-0,030/-0,105	> 3–6	0/0,008
> 6–10	-0,040/-0,130	> 6–10	0/0,009
> 10–18	-0,050/-0,160	> 10–18	0/0,011
> 18–30	-0,065/-0,195	> 18–30	0/0,013

Series 4979

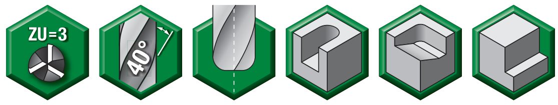


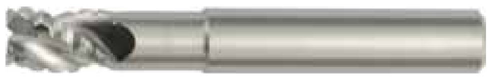


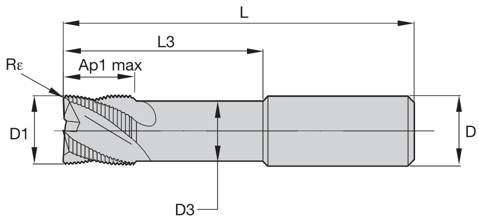
● first choice
○ alternate choice

grade UNCOATED order #	grade UNCOATED catalogue #	grade TiCN-CT TiCN order #	grade TiCN-CT TiCN catalogue #	D1	D	length of cut Ap1 max	length L	Rε
1858322	497906002..	1858423	497906002CT	6,0	6	13,00	57	0,25
1858424	497908003..	1858425	497908003CT	8,0	8	16,00	63	0,25
1858426	497910004..	1858427	497910004CT	10,0	10	22,00	72	0,50
1858428	497912005..	1858430	497912005CT	12,0	12	26,00	83	0,50
1858434	497916006..	1858437	497916006CT	16,0	16	32,00	92	1,00
1858441	497920007..	1858463	497920007CT	20,0	20	38,00	104	1,00
1858465	497925008..	1858466	497925008CT	25,0	25	45,00	121	1,50

- Centre cutting.
- Chamfered pitch.
- Standard items listed. Additional styles and coatings made-to-order.



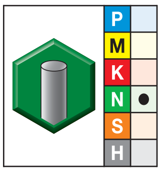




End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3–6	-0,030/-0,105	> 3–6	0/0,008
> 6–10	-0,040/-0,130	> 6–10	0/0,009
> 10–18	-0,050/-0,160	> 10–18	0/0,011
> 18–30	-0,065/-0,195	> 18–30	0/0,013

Series 49N9

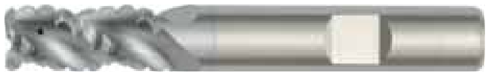


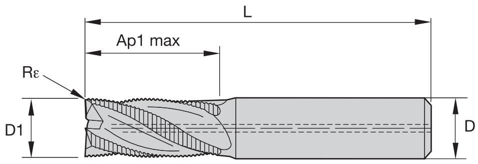
● first choice
○ alternate choice

grade UNCOATED

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2510324	**49N906002..**	6,0	6	5,00	8,00	18,00	57	0,25
2510325	**49N908003..**	8,0	8	7,00	10,00	24,00	63	0,25
2510326	**49N910004..**	10,0	10	9,00	12,00	30,00	72	0,50
2510327	**49N912005..**	12,0	12	11,00	15,00	36,00	83	0,50
2510328	**49N916006..**	16,0	16	14,80	20,00	48,00	92	1,00
2510329	**49N920007..**	20,0	20	18,70	24,00	60,00	104	1,00

- Centre cutting.
- Chamfered pitch.
- Through coolant.
- Standard items listed. Additional styles and coatings made-to-order.

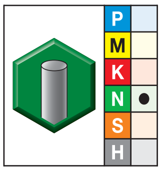


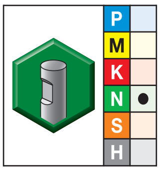


End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3–6	-0,030/-0,105	> 3–6	0/0,008
> 6–10	-0,040/-0,130	> 6–10	0/0,009
> 10–18	-0,050/-0,160	> 10–18	0/0,011
> 18–30	-0,065/-0,195	> 18–30	0/0,013

Series 49G9

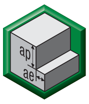


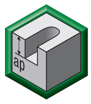


● first choice
○ alternate choice

grade TiCN-CT TiCN order #	catalogue #	grade TiCN-CW TiCN order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
1859874	49G908003CT	1902489	49G908003CW	8,0	8	16,00	63	0,25
1859875	49G910004CT	1902490	49G910004CW	10,0	10	22,00	72	0,50
1859876	49G912005CT	1902491	49G912005CW	12,0	12	26,00	83	0,50
1859877	49G916006CT	1902492	49G916006CW	16,0	16	32,00	92	1,00
1859878	49G920007CT	1902493	49G920007CW	20,0	20	38,00	104	1,00
1859879	49G925008CT	1902494	49G925008CW	25,0	25	45,00	121	1,50

Series 524149



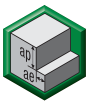


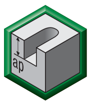
Material Group		Side Milling (A) and Slotting (B)			K10F-DCL / DLC			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0
N	1	1,2 x D	0,5 x D	1 x D	500	–	2000	fz	0,021	0,028	0,035	0,042	0,056	0,070	0,084
	2	1,2 x D	0,5 x D	1 x D	500	–	1500	fz	0,019	0,025	0,032	0,038	0,050	0,063	0,076
	3	1,2 x D	0,5 x D	1 x D	500	–	1500	fz	0,017	0,022	0,028	0,034	0,045	0,056	0,067
	4	1,2 x D	0,5 x D	1 x D	250	–	750	fz	0,015	0,020	0,025	0,029	0,039	0,049	0,059
	6	1,2 x D	0,5 x D	1 x D	100	–	500	fz	0,021	0,028	0,035	0,042	0,056	0,070	0,084

NOTE: For better surface finish, reduce feed per tooth.

Application Data • Series 022849

Series 022849



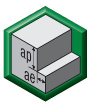


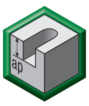
Material Group		Side Milling (A) and Slotting (B)			K10F / uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0
N	1	1,2 x D	0,5 x D	1 x D	500	–	2000	fz	0,014	0,021	0,028	0,035	0,042	0,056	0,070	0,084
	2	1,2 x D	0,5 x D	1 x D	500	–	1500	fz	0,011	0,017	0,022	0,028	0,034	0,045	0,056	0,067

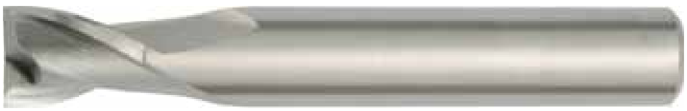
NOTE: For better surface finish, reduce feed per tooth.

Application Data • Series D502

Series D502



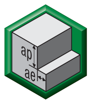
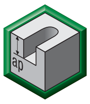
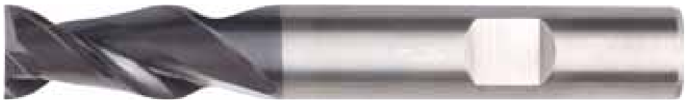




Material Group		Side Milling (A) and Slotting (B)			uncoated			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	500	–	2000	fz	0,027	0,036	0,045	0,054	0,072	0,090	0,108	0,126	0,144	0,180
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	500	–	1500	fz	0,024	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,162
	3	1,5 x D	0,5 x D	1 x D	500	–	1500	500	–	1500	fz	0,019	0,025	0,032	0,038	0,050	0,063	0,076	0,088	0,101	0,126
	4	1,5 x D	0,5 x D	1 x D	400	–	750	400	–	750	fz	0,022	0,029	0,036	0,043	0,058	0,072	0,086	0,101	0,115	0,144
	5	1,5 x D	0,5 x D	1 x D	250	–	1000	250	–	1000	fz	0,024	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,162

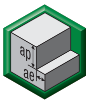
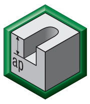
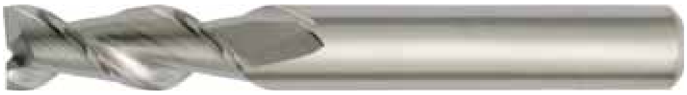
NOTE: For cutting aluminium with high silicon, TiAlN coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 022814 022817

Material Group																		
		Side Milling (A) and Slotting (B)			K10F uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,036	0,045	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180
N	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,146	0,162
N	3	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,025	0,032	0,038	0,050	0,063	0,076	0,088	0,101	0,113	0,126
N	4	1,5 x D	0,5 x D	1 x D	400	–	750	fz	0,029	0,036	0,043	0,058	0,072	0,086	0,101	0,115	0,130	0,144
N	5	1,5 x D	0,5 x D	1 x D	250	–	1000	fz	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,146	0,162

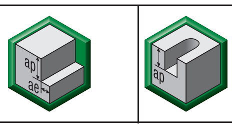
NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

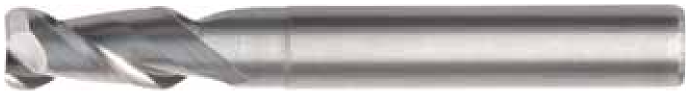
Series 4102

Material Group																			
		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	1,5	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,014	0,018	0,027	0,036	0,054	0,072	0,090	0,108	0,144	0,162	0,180
N	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,012	0,016	0,024	0,032	0,049	0,065	0,081	0,097	0,130	0,146	0,162
N	3	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,009	0,013	0,019	0,025	0,038	0,050	0,063	0,076	0,101	0,113	0,126
N	4	1,5 x D	0,5 x D	1 x D	400	–	750	fz	0,011	0,014	0,022	0,029	0,043	0,058	0,072	0,086	0,115	0,130	0,144
N	5	1,5 x D	0,5 x D	1 x D	250	–	1000	fz	0,012	0,016	0,024	0,032	0,049	0,065	0,081	0,097	0,130	0,146	0,162

NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 022852 524152



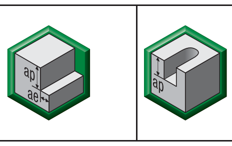


Material Group		Side Milling (A) and Slotting (B)			K10F uncoated			K10F–DCL DLC			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	14,0	16,0
N	1	1,2 x D	0,5 x D	1 x D	500	–	2000	500	–	2000	fz	0,021	0,028	0,042	0,056	0,070	0,084	0,098	0,112
	2	1,2 x D	0,5 x D	1 x D	500	–	1500	500	–	1500	fz	0,019	0,025	0,038	0,050	0,063	0,076	0,088	0,101
	3	1,2 x D	0,5 x D	1 x D	–	–	–	500	–	1500	fz	0,017	0,022	0,034	0,045	0,056	0,067	0,078	0,090
	4	1,2 x D	0,5 x D	1 x D	–	–	–	400	–	750	fz	0,015	0,020	0,029	0,039	0,049	0,059	0,069	0,078
	6	1,2 x D	0,5 x D	1 x D	–	–	–	750	–	1200	fz	0,021	0,028	0,042	0,056	0,070	0,084	0,098	0,112

NOTE: For cutting aluminium with high silicon, DLC coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0.5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

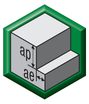
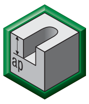
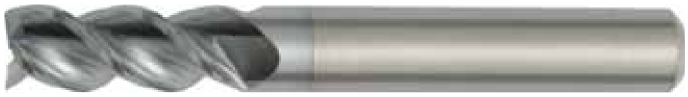
Application Data • Series 024101

Series 024101



Material Group		Side Milling (A) and Slotting (B)			PCD PCD–PT			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.				
		A		B	Cutting Speed — vc m/min				D1 — Diameter			
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0
N	2	1 x D	0,5 x D	0,7 x D	400	–	2500	fz	0,055	0,075	0,095	0,100
	3	1 x D	0,5 x D	0,7 x D	300	–	1500	fz	0,055	0,075	0,095	0,100
	4	1 x D	0,5 x D	0,7 x D	500	–	3000	fz	0,055	0,075	0,095	0,100
	5	1 x D	0,5 x D	0,7 x D	200	–	1000	fz	0,055	0,075	0,095	0,100
	6	1 x D	0,5 x D	0,7 x D	400	–	800	fz	0,055	0,075	0,095	0,100

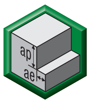
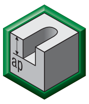
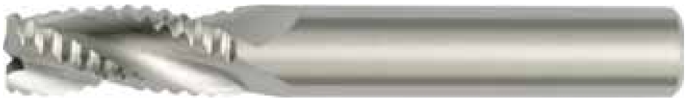
Series 4103

Material Group																			
		Side Milling (A) and Slotting (B)			uncoated			TiCN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
N	1	1 x D	0,5 x D	0,7 x D	500	–	2000	500	–	2000	fz	0,027	0,036	0,054	0,072	0,090	0,108	0,144	0,180
	2	1 x D	0,5 x D	0,7 x D	500	–	1500	500	–	1500	fz	0,024	0,032	0,049	0,065	0,081	0,097	0,130	0,162

NOTE: For cutting aluminium with high silicon, TiCN coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0.5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

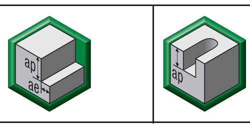
Application Data • Series 4909

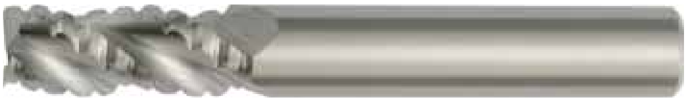
Series 4909

Material Group															
		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	max	6,0	8,0	10,0	12,0	16,0	20,0	25,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,066	0,088	0,110	0,132	0,176	0,220	0,275
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,059	0,079	0,099	0,119	0,158	0,198	0,248

NOTE: For cutting aluminium with high silicon TiCN coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0,5.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 4979



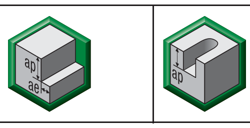


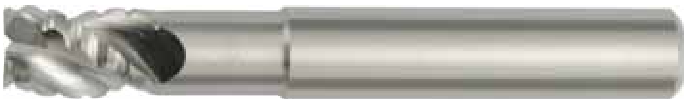
Material Group		Side Milling (A) and Slotting (B) A ap	ae	B ap	uncoated Cutting Speed – vc m/min min		max	mm	D1 – Diameter 6,0	8,0	10,0	12,0	16,0	18,0	20,0
									Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,072	0,096	0,120	0,144	0,192	0,216	0,240
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216
	3	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,050	0,067	0,084	0,101	0,134	0,151	0,168
	4	1,5 x D	0,5 x D	1 x D	400	–	750	fz	0,058	0,077	0,096	0,115	0,154	0,173	0,192
	5	1,5 x D	0,5 x D	1 x D	250	–	1000	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216

NOTE: For cutting aluminium with high silicon, TiCN coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0,5.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Application Data • Series 49N9

Series 49N9

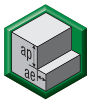
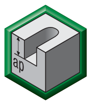
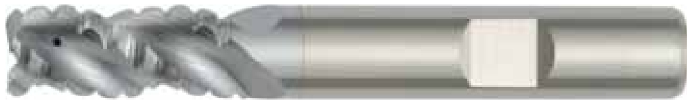




Material Group		Side Milling (A) and Slotting (B) A ap	ae	B ap	uncoated Cutting Speed – vc m/min min		max	mm	D1 – Diameter 6,0	8,0	10,0	12,0	16,0	18,0	20,0
									Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
N	1	1 x D	0,5 x D	1 x D	500	–	2000	fz	0,072	0,096	0,120	0,144	0,192	0,216	0,240
	2	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216
	3	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,050	0,067	0,084	0,101	0,134	0,151	0,168
	4	1 x D	0,5 x D	1 x D	400	–	750	fz	0,058	0,077	0,096	0,115	0,154	0,173	0,192
	5	1 x D	0,5 x D	1 x D	250	–	1000	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216

NOTE: For cutting aluminium with high silicon, TiCN coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0,5.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 49G9

															
		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
Material Group		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	18,0	20,0
N	1	1 x D	0,5 x D	1 x D	500	–	2000	fz	0,072	0,096	0,120	0,144	0,192	0,216	0,240
	2	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216
	3	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,050	0,067	0,084	0,101	0,134	0,151	0,168
	4	1 x D	0,5 x D	1 x D	400	–	750	fz	0,058	0,077	0,096	0,115	0,154	0,173	0,192
	5	1 x D	0,5 x D	1 x D	250	–	1000	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216

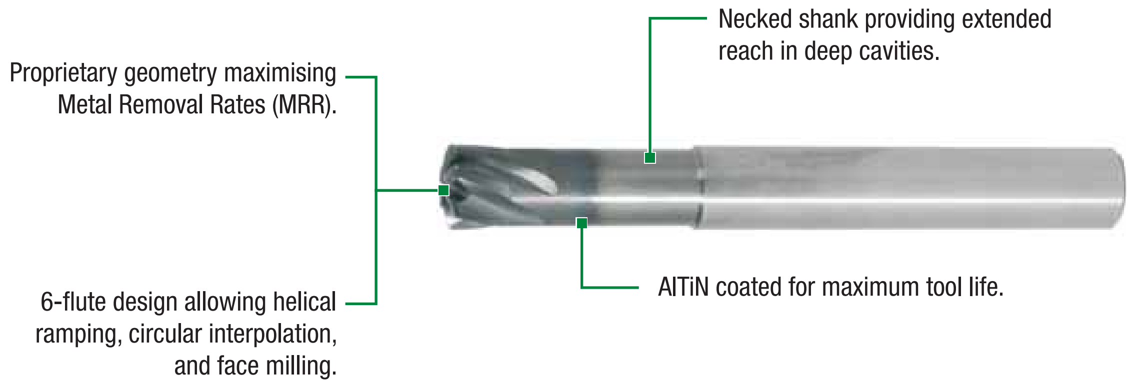
NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

X-Feed™ End Mills for High-Feed Milling

X-Feed

X-Feed significantly reduces manufacturing time machining heat-treated steels up to 67 HRC hardness, having 50% more effective cutting edges than regular solid carbide tooling. X-Feed combines roughing and semi-finishing into one operation by taking shallow depths-of-cut at extremely high feed rates, maximising Metal Removal Rates (MRR). X-Feed, which has a 3 x D neck and extended reach design, is perfectly suited for pocketing using 3D machining techniques such as ramping and helical interpolation. During face milling, the proprietary front-end geometry of X-Feed is entirely in contact with the workpiece, providing up to 55% engagement compared to the regular 5–10% provided by ball nose-type tooling.

- Proprietary 6-flute design for high productivity.
- One tool for roughing and semi-finishing operations.
- Covering hardened materials ranging from 37–67 HRC with two dedicated geometries.
- Custom solutions tailored for machining titanium and other high-temperature alloys available.



X-Feed™ Series

- Significantly reduces manufacturing time in machining hardened steels.
- Providing the benefits of indexable style high-feed milling starting from as small as 6mm.
- Increases your capability to perform 3D machining, helical ramping, circular interpolation, face milling, and pocketing.
- One tool for roughing and semi-finishing.

70N6 Series

- 6-flute.
- Extended neck for long-reach applications.
- Applicable for hardened steels from 40–52 HRC.

70N7 Series

- 6-flute.
- Extended neck for long-reach applications.
- Applicable for hardened steels from 50–67 HRC.

Operation Pocket Milling

Customer: Die and Mould Manufacturer

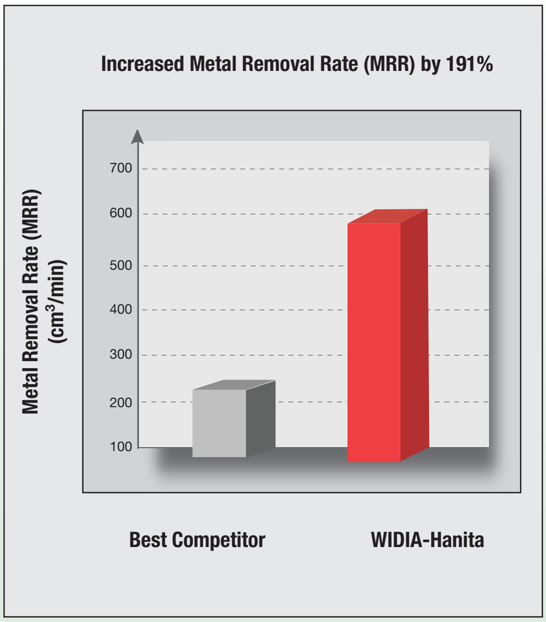
Material: AISI 4340 hardened steel (52 HRc)

Workpiece: Mould

Results:
- 3x better Metal Removal Rate (MRR) than competitive tool!
- Machined at more than 3x faster feed!

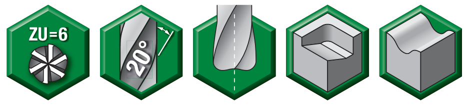
	COMPETITOR	WIDIA™-Hanita™
tool:	6-flute H/P for die & mould	70N612005MT
material:	medium-hardened steel (52 HRc)	medium-hardened steel (52 HRc)
surface speed:	120 m/min	160 m/min
feed per tooth:	0,34mm	0,34mm
depth of cut:	0,8mm	0,6mm
table feed:	4,331 mm/min	15,287 mm/min
metal removal rate:	22,8 cm^3	60,5 cm^3

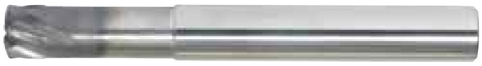
Individual results may vary.

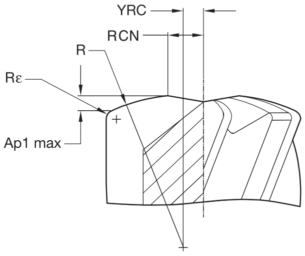


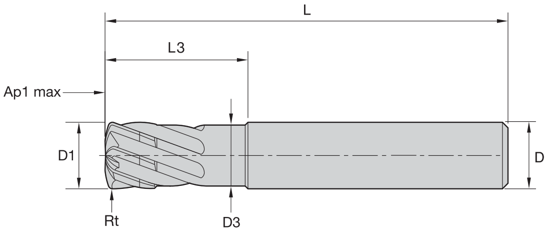
WIDIA
HANITA

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





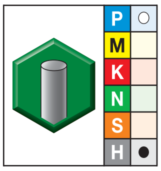




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 70N6 71N6 • 37–52 HRC • Vision Plus X-Feed



grade AlTiN-MT1
AlTiN

● first choice
○ alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	Rt
3745400	71N606002MT	6,0	6	5,50	0,32	9,00	57	0,38	0,62
3341346	70N606002MT	6,0	6	5,50	0,32	18,00	63	0,38	0,62
3745401	71N608003MT	8,0	8	7,50	0,42	12,00	63	0,50	0,83
3341348	70N608003MT	8,0	8	7,50	0,42	24,00	76	0,50	0,83
3745402	71N610004MT	10,0	10	9,00	0,53	15,00	72	0,63	1,04
3101466	70N610004MT	10,0	10	9,00	0,53	30,00	89	0,63	1,04
3745413	71N612005MT	12,0	12	11,00	0,63	18,00	83	0,75	1,24
3101467	70N612005MT	12,0	12	11,00	0,63	36,00	100	0,75	1,24
3484748	70N616006MT	16,0	16	15,00	0,84	48,00	110	1,00	1,66
3484749	70N620007MT	20,0	20	19,00	1,05	60,00	125	1,25	2,07

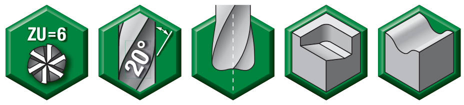
NOTE: YRC = distance from centre line to the crown of the R radius.
RCN = distance from centre line to the start of the cutting edge. This dimension can also help determine the minimum circle size when helical ramping.
R = the head radius size.
Rε = the shoulder radius or radius at the corner of the cutter.

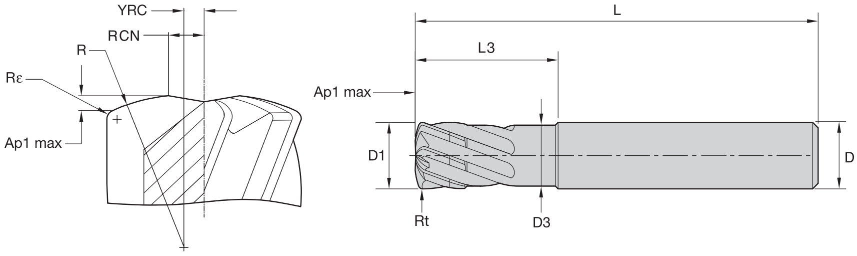
Programming Data

Tool List 70N6

Geometrical Parameters									Ramping Guide for Circular and Linear Interpolation						
									Circular Interpolation		Linear Interpolation				
									Allowed Range of Hole Diameter		Calculated Length (mm) per Ramp Angle				
diameter	Ap1 max	Rfm	Rt	Rc	Xfm	Yfm	YD	Number			Ramp Angle (degree)				
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	flutes	Smallest	Largest	1	2	3	4	5
6	0,32	6	0,62	0,375	0,32	0,75	1,32	6	8,64	12	18,12	9,06	6,03	4,52	3,61
8	0,42	8	0,83	0,500	0,42	1,00	1,76	6	11,52	16	24,16	12,08	8,05	6,03	4,82
10	0,53	10	1,04	0,625	0,53	1,25	2,20	6	14,4	20	30,20	15,09	10,06	7,54	6,02
12	0,63	12	1,24	0,750	0,63	1,50	2,64	6	17,28	24	36,24	18,11	12,07	9,05	7,23
16	0,84	16	1,66	1,000	0,84	2,00	3,52	6	23,04	32	48,31	24,15	16,09	12,06	9,64
20	1,05	20	2,07	1,250	1,05	2,50	4,40	6	28,8	40	60,39	30,19	20,11	15,08	12,05
Recommended Feed											100%	70%	50%	30%	10%

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

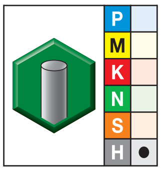




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 70N7 • >52 HRC • Vision Plus X-Feed



● first choice
○ alternate choice

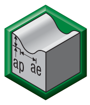
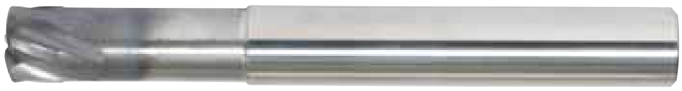
grade AlTiN-MT1 AlTiN order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	Rt
3484756	**70N706002MT**	6,0	6	5,50	0,20	18,00	63	0,38	0,58
3484757	**70N708003MT**	8,0	8	7,50	0,27	24,00	76	0,50	0,77
3484758	**70N710004MT**	10,0	10	9,00	0,33	30,00	89	0,63	0,96
3403492	**70N712005MT**	12,0	12	11,00	0,40	36,00	100	0,75	1,15
3477329	**70N716006MT**	16,0	16	15,00	0,54	48,00	110	1,00	1,54
3484759	**70N720007MT**	20,0	20	19,00	0,67	60,00	125	1,25	1,92

NOTE: YRC = distance from centre line to the crown of the R radius.
RCN = distance from centre line to the start of the cutting edge. This dimension can also help determine the minimum circle size when helical ramping.
R = the head radius size.
Rε = the shoulder radius or radius at the corner of the cutter.

Programming Data

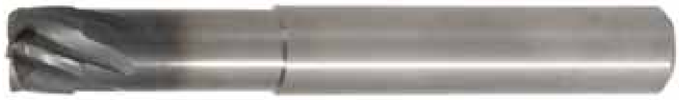
Tool List 70N7															
Geometrical Parameters									Ramping Guide for Circular and Linear Interpolation						
									Circular Interpolation		Linear Interpolation				
									Allowed Range of Hole Diameter		Calculated Length (mm) per Ramp Angle				
diameter	Ap1 max	Rfm	Rt	Rc	Xfm	Yfm	YD	Number			Ramp Angle (degree)				
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	flutes	Smallest	Largest	1	2	3	4	5
6	0,20	9	0,58	0,375	0,20	0,75	1,26	6	8,52	12	11,51	5,75	3,83	2,87	2,30
8	0,27	12	0,77	0,500	0,27	1,00	1,68	6	11,36	16	15,34	7,67	5,11	3,83	3,06
10	0,33	15	0,96	0,625	0,33	1,25	2,10	6	14,2	20	19,18	9,58	6,39	4,79	3,83
12	0,40	18	1,15	0,750	0,40	1,50	2,52	6	17,04	24	23,01	11,50	7,66	5,74	4,59
16	0,54	24	1,54	1,000	0,54	2,00	3,36	6	22,72	32	30,68	15,34	10,22	7,66	6,12
20	0,67	30	1,92	1,250	0,67	2,50	4,20	6	28,4	40	38,35	19,17	12,77	9,57	7,65
Recommended Feed											100%	70%	50%	30%	10%

Series 70N6 71N6 • Vision Plus X-Feed

Material Group													
		Profile Milling		AlTiN			Recommended Feed Per Tooth (fz = mm/th) for 3D milling/profiling (A)						
		A		Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
P	4	0,05 x D	0,55 x D	160	–	180	fz	0,300	0,500	0,500	0,500	0,600	0,700
H	1	0,05 x D	0,55 x D	140	–	160	fz	0,300	0,500	0,500	0,500	0,600	0,700
	2	0,05 x D	0,55 x D	100	–	120	fz	0,200	0,300	0,300	0,400	0,500	0,600

NOTE: Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters on diameters >12mm.

Series 70N7 • Vision Plus X-Feed

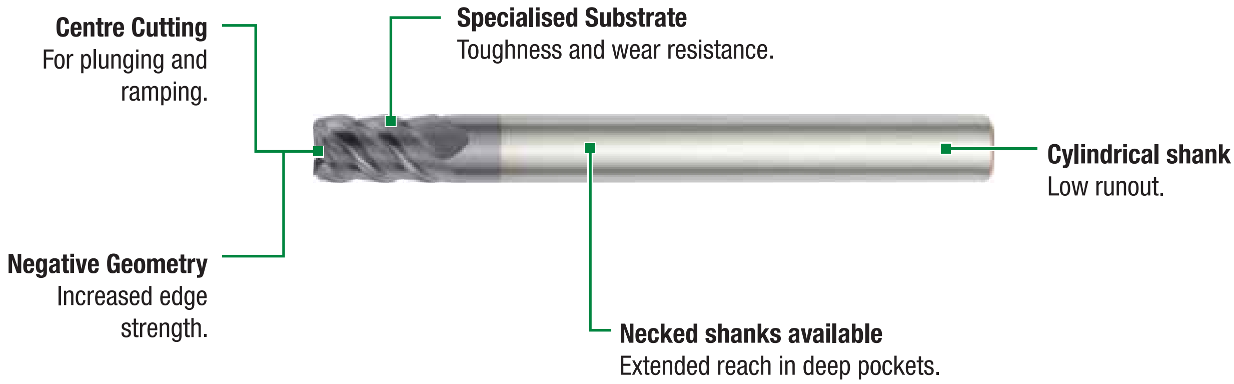
													
		Profile Milling		AlTiN			Recommended Feed Per Tooth (fz = mm/th) for 3D milling/profiling (A)						
		A		Cutting Speed — vc m/min				D1 — Diameter					
Material Group		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
H	2	0,03 x D	0,55 x D	100	–	120	fz	0,200	0,300	0,300	0,400	0,500	0,600
	3	0,03 x D	0,55 x D	80	–	100	fz	0,200	0,300	0,300	0,400	0,500	0,600
	4	0,03 x D	0,55 x D	50	–	70	fz	0,150	0,200	0,250	0,300	0,400	0,500

NOTE: Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Vision Plus

Engineered to machine hardened steels up to 67 HRC at extreme speeds and feeds, Vision Plus solid carbide end mills are designed with a special substrate and geometries to extend tool life and lower manufacturing costs. Vision Plus end mills offer a complete portfolio for the die and mould industry or any application that requires machining of hardened workpiece materials. Vision Plus end mills will make your next application in hardened materials more productive and efficient.

- Capable of machining hardened steels up to 67 HRC.
- Complete line of Vision Plus micro end mills.
- Unique design allows higher feeds and speeds, increasing Metal Removal Rates (MRR).
- Wide range of diameters from 0,3–25mm.
- AlTiN Coating for maximum wear resistance.



Vision Plus™ Series

- Machine hardened materials up to 67 HRC.
- Long overall length for deep-reach applications.
- Reinforced core for better rigidity.
- High helix for better surface finishes.

7N02 Series

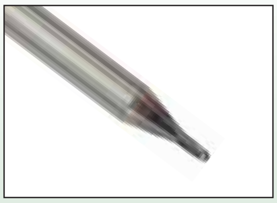
- Centre cutting.
- 2-flute.
- 30° helix.
- Extended neck for long-reach applications.
- JIS.
- Sharp corner.
- 0,3–3,1mm diameter range.

423034 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- 0,5–3mm diameter range.

7N01 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- JIS.
- 0,3–6mm diameter range.



7N21 Series

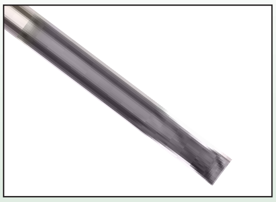
- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 0,5–3mm diameter range.

75N2 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Extended neck for long-reach applications.
- 3–12mm diameter range.

422875 Series

- Centre cutting.
- 2-flute.
- 20° helix.
- Extended neck for long-reach applications.
- Torus corner.
- 2–12mm diameter range.

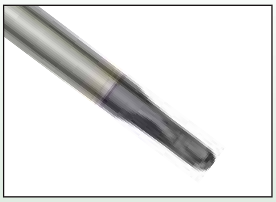


7151 Series

- Centre cutting.
- 2-flute.
- 15° helix.
- Ball nose.
- 1–20mm diameter range.

7061 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 1–12mm diameter range.



(continued)

Vision Plus™ Series *(continued)*

- Machine hardened materials up to 67 HRC.
- Long overall length for deep-reach applications.
- Reinforced core for better rigidity.
- High helix for better surface finishes.

70N1 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 1–12mm diameter range.

422869 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 1–16mm diameter range.

422870 Series

- Centre cutting.
- 2-flute.
- 20° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 2–12mm diameter range.

422873 Series

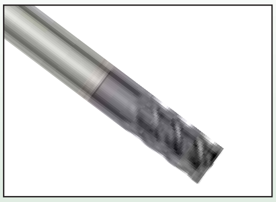
- Centre cutting.
- 2-flute.
- 0° helix.
- Extended neck for long-reach applications.
- 3–10mm diameter range.

7505 Series

- Centre cutting.
- 4-,5-, and 6-flutes.
- 50° helix.
- Sharp corner.
- 3–25mm diameter range.

7585 Series

- Centre cutting.
- 4- and 5-flutes.
- 50° helix.
- Radii corner.
- 3–25mm diameter range.

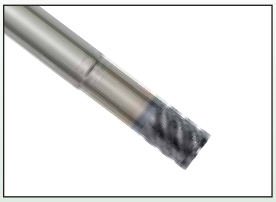


75N5 Series

- Centre cutting.
- 4- and 5-flutes.
- 50° helix.
- Sharp corner and radii.
- Extended neck for long-reach applications.
- 3–25mm diameter range.

75N8

- Centre cutting.
- 6-flute.
- 50° helix.
- JIS.
- Radii corner.
- Extended neck for long-reach applications.
- 3–25mm diameter range.



(continued)

Vision Plus™ Series *(continued)*

- Machine hardened materials up to 67 HRC.
- Long overall length for deep-reach applications.
- Reinforced core for better rigidity.
- High helix for better surface finishes.

422876 422878 Series

- Centre cutting.
- 4-flute.
- 20° helix.
- Torus style.
- Extended neck for long-reach applications.
- 4–12mm diameter range.

7150 Series

- Centre cutting.
- 4-flute.
- 15° helix.
- Ball nose.
- 2–20mm diameter range.

7050 7060 Series

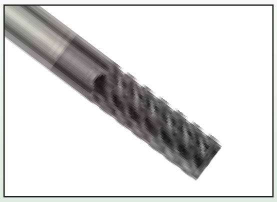
- Centre cutting.
- 4-flute.
- 15° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 2–20mm diameter range.

422871 Series

- Centre cutting.
- 4-flute.
- 30° helix.
- Taper ball nose for extended reach.
- 3–10mm diameter range.

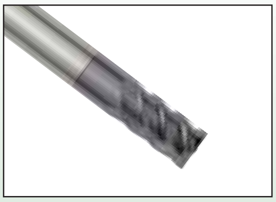
D618 Series

- Centre cutting.
- 4- and 6-flutes.
- 50° helix.
- Sharp corner.
- 3–20mm diameter range.



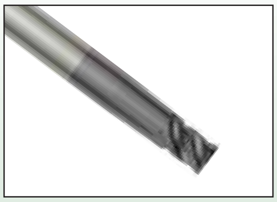
422837 422831 Series

- Non-centre cutting.
- 6- and 8-flutes.
- 45° helix.
- Radii corner.
- 6–25mm diameter range.

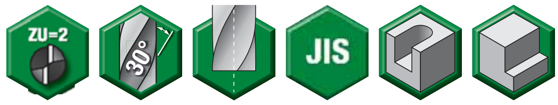


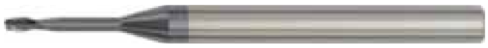
7670 Series

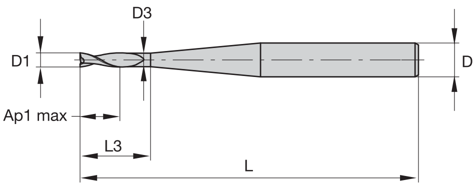
- Centre cutting.
- 3-, 4- and 6-flutes.
- 45° helix.
- Radii corner.
- Rougher profile.
- 4–mm diameter range.



- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



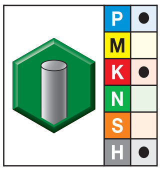


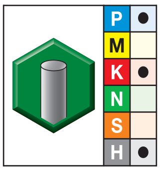


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7N02 7N12 7N22 • Vision Plus Micro



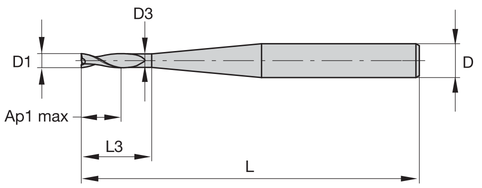


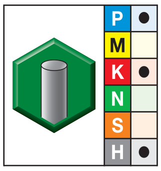
● first choice
○ alternate choice

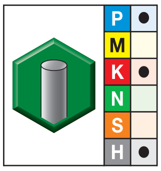
grade AlTiN-MJ1 AlTiN order #	catalogue #	grade TiAlN-RJ1 TiAlN order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
3321518	7N0200302MJ	2256390	7N0200302RJ	0,3	6	0,84	0,40	0,40	50
3321529	7N2200400MJ	2256438	7N2200400RJ	0,4	3	0,34	0,60	2,00	38
3321530	7N2200410MJ	2256439	7N2200410RJ	0,4	3	0,34	0,60	4,00	38
	—	2256391	7N0200402RJ	0,4	6	0,84	0,60	0,60	50
3089244	7N0200402MJ		—	0,4	6	—	0,60	0,60	50
3321531	7N2200500MJ	2256440	7N2200500RJ	0,5	3	0,44	0,70	2,00	38
3321532	7N2200510MJ	2256441	7N2200510RJ	0,5	3	0,44	0,70	4,00	38
3321533	7N2200520MJ	2256442	7N2200520RJ	0,5	3	0,44	0,70	6,00	38
3321519	7N0200502MJ	2256392	7N0200502RJ	0,5	6	0,44	0,70	1,50	50
3089248	7N1200502MJ	2256403	7N1200502RJ	0,5	6	0,44	0,70	2,50	60
3321534	7N2200600MJ	2256443	7N2200600RJ	0,6	3	0,54	0,90	2,00	38
3321535	7N2200610MJ	2256444	7N2200610RJ	0,6	3	0,54	0,90	4,00	38
3321536	7N2200620MJ	2256445	7N2200620RJ	0,6	3	0,54	0,90	6,00	38
3321520	7N0200602MJ	2256393	7N0200602RJ	0,6	6	0,54	0,90	1,80	50
3089249	7N1200602MJ	2256404	7N1200602RJ	0,6	6	0,54	0,90	3,00	60
3321537	7N2200701MJ	2256446	7N2200701RJ	0,7	4	0,64	1,00	2,00	50
3321538	7N2200711MJ	2256447	7N2200711RJ	0,7	4	0,64	1,00	4,00	50
3321539	7N2200721MJ	2256448	7N2200721RJ	0,7	4	0,64	1,00	6,00	50
3321540	7N2200801MJ	2256449	7N2200801RJ	0,8	4	0,74	1,20	4,00	50
3321541	7N2200811MJ	2256450	7N2200811RJ	0,8	4	0,74	1,20	6,00	50
3321542	7N2200821MJ	2256451	7N2200821RJ	0,8	4	0,74	1,20	8,00	50
3321521	7N0200802MJ	2256394	7N0200802RJ	0,8	6	0,74	1,20	2,40	50
3089250	7N1200802MJ	2256405	7N1200802RJ	0,8	6	0,74	1,20	4,00	60
3321543	7N2200901MJ	2256452	7N2200901RJ	0,9	4	0,84	1,35	6,00	50

(continued)

(Series 7N02 7N12 7N22 • Vision Plus Micro — continued)





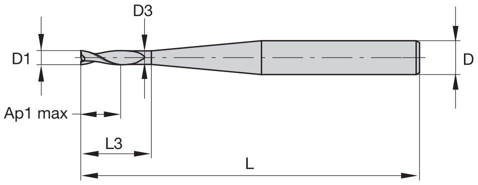


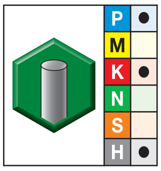
● first choice
○ alternate choice

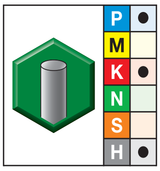
grade AlTiN-MJ1 AlTiN		grade TiAlN-RJ1 TiAlN							
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
3321544	7N2200911MJ	2256453	7N2200911RJ	0,9	4	0,84	1,35	8,00	50
3321545	7N2200921MJ	2256454	7N2200921RJ	0,9	4	0,84	1,35	10,00	50
3321546	7N2201001MJ	2256455	7N2201001RJ	1,0	4	0,94	1,50	6,00	50
3321547	7N2201011MJ	2256456	7N2201011RJ	1,0	4	0,94	1,50	8,00	50
3321548	7N2201021MJ	2256457	7N2201021RJ	1,0	4	0,94	1,50	10,00	50
3321549	7N2201031MJ	2256458	7N2201031RJ	1,0	4	0,94	1,50	12,00	50
3089245	7N0201002MJ	2256395	7N0201002RJ	1,0	6	0,94	1,50	2,50	50
3089251	7N1201002MJ	2256406	7N1201002RJ	1,0	6	0,94	1,50	5,00	60
3321550	7N2201201MJ	2256459	7N2201201RJ	1,2	4	1,14	1,50	6,00	50
3321551	7N2201211MJ	2256460	7N2201211RJ	1,2	4	1,14	1,80	8,00	50
3321552	7N2201221MJ	2256461	7N2201221RJ	1,2	4	1,14	1,80	10,00	50
3321553	7N2201231MJ	2256462	7N2201231RJ	1,2	4	1,14	1,80	12,00	50
3321522	7N0201202MJ	2256396	7N0201202RJ	1,2	6	1,14	1,80	3,00	50
3089252	7N1201202MJ	2256407	7N1201202RJ	1,2	6	1,14	1,80	6,00	60
3321554	7N2201401MJ	2256463	7N2201401RJ	1,4	4	1,34	2,10	6,00	50
3321555	7N2201411MJ	2256464	7N2201411RJ	1,4	4	1,34	2,10	8,00	50
3321556	7N2201421MJ		–	1,4	4	1,34	2,10	10,00	50
3321557	7N2201431MJ	2256466	7N2201431RJ	1,4	4	1,34	2,10	12,00	50
3321558	7N2201441MJ	2256467	7N2201441RJ	1,4	4	1,34	2,10	16,00	50
	–	2256465	7N2201421RJ	1,4	4	1,35	2,10	10,00	50
3089246	7N0201402MJ	2256397	7N0201402RJ	1,4	6	1,34	2,10	3,50	50
3321527	7N1201402MJ	2256408	7N1201402RJ	1,4	6	1,34	2,10	7,00	60
	–	3454427	7N2201561RJ	1,5	4	1,44	2,30	5,70	50
3321559	7N2201501MJ	2256468	7N2201501RJ	1,5	4	1,44	2,30	6,00	50
3321560	7N2201511MJ	2256469	7N2201511RJ	1,5	4	1,44	2,30	10,00	50
3321561	7N2201521MJ	2256470	7N2201521RJ	1,5	4	1,44	2,30	12,00	50
3321562	7N2201531MJ	2256471	7N2201531RJ	1,5	4	1,44	2,30	16,00	50
3321563	7N2201541MJ	2256472	7N2201541RJ	1,5	4	1,44	2,30	18,00	63
3321564	7N2201551MJ	2256473	7N2201551RJ	1,5	4	1,44	2,30	20,00	63
3321523	7N0201502MJ	2256398	7N0201502RJ	1,5	6	1,44	2,30	3,80	50
3089253	7N1201502MJ	2256409	7N1201502RJ	1,5	6	1,44	2,30	7,50	60
3321566	7N2201611MJ	2256475	7N2201611RJ	1,6	4	1,54	2,40	10,00	50
3321567	7N2201621MJ	2256476	7N2201621RJ	1,6	4	1,54	2,40	12,00	50
3321568	7N2201631MJ	2256477	7N2201631RJ	1,6	4	1,54	2,40	16,00	50
3321569	7N2201641MJ	2256478	7N2201641RJ	1,6	4	1,54	2,40	20,00	63
	–	3454428	7N2201571RJ	1,6	4	1,54	2,80	11,70	50

(continued)

(Series 7N02 • Series 7N02 7N12 7N22 • Vision Plus Micro — continued)





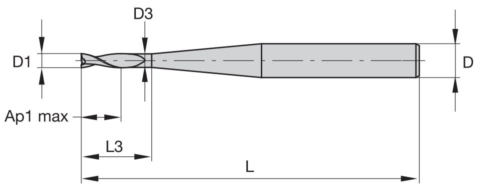


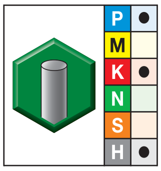
● first choice
○ alternate choice

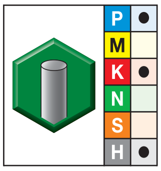
grade AlTiN-MJ1 AlTiN		grade TiAlN-RJ1 TiAlN							
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
3321565	7N2201601MJ	2256474	7N2201601RJ	1,6	4	1,57	2,40	6,00	50
3321524	7N0201602MJ	2256399	7N0201602RJ	1,6	6	1,54	2,40	4,00	50
3321528	7N1201602MJ	2256410	7N1201602RJ	1,6	6	1,54	2,40	8,00	60
3321570	7N2201701MJ	2256479	7N2201701RJ	1,7	4	1,64	2,60	6,00	50
3321571	7N2201711MJ	2256480	7N2201711RJ	1,7	4	1,64	2,60	10,00	50
3321572	7N2201721MJ	2256481	7N2201721RJ	1,7	4	1,64	2,60	12,00	50
3321573	7N2201731MJ	2256482	7N2201731RJ	1,7	4	1,64	2,60	16,00	50
3321574	7N2201741MJ	2256483	7N2201741RJ	1,7	4	1,64	2,60	20,00	63
3321575	7N2201801MJ	2256484	7N2201801RJ	1,8	4	1,74	2,70	6,00	50
3321576	7N2201811MJ	2256485	7N2201811RJ	1,8	4	1,74	2,70	10,00	50
3321577	7N2201821MJ	2256486	7N2201821RJ	1,8	4	1,74	2,70	12,00	50
3321578	7N2201831MJ	2256487	7N2201831RJ	1,8	4	1,74	2,70	16,00	50
3321579	7N2201841MJ	2256488	7N2201841RJ	1,8	4	1,74	2,70	20,00	63
3321525	7N0201802MJ	2256400	7N0201802RJ	1,8	6	1,74	2,70	4,50	50
3089254	7N1201802MJ	2256411	7N1201802RJ	1,8	6	1,74	2,70	9,00	60
3321580	7N2201901MJ	2256489	7N2201901RJ	1,9	4	1,84	2,80	6,00	50
3321581	7N2201911MJ	2256490	7N2201911RJ	1,9	4	1,84	2,80	10,00	50
3321582	7N2201921MJ	2256491	7N2201921RJ	1,9	4	1,84	2,80	12,00	50
3321583	7N2201931MJ	2256492	7N2201931RJ	1,9	4	1,84	2,80	16,00	50
3321584	7N2201941MJ	2256493	7N2201941RJ	1,9	4	1,84	2,80	20,00	63
3321585	7N2202001MJ	2256494	7N2202001RJ	2,0	4	1,96	3,00	6,00	50
3321586	7N2202011MJ	2256495	7N2202011RJ	2,0	4	1,96	3,00	10,00	50
3321587	7N2202021MJ	2256496	7N2202021RJ	2,0	4	1,96	3,00	16,00	50
3321588	7N2202031MJ	2256497	7N2202031RJ	2,0	4	1,96	3,00	20,00	63
3321589	7N2202041MJ	2256498	7N2202041RJ	2,0	4	1,96	3,00	20,00	75
3089247	7N0202002MJ	2256401	7N0202002RJ	2,0	6	1,96	3,00	5,00	50
3089255	7N1202002MJ	2256412	7N1202002RJ	2,0	6	1,96	3,00	10,00	60
–		3454429	7N2202051RJ	2,1	4	2,00	3,00	8,00	50
–		3454430	7N2202061RJ	2,1	4	2,00	3,00	12,00	50
–		3454431	7N2202071RJ	2,1	4	2,00	3,00	14,00	50
–		3454432	7N2202091RJ	2,1	4	2,00	3,00	25,00	63
3321590	7N2202501MJ	2256499	7N2202501RJ	2,5	4	2,40	3,70	8,00	50

(continued)

(Series 7N02 7N12 7N22 • Vision Plus Micro — continued)



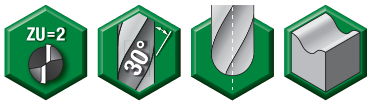


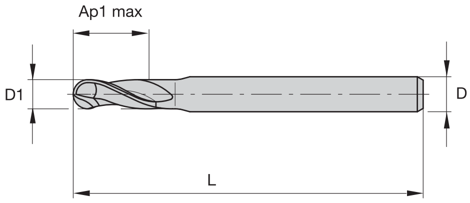


● first choice
○ alternate choice

grade AlTiN-MJ1 AlTiN order #	grade AlTiN-MJ1 AlTiN catalogue #	grade TiAlN-RJ1 TiAlN order #	grade TiAlN-RJ1 TiAlN catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
3321591	7N2202511MJ	2256500	7N2202511RJ	2,5	4	2,40	3,70	10,00	50
3321592	7N2202521MJ	2256501	7N2202521RJ	2,5	4	2,44	3,70	16,00	63
3321593	7N2202531MJ	2256502	7N2202531RJ	2,5	4	2,44	3,70	20,00	63
3321594	7N2202541MJ	2256503	7N2202541RJ	2,5	4	2,44	3,70	30,00	80
3321526	7N0202502MJ	2256402	7N0202502RJ	2,5	6	2,44	3,70	5,00	50
3089256	7N1202502MJ	2256413	7N1202502RJ	2,5	6	2,44	3,70	12,50	60
3321595	7N2203002MJ	2256504	7N2203002RJ	3,0	6	2,94	4,50	8,00	50
3321596	7N2203012MJ	2256505	7N2203012RJ	3,0	6	2,94	4,50	10,00	50
3321597	7N2203022MJ	2256506	7N2203022RJ	3,0	6	2,94	4,50	16,00	63
3321598	7N2203032MJ	2256507	7N2203032RJ	3,0	6	2,94	4,50	20,00	63
3321599	7N2203042MJ	2256508	7N2203042RJ	3,0	6	2,94	4,50	20,00	80
	–	3454433	7N2203052RJ	3,1	6	3,00	4,50	12,00	50
	–	3454434	7N2203062RJ	3,1	6	3,00	4,50	25,00	76

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 423034 • Vision Plus Micro

P	○
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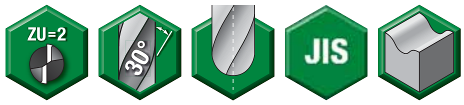
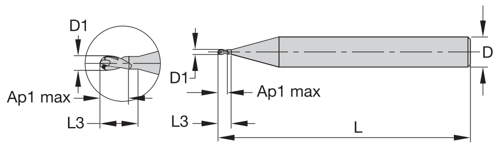
● first choice
○ alternate choice

grade K10UF-DCHP AlTiN

order #	catalogue #	D1	D	length of cut Ap1 max	length L
2343490	423034-000005	0,5	3	1,50	38
2343492	423034-000006	0,6	3	1,60	38
2343494	423034-000008	0,8	3	1,80	38
2343496	423034-000010	1,0	3	2,00	38
2343498	423034-000012	1,2	3	2,20	38
2343500	423034-000015	1,5	3	2,50	38
2343502	423034-000020	2,0	3	3,00	38
2343504	423034-000025	2,5	3	4,00	38
2343506	423034-000030	3,0	3	5,00	38

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

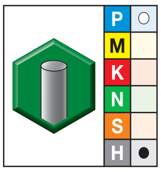


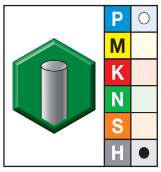


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7N01 • Vision Plus Micro

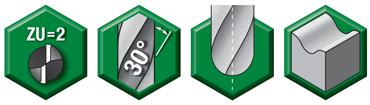


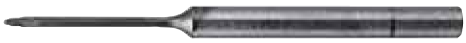


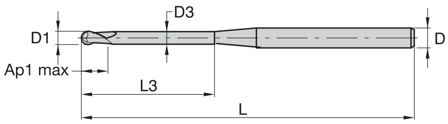
● first choice
○ alternate choice

grade AlTiN-MJ1 AlTiN		grade TiAlN-RJ1 TiAlN							
order #	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**D3**	**length of cut Ap1 max**	**L3**	**length L**
3321510	7N0100302MJ	2256358	7N0100302RJ	0,3	6	—	0,30	0,30	50
3321511	7N0100402MJ	2256359	7N0100402RJ	0,4	6	—	0,40	0,40	50
3089237	7N0100502MJ	2256360	7N0100502RJ	0,5	6	0,45	0,50	1,50	50
3089238	7N0100602MJ	2256361	7N0100602RJ	0,6	6	0,55	0,60	1,80	50
3321512	7N0100802MJ	2256362	7N0100802RJ	0,8	6	0,75	0,80	2,40	50
3321513	7N0101002MJ	2256363	7N0101002RJ	1,0	6	0,95	2,50	2,50	50
3089239	7N0101202MJ	2256364	7N0101202RJ	1,2	6	1,15	1,20	3,00	50
3089240	7N0101402MJ	2256365	7N0101402RJ	1,4	6	1,35	1,40	3,50	50
3321514	7N0101502MJ	2256366	7N0101502RJ	1,5	6	1,45	1,50	3,80	50
3089241	7N0101602MJ	2256367	7N0101602RJ	1,6	6	1,55	1,60	4,00	50
3089242	7N0101802MJ	2256368	7N0101802RJ	1,8	6	1,75	1,80	4,50	50
3321515	7N0102002MJ	2256369	7N0102002RJ	2,0	6	1,95	2,00	5,00	50
3321516	7N0102502MJ	2256370	7N0102502RJ	2,5	6	2,40	2,50	5,00	50
3321517	7N0103002MJ	2256371	7N0103002RJ	3,0	6	2,85	3,00	6,00	50
3089243	7N0104002MJ	2256372	7N0104002RJ	4,0	6	3,85	4,00	6,00	50
3091240	7N0106002MJ	2256373	7N0106002RJ	6,0	6	5,85	6,00	9,00	50

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



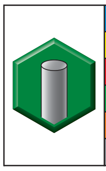




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7N21 • Vision Plus Micro



P	○
M	
K	
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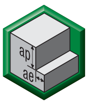
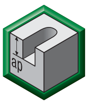
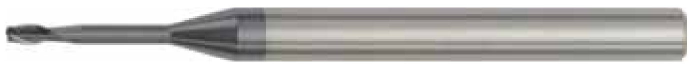
S	
H	●

● first choice
○ alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
grade TiAlN-RT1 TiAlN							
3665122	**7N2100501RT**	0,5	4	0,44	1,00	5,00	63
3665140	**7N2100601RT**	0,6	4	0,54	1,00	6,00	63
3665141	**7N2100801RT**	0,8	4	0,74	1,30	8,00	63
3665142	**7N2101001RT**	1,0	4	0,94	1,60	10,00	63
3665163	**7N2101201RT**	1,2	4	1,14	1,90	12,00	63
3665164	**7N2101501RT**	1,5	4	1,44	2,40	16,00	63
3665166	**7N2102001RT**	2,0	4	1,94	3,20	20,00	63
3665167	**7N2102501RT**	2,5	4	2,44	3,80	25,00	63
3665168	**7N2103001RT**	3,0	4	2,90	4,50	30,00	63

Series 7N02 7N12 7N22 • Vision Plus Micro

																		
		Side Milling (A) and Slotting (B)			AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
Material Group		ap	ae	ap	min		max	mm	0,3	0,4	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	0	1,25 x D	0,25 x D	0,75 x D	150	–	200	fz	0,002	0,003	0,003	0,004	0,005	0,007	0,010	0,014	0,017	0,021
	1	1,25 x D	0,25 x D	0,75 x D	150	–	200	fz	0,002	0,003	0,003	0,004	0,005	0,007	0,010	0,014	0,017	0,021
	2	1,25 x D	0,25 x D	0,75 x D	140	–	190	fz	0,002	0,003	0,003	0,004	0,005	0,007	0,010	0,014	0,017	0,021
	3	1,25 x D	0,25 x D	0,75 x D	120	–	160	fz	0,002	0,002	0,003	0,003	0,004	0,006	0,008	0,011	0,014	0,017
	4	1,25 x D	0,25 x D	0,5 x D	90	–	150	fz	0,002	0,002	0,003	0,003	0,004	0,005	0,008	0,010	0,013	0,016
	5	1,25 x D	0,25 x D	0,5 x D	60	–	100	fz	0,001	0,002	0,002	0,003	0,004	0,005	0,007	0,009	0,012	0,014
K	1	1,25 x D	0,25 x D	0,75 x D	120	–	150	fz	0,002	0,003	0,003	0,004	0,005	0,007	0,010	0,014	0,017	0,021
	2	1,25 x D	0,25 x D	0,5 x D	110	–	140	fz	0,002	0,002	0,003	0,003	0,004	0,006	0,008	0,011	0,014	0,017
H	1	1,25 x D	0,25 x D	0,5 x D	80	–	140	fz	0,002	0,002	0,003	0,003	0,004	0,005	0,008	0,010	0,013	0,016
	2	1,25 x D	0,25 x D	0,3 x D	70	–	120	fz	0,001	0,002	0,002	0,002	0,003	0,004	0,006	0,008	0,010	0,012
	3	1,25 x D	0,25 x D	0,25 x D	60	–	90	fz	0,001	0,001	0,002	0,002	0,002	0,003	0,005	0,006	0,008	0,009

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For tools with reach > 3 x D, reduce fz by 20%.
For tools with reach > 5 x D, reduce fz by 30%.

Series 423034 • Vision Plus Micro

Material Group		Profile Milling A ap	ae	K10UF-DCHP AlTiN Cutting Speed — vc m/min min		max	Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Finishing** mm	D1 — Diameter 0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,04 x D	0,04 x D	432	–	576	fz	0,012	0,015	0,020	0,025	0,038	0,051	0,064	0,078
	4	0,04 x D	0,04 x D	324	–	540	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
H	1	0,03 x D	0,03 x D	288	–	504	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
	2	0,03 x D	0,03 x D	252	–	432	fz	0,009	0,011	0,014	0,018	0,027	0,036	0,045	0,054
	3	0,02 x D	0,02 x D	216	–	324	fz	0,007	0,008	0,011	0,014	0,021	0,028	0,035	0,043
	4	0,02 x D	0,02 x D	180	–	252	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028

Material Group		Profile Milling A ap	ae	K10UF-DCHP AlTiN Cutting Speed — vc m/min min		max	Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Semi-Finishing** mm	D1 — Diameter 0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,1 x D	0,05 x D	300	-	400	fz	0,008	0,010	0,013	0,017	0,025	0,034	0,043	0,052
	4	0,1 x D	0,05 x D	225	-	375	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
H	1	0,07 x D	0,1 x D	200	-	350	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
	2	0,05 x D	0,04 x D	175	-	300	fz	0,006	0,007	0,009	0,012	0,018	0,024	0,030	0,036
	3	0,03 x D	0,03 x D	150	-	225	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028
	4	0,03 x D	0,03 x D	125	-	175	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,016	0,019

Material Group		Profile Milling A ap	ae	K10UF-DCHP AlTiN Cutting Speed — vc m/min min		max	Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Roughing** mm	D1 — Diameter 0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,2 x D	0,1 x D	216	-	288	fz	0,004	0,005	0,007	0,008	0,013	0,017	0,021	0,026
	4	0,2 x D	0,1 x D	162	-	270	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
H	1	0,15 x D	0,1 x D	144	-	252	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
	2	0,1 x D	0,075 x D	126	-	216	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,015	0,018
	3	0,05 x D	0,05 x D	108	-	162	fz	0,002	0,003	0,004	0,005	0,007	0,009	0,012	0,014
	4	0,05 x D	0,05 x D	90	-	126	fz	0,002	0,002	0,002	0,003	0,005	0,006	0,008	0,009

NOTE: Please use reference table for correction of vc based on average degrees of the mould. *See page O205.*

Series 7N01 • Vision Plus Micro

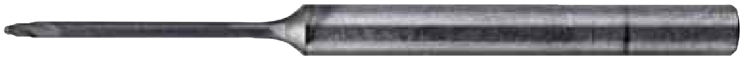

Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Finishing**								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,04 x D	0,04 x D	432	–	576	fz	0,012	0,015	0,020	0,025	0,038	0,051	0,064	0,078
	4	0,04 x D	0,04 x D	324	–	540	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
H	1	0,03 x D	0,03 x D	288	–	504	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
	2	0,03 x D	0,03 x D	252	–	432	fz	0,009	0,011	0,014	0,018	0,027	0,036	0,045	0,054
	3	0,02 x D	0,02 x D	216	–	324	fz	0,007	0,008	0,011	0,014	0,021	0,028	0,035	0,043
	4	0,02 x D	0,02 x D	180	–	252	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028


Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Semi-Finishing**								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,1 x D	0,05 x D	300	-	400	fz	0,008	0,010	0,013	0,017	0,025	0,034	0,043	0,052
	4	0,1 x D	0,05 x D	225	-	375	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
H	1	0,07 x D	0,1 x D	200	-	350	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
	2	0,05 x D	0,04 x D	175	-	300	fz	0,006	0,007	0,009	0,012	0,018	0,024	0,030	0,036
	3	0,03 x D	0,03 x D	150	-	225	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028
	4	0,03 x D	0,03 x D	125	-	175	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,016	0,019

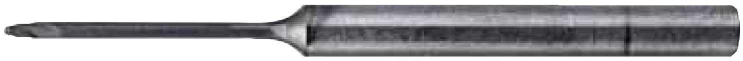

Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Roughing**								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,2 x D	0,1 x D	216	-	288	fz	0,004	0,005	0,007	0,008	0,013	0,017	0,021	0,026
	4	0,2 x D	0,1 x D	162	-	270	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
H	1	0,15 x D	0,1 x D	144	-	252	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
	2	0,1 x D	0,075 x D	126	-	216	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,015	0,018
	3	0,05 x D	0,05 x D	108	-	162	fz	0,002	0,003	0,004	0,005	0,007	0,009	0,012	0,014
	4	0,05 x D	0,05 x D	90	-	126	fz	0,002	0,002	0,002	0,003	0,005	0,006	0,008	0,009

NOTE: Please use reference table for correction of vc based on average degrees of the mould. *See page O205.*

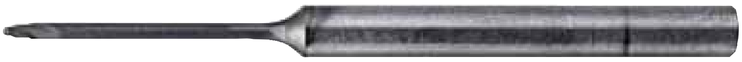
Series 7N21 • Vision Plus Micro



Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Finishing**								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,04 x D	0,04 x D	432	–	576	fz	0,012	0,015	0,020	0,025	0,038	0,051	0,064	0,078
P	4	0,04 x D	0,04 x D	324	–	540	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
H	1	0,03 x D	0,03 x D	288	–	504	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
H	2	0,03 x D	0,03 x D	252	–	432	fz	0,009	0,011	0,014	0,018	0,027	0,036	0,045	0,054
H	3	0,02 x D	0,02 x D	216	–	324	fz	0,007	0,008	0,011	0,014	0,021	0,028	0,035	0,043
H	4	0,02 x D	0,02 x D	180	–	252	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028



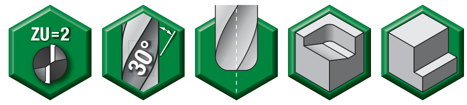
Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Semi-Finishing**								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,1 x D	0,05 x D	300	-	400	fz	0,008	0,010	0,013	0,017	0,025	0,034	0,043	0,052
P	4	0,1 x D	0,05 x D	225	-	375	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
H	1	0,07 x D	0,1 x D	200	-	350	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
H	2	0,05 x D	0,04 x D	175	-	300	fz	0,006	0,007	0,009	0,012	0,018	0,024	0,030	0,036
H	3	0,03 x D	0,03 x D	150	-	225	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028
H	4	0,03 x D	0,03 x D	125	-	175	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,016	0,019

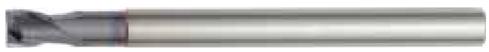


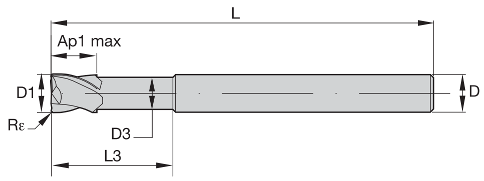
Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Roughing**								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,2 x D	0,1 x D	216	-	288	fz	0,004	0,005	0,007	0,008	0,013	0,017	0,021	0,026
P	4	0,2 x D	0,1 x D	162	-	270	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
H	1	0,15 x D	0,1 x D	144	-	252	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
H	2	0,1 x D	0,075 x D	126	-	216	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,015	0,018
H	3	0,05 x D	0,05 x D	108	-	162	fz	0,002	0,003	0,004	0,005	0,007	0,009	0,012	0,014
H	4	0,05 x D	0,05 x D	90	-	126	fz	0,002	0,002	0,002	0,003	0,005	0,006	0,008	0,009

NOTE: Please use reference table for correction of vc based on averages degree of the mould. See page O205.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



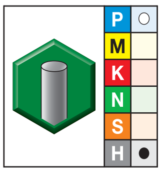




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 75N2 • Vision Plus

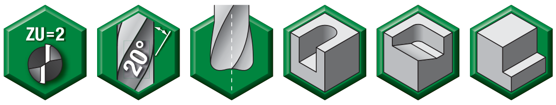


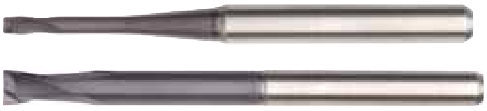
● first choice
○ alternate choice

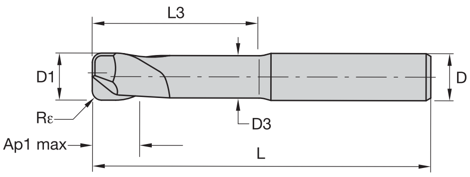
grade TiAlN-RT1
TiAlN

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2544530	75N203022RT	3,0	6	2,80	3,00	9,00	75	0,30
2544735	75N203042RT	3,0	6	2,80	3,00	9,00	75	0,50
2544736	75N203062RT	3,0	6	2,80	3,00	9,00	75	1,00
2544737	75N204022RT	4,0	6	3,70	4,00	12,00	75	0,30
2544738	75N204042RT	4,0	6	3,70	4,00	12,00	75	0,50
2544739	75N204062RT	4,0	6	3,70	4,00	12,00	75	1,00
2544740	75N205022RT	5,0	6	4,60	5,00	15,00	75	0,30
2544741	75N205042RT	5,0	6	4,60	5,00	15,00	75	1,00
2544742	75N206032RT	6,0	6	5,50	6,00	18,00	75	0,30
2545163	75N206042RT	6,0	6	5,50	6,00	18,00	75	0,50
2545164	75N206052RT	6,0	6	5,50	6,00	18,00	75	0,75
2545166	75N206062RT	6,0	6	5,50	6,00	18,00	75	1,00
2545167	75N206072RT	6,0	6	5,50	6,00	18,00	75	1,50
2545168	75N208023RT	8,0	8	7,40	8,00	24,00	100	0,50
2545169	75N208043RT	8,0	8	7,40	8,00	24,00	100	1,00
2545170	75N208063RT	8,0	8	7,40	8,00	24,00	100	1,50
2545171	75N210024RT	10,0	10	9,20	10,00	30,00	100	0,50
2545172	75N210034RT	10,0	10	9,20	10,00	30,00	100	0,75
2545183	75N210044RT	10,0	10	9,20	10,00	30,00	100	1,00
2545184	75N210064RT	10,0	10	9,20	10,00	30,00	100	2,00
2545185	75N212025RT	12,0	12	11,00	12,00	36,00	125	0,50
2545186	75N212035RT	12,0	12	11,00	12,00	36,00	125	0,75
2545187	75N212045RT	12,0	12	11,00	12,00	36,00	125	1,00
2545188	75N212055RT	12,0	12	11,00	12,00	36,00	125	1,50
2545189	75N212065RT	12,0	12	11,00	12,00	36,00	125	2,00

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





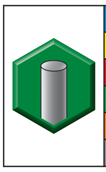


Larger than 4mm

End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 422875 • Vision Plus



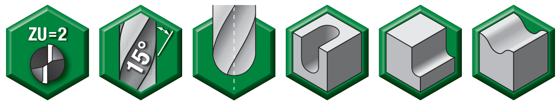
P	○
M	
K	
N	
S	
H	●

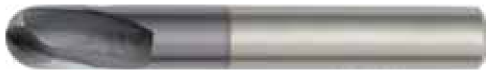
● first choice
○ alternate choice

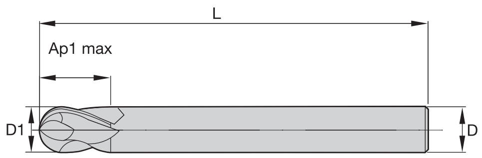
grade K10UF-DCHP AlTiN

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2343319	422875-002003	2,0	6	1,90	2,00	17,50	70	0,30
2343303	422875-002005	2,0	6	1,90	2,00	17,50	70	0,50
2343305	422875-003005	3,0	6	2,90	3,00	18,50	70	0,50
2343321	422875-003010	3,0	6	2,90	3,00	18,50	70	1,00
2343307	422875-004005	4,0	6	3,80	4,00	19,50	80	0,50
2343323	422875-004010	4,0	6	3,80	4,00	19,50	80	1,00
2343309	422875-005005	5,0	6	4,80	5,00	42,00	80	0,50
2343325	422875-005010	5,0	6	4,80	5,00	42,00	80	1,00
2343327	422875-006005	6,0	6	5,80	6,00	42,00	80	0,50
2343311	422875-006010	6,0	6	5,80	6,00	42,00	80	1,00
2629541	422875-008005	8,0	8	7,80	8,00	51,00	90	0,50
2343329	422875-008010	8,0	8	7,80	8,00	51,00	90	1,00
2629555	422875-008015	8,0	8	7,80	8,00	51,00	90	1,50
2343313	422875-008020	8,0	8	7,80	8,00	51,00	90	2,00
2629559	422875-010005	10,0	10	9,70	10,00	57,00	100	0,50
2629560	422875-010010	10,0	10	9,70	10,00	57,00	100	1,00
3048961	422875-010015	10,0	10	9,70	10,00	57,00	100	1,50
2343331	422875-010020	10,0	10	9,70	10,00	57,00	100	2,00
2343315	422875-010030	10,0	10	9,70	10,00	57,00	100	3,00
2629561	422875-012005	12,0	12	11,70	12,00	62,00	110	0,50
2629573	422875-012010	12,0	12	11,70	12,00	62,00	110	1,00
2343333	422875-012030	12,0	12	11,70	12,00	62,00	110	3,00
2343317	422875-012040	12,0	12	11,70	12,00	62,00	110	4,00

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



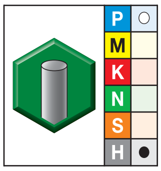




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

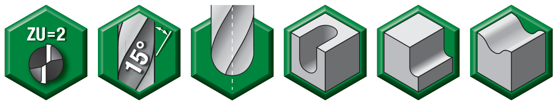
Series 7151 • Vision Plus

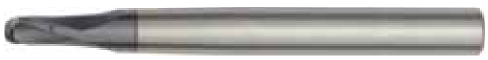


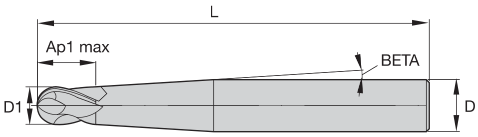
● first choice
○ alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L
grade TiAlN-RT1 TiAlN					
1860036	715101000RT	1,0	3	3,00	38
1860090	715102000RT	2,0	3	3,00	38
1860103	715102500RT	2,5	3	3,00	38
1860106	715103000RT	3,0	3	3,00	38
1860109	715104001RT	4,0	4	4,00	50
1860111	715105001RT	5,0	5	5,00	50
1860112	715106002RT	6,0	6	6,00	50
1860133	715108003RT	8,0	8	8,00	63
1860134	715110004RT	10,0	10	10,00	76
1860135	715112005RT	12,0	12	12,00	76
1860136	715116006RT	16,0	16	16,00	89
1860137	715120007RT	20,0	20	20,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



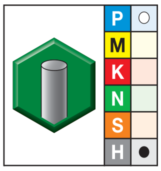




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7061 • Vision Plus

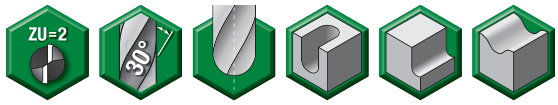


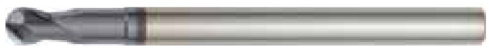
● first choice
○ alternate choice

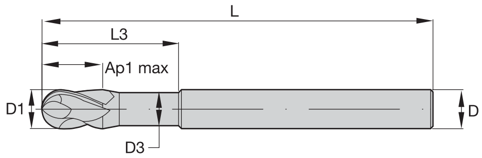
grade TiAlN-RT1
TiAlN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BETA
2495994	706101001RT	1,0	4	1,00	63	3.50
2495995	706102001RT	2,0	4	2,00	63	3.50
2495996	706102501RT	2,5	4	2,50	63	3.00
2495997	706103002RT	3,0	6	3,00	75	1.50
2495998	706104002RT	4,0	6	4,00	75	1.50
2495999	706105002RT	5,0	6	5,00	75	1.50
2496000	706106004RT	6,0	10	6,00	100	1.50
2496001	706108004RT	8,0	10	8,00	100	1.50
2496002	706110005RT	10,0	12	10,00	125	1.50
2496023	706112006RT	12,0	16	12,00	125	1.50

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



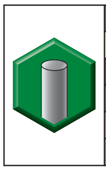




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 70N1 • Vision Plus

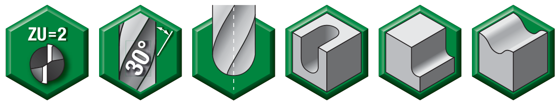


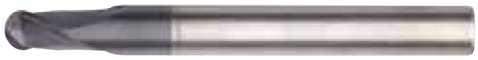
P	○
M	
K	
N	
S	
H	●

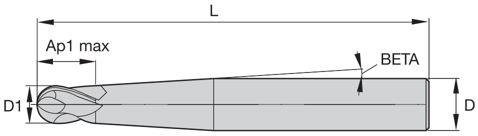
● first choice
○ alternate choice

grade TiAIN-RT1 TiAIN order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
2545190	70N101001RT	1,0	4	0,80	1,00	3,00	63
2545191	70N101501RT	1,5	4	1,30	1,50	4,50	63
2545192	70N102002RT	2,0	6	1,80	2,00	6,00	76
2545213	70N103002RT	3,0	6	2,80	3,00	9,00	76
2545214	70N104002RT	4,0	6	3,70	4,00	12,00	76
2545215	70N105002RT	5,0	6	4,60	5,00	15,00	76
2545216	70N106002RT	6,0	6	5,50	6,00	18,00	76
2545217	70N108003RT	8,0	8	7,50	8,00	24,00	100
2545218	70N110004RT	10,0	10	9,50	10,00	30,00	100
2545219	70N112005RT	12,0	12	11,50	12,00	36,00	125

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



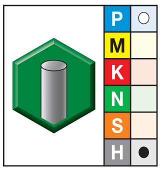




End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 422869 422868 • Vision Plus

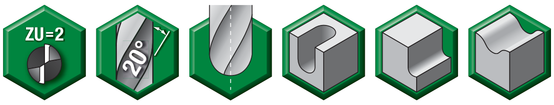


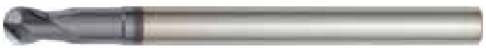
● first choice
○ alternate choice

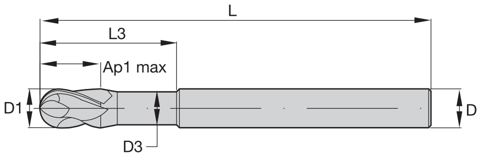
grade K10UF-DCHP AlTiN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BETA
2343179	422869-000010	1,0	4	1,00	40	7.50
2343183	422869-000020	2,0	6	2,00	45	7.50
2343186	422869-000030	3,0	6	3,00	45	7.50
2343188	422869-000040	4,0	6	4,00	45	7.50
2343190	422869-000050	5,0	6	5,00	50	7.50
2343169	422868-000060	6,0	6	6,00	80	–
2343192	422869-000060	6,0	6	6,00	50	–
2343171	422868-000080	8,0	8	8,00	90	–
2343194	422869-000080	8,0	8	8,00	60	–
2343173	422868-000100	10,0	10	10,00	100	–
2343196	422869-000100	10,0	10	10,00	70	–
2343198	422869-000120	12,0	12	12,00	75	–
2343200	422869-000160	16,0	16	16,00	80	–

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





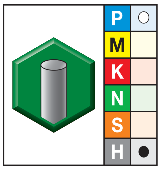


Diameter 4mm

End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

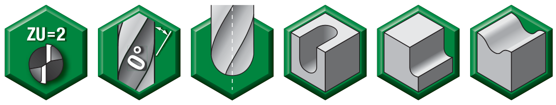
Series 422870 • Vision Plus

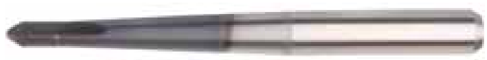


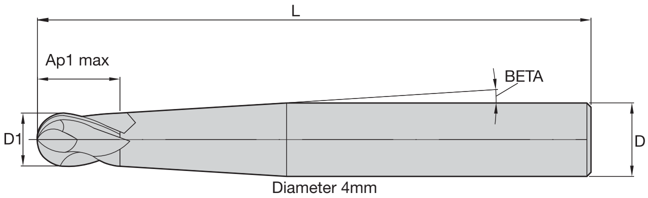
● first choice
○ alternate choice

grade K10UF-DCHP AlTiN order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
2343202	422870-000020	2,0	6	1,90	2,00	17,50	70
2343204	422870-000030	3,0	6	2,90	3,00	18,50	70
2343206	422870-000040	4,0	6	3,80	4,00	19,50	80
2343208	422870-000050	5,0	6	4,80	5,00	39,00	80
2343210	422870-000060	6,0	6	5,80	6,00	42,00	80
2343212	422870-000080	8,0	8	7,80	8,00	52,00	90
2343214	422870-000100	10,0	10	9,70	10,00	58,00	100
2343216	422870-000120	12,0	12	11,70	12,00	63,00	110

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



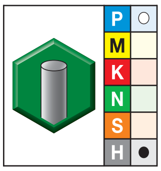




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 422873 • Vision Plus

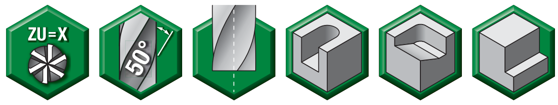


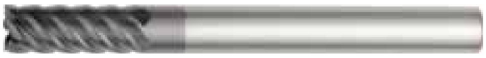
● first choice
○ alternate choice

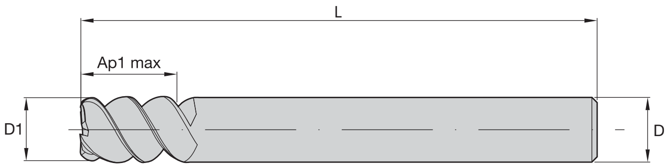
grade K10UF-DCHP
AlTiN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BETA
2343265	**422873-050100**	5,0	8	6,00	100	1.75
2343269	**422873-060100**	6,0	10	8,00	100	2.52
2343275	**422873-100100**	10,0	12	15,00	100	1.83
2343277	**422873-100150**	10,0	12	15,00	150	0.80

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



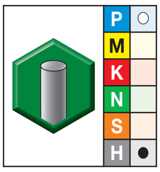




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7505 7515 7525 7545 • Vision Plus



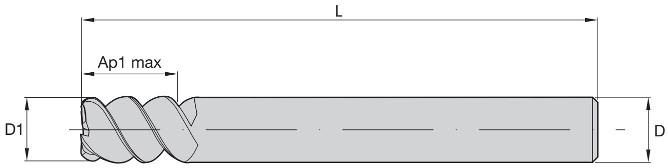
● first choice
○ alternate choice

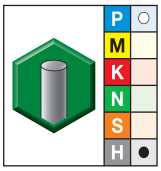
grade TiAlN-LT1
TiAlN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
2499570	754503002LT	3,0	6	4,50	50	4
2499567	750503002LT	3,0	6	4,50	57	4
2499571	754504002LT	4,0	6	6,00	50	4
2499568	750504002LT	4,0	6	6,00	57	4
2499572	754505002LT	5,0	6	7,50	50	4
2499569	750505002LT	5,0	6	7,50	76	4
1848805	754506002LT	6,0	6	9,00	50	4
1724468	751506002LT	6,0	6	15,00	76	4
1724487	752506002LT	6,0	6	21,00	76	4
1860603	754508003LT	8,0	8	12,00	63	4
1724463	750508003LT	8,0	8	12,00	100	4
1724469	751508003LT	8,0	8	20,00	100	4
1724489	752508003LT	8,0	8	28,00	100	4
1860604	754510004LT	10,0	10	15,00	76	4
1724464	750510004LT	10,0	10	15,00	100	4
1724481	751510004LT	10,0	10	25,00	100	5
1724490	752510004LT	10,0	10	35,00	100	5
1860605	754512005LT	12,0	12	18,00	76	4
1724465	750512005LT	12,0	12	18,00	125	4
1724482	751512005LT	12,0	12	30,00	125	6

(continued)

(Series 7505 7515 7525 7545 • Vision Plus — continued)

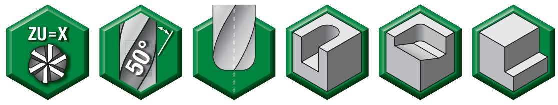


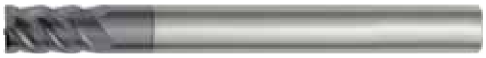


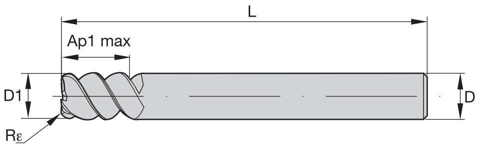
● first choice
○ alternate choice

grade TiAlN-LT1 TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
1724531	**752512005LT**	12,0	12	42,00	125	6
1860606	**754516006LT**	16,0	16	24,00	89	4
1724466	**750516006LT**	16,0	16	24,00	125	4
1724483	**751516006LT**	16,0	16	40,00	125	6
1724533	**752516006LT**	16,0	16	56,00	125	6
1860607	**754520007LT**	20,0	20	30,00	104	4
1724467	**750520007LT**	20,0	20	30,00	150	4
1724484	**751520007LT**	20,0	20	50,00	150	6
1724536	**752520007LT**	20,0	20	70,00	150	6
1860608	**754525008LT**	25,0	25	38,00	121	5
1731683	**750525008LT**	25,0	25	38,00	150	5
1747878	**751525008LT**	25,0	25	63,00	150	6
1747931	**752525008LT**	25,0	25	88,00	150	6

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



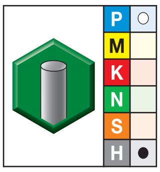




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7585 7595 • Vision Plus



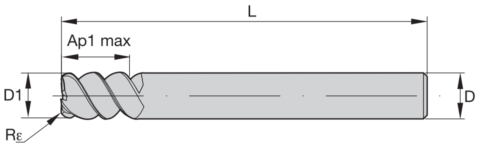
● first choice
○ alternate choice

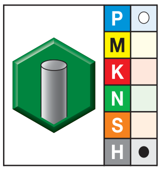
grade TiAlN-LT1
TiAlN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	ZU
2540317	759503002LT	3,0	6	4,50	50	0,25	4
2540318	759503012LT	3,0	6	4,50	50	0,50	4
2540319	759504002LT	4,0	6	6,00	50	0,25	4
2540320	759504012LT	4,0	6	6,00	50	0,50	4
2540321	759505002LT	5,0	6	7,50	50	0,25	4
2540322	759505012LT	5,0	6	7,50	50	0,50	4
1862105	759506002LT	6,0	6	9,00	50	0,25	4
1862106	759506012LT	6,0	6	9,00	50	0,50	4
2541273	759506022LT	6,0	6	9,00	50	0,75	4
2541274	759506032LT	6,0	6	9,00	50	1,00	4
1860609	758506002LT	6,0	6	9,00	76	0,25	4
1860610	758506012LT	6,0	6	9,00	76	0,50	4
1862107	759508003LT	8,0	8	12,00	63	0,50	4
2541275	759508023LT	8,0	8	12,00	63	0,75	4
1862108	759508013LT	8,0	8	12,00	63	1,00	4
2541276	759508033LT	8,0	8	12,00	63	1,50	4
1860611	758508003LT	8,0	8	12,00	100	0,50	4
1860612	758508013LT	8,0	8	12,00	100	1,00	4
1862109	759510004LT	10,0	10	15,00	76	0,50	4
1862110	759510014LT	10,0	10	15,00	76	1,00	4

(continued)

(Series 7585 7595 • Vision Plus — continued)



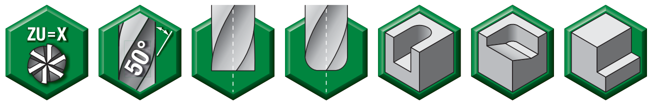


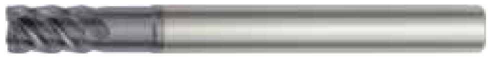
● first choice
○ alternate choice

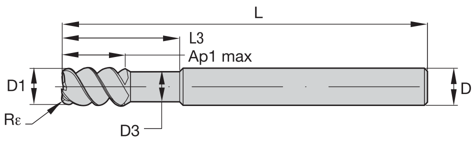
grade TiAlN-LT1
TiAlN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	ZU
2541277	759510024LT	10,0	10	15,00	76	1,50	4
2541278	759510034LT	10,0	10	15,00	76	2,00	4
1860623	758510004LT	10,0	10	15,00	100	0,50	4
1860624	758510014LT	10,0	10	15,00	100	1,00	4
1862111	759512005LT	12,0	12	18,00	76	0,50	4
2541279	759512025LT	12,0	12	18,00	76	1,00	4
1862112	759512015LT	12,0	12	18,00	76	1,50	4
2541280	759512035LT	12,0	12	18,00	76	2,00	4
1860625	758512005LT	12,0	12	18,00	125	0,50	4
1860626	758512015LT	12,0	12	18,00	125	1,50	4
1862113	759516006LT	16,0	16	24,00	89	0,50	4
1862114	759516016LT	16,0	16	24,00	89	1,50	4
2541282	759516036LT	16,0	16	24,00	89	2,00	4
1860627	758516006LT	16,0	16	24,00	125	0,50	4
1860628	758516016LT	16,0	16	24,00	125	1,50	4
1862115	759520007LT	20,0	20	30,00	104	0,50	4
2541293	759520027LT	20,0	20	30,00	104	1,00	4
1862116	759520017LT	20,0	20	30,00	104	2,00	4
1860629	758520007LT	20,0	20	30,00	150	0,50	4
1860630	758520017LT	20,0	20	30,00	150	2,00	4
1862117	759525008LT	25,0	25	38,00	121	0,50	5
1862118	759525018LT	25,0	25	38,00	121	3,00	5
1860631	758525008LT	25,0	25	38,00	150	0,50	5
1860632	758525018LT	25,0	25	38,00	150	3,00	5

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



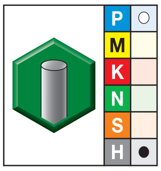




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 75N5 • Vision Plus



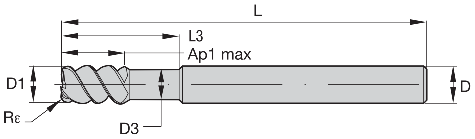
● first choice
○ alternate choice

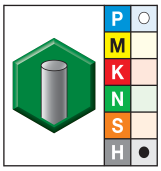
grade TiAlN-LT1
TiAlN

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	ZU
2544367	75N503022LT	3,0	6	2,7	4,50	9,00	57	0,25	4
2544368	75N503042LT	3,0	6	2,7	4,50	9,00	57	0,50	4
2544369	75N504022LT	4,0	6	3,7	6,00	12,00	57	0,25	4
2544370	75N504042LT	4,0	6	3,7	6,00	12,00	57	0,50	4
2544371	75N505022LT	5,0	6	4,6	7,50	15,00	76	0,25	4
2544372	75N505042LT	5,0	6	4,6	7,50	15,00	76	0,50	4
1862119	75N506002LT	6,0	6	5,4	9,00	18,00	76	—	4
2544443	75N506022LT	6,0	6	5,4	9,00	18,00	76	0,25	4
2544444	75N506042LT	6,0	6	5,4	9,00	18,00	76	0,50	4
2544445	75N506062LT	6,0	6	5,4	9,00	18,00	76	0,75	4
2544446	75N506082LT	6,0	6	5,4	9,00	18,00	76	1,00	4
1862120	75N508003LT	8,0	8	7,4	12,00	24,00	100	—	4
2544447	75N508023LT	8,0	8	7,4	12,00	24,00	100	0,50	4
2544448	75N508033LT	8,0	8	7,4	12,00	24,00	100	1,00	4
2544449	75N508043LT	8,0	8	7,4	12,00	24,00	100	1,50	4
2544450	75N508053LT	8,0	8	7,4	12,00	24,00	100	2,00	4
1862121	75N510004LT	10,0	10	9,4	15,00	30,00	100	—	4
2544452	75N510024LT	10,0	10	9,2	15,00	30,00	100	0,50	4
2544483	75N510034LT	10,0	10	9,2	15,00	30,00	100	1,00	4
2544484	75N510044LT	10,0	10	9,2	15,00	30,00	100	1,50	4

(continued)

(Series 75N5 • Vision Plus — continued)

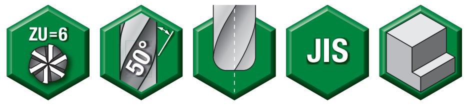


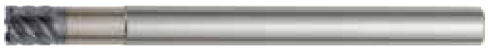


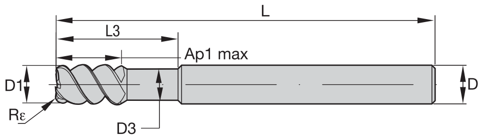
● first choice
○ alternate choice

grade TiAlN-LT1 TiAlN order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	ZU
2544485	**75N510054LT**	10,0	10	9,2	15,00	30,00	100	2,00	4
1862122	**75N512005LT**	12,0	12	11,4	18,00	36,00	125	–	4
2544486	**75N512025LT**	12,0	12	11,0	18,00	36,00	125	0,50	4
2544487	**75N512035LT**	12,0	12	11,0	18,00	36,00	125	1,00	4
2544488	**75N512045LT**	12,0	12	11,0	18,00	36,00	125	1,50	4
2544489	**75N512055LT**	12,0	12	11,0	18,00	36,00	125	2,00	4
1862123	**75N516006LT**	16,0	16	15,4	24,00	48,00	125	–	4
2544490	**75N516026LT**	16,0	16	15,0	24,00	48,00	125	0,50	4
2544491	**75N516046LT**	16,0	16	15,0	24,00	48,00	125	1,50	4
1862124	**75N520007LT**	20,0	20	19,4	30,00	60,00	150	–	4
2544492	**75N520027LT**	20,0	20	19,0	30,00	60,00	150	0,50	4
2544523	**75N520047LT**	20,0	20	19,0	30,00	60,00	150	2,00	4
1862125	**75N525008LT**	25,0	25	24,4	38,00	75,00	150	–	5
2544524	**75N525028LT**	25,0	25	24,0	38,00	75,00	150	0,50	5
2544525	**75N525048LT**	25,0	25	24,0	38,00	75,00	150	3,00	5

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



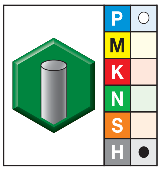




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

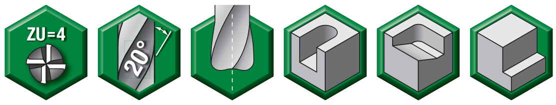
Series 75N8 • Vision Plus

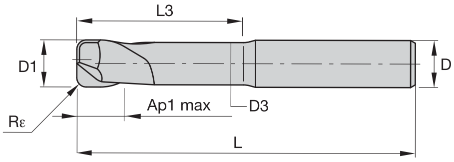


● first choice
○ alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
	grade TiAlN-RT1 TiAlN							
2544526	**75N806002RT**	6,0	6	5,50	6,00	18,00	76	0,50
2544527	**75N808003RT**	8,0	8	7,40	8,00	24,00	100	0,50
2544528	**75N810004RT**	10,0	10	9,20	10,00	30,00	100	1,00
2544529	**75N812005RT**	12,0	12	11,00	12,00	36,00	125	1,00

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

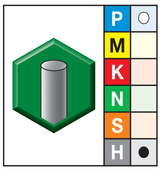




End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 422876 422878 • Vision Plus

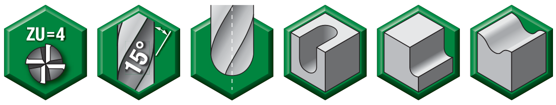


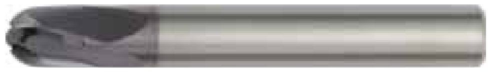
● first choice
○ alternate choice

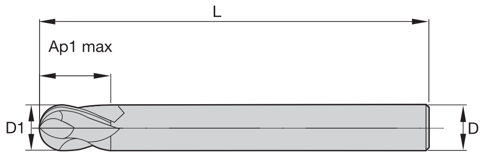
grade K10UF-DCHP
AlTiN

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2628898	422876-004005	4,0	6	3,80	4,00	10,00	45	0,50
2629013	422876-004010	4,0	6	3,80	4,00	10,00	45	1,00
2629015	422876-005005	5,0	6	4,80	5,00	12,00	50	0,50
2629016	422876-005010	5,0	6	4,80	5,00	12,00	50	1,00
2629018	422876-006005	6,0	6	5,80	6,00	12,00	50	0,50
2629021	422876-006010	6,0	6	5,80	6,00	12,00	50	1,00
2630276	422878-006005	6,0	6	5,80	6,00	42,00	80	0,50
2629056	422876-008005	8,0	8	7,80	8,00	20,00	60	0,50
2629060	422876-008010	8,0	8	7,80	8,00	20,00	60	1,00
2629061	422876-008020	8,0	8	7,80	8,00	20,00	60	2,00
2630285	422878-008010	8,0	8	7,80	8,00	51,00	90	1,00
2630288	422878-008015	8,0	8	7,80	8,00	51,00	90	1,50
2630290	422878-008020	8,0	8	7,80	8,00	51,00	90	2,00
2629062	422876-010005	10,0	10	9,80	10,00	26,00	70	0,50
2629077	422876-010010	10,0	10	9,80	10,00	26,00	70	1,00
2629086	422876-010020	10,0	10	9,80	10,00	26,00	70	2,00
2630291	422878-010005	10,0	10	9,70	10,00	57,00	100	0,50
2630292	422878-010010	10,0	10	9,70	10,00	57,00	100	1,00
2630345	422878-010020	10,0	10	9,70	10,00	57,00	100	2,00
2629089	422876-012005	12,0	12	11,80	12,00	26,00	75	0,50
2629094	422876-012010	12,0	12	11,80	12,00	26,00	75	1,00
2629095	422876-012020	12,0	12	11,80	12,00	26,00	75	2,00
2629097	422876-012030	12,0	12	11,80	12,00	26,00	75	3,00
2630347	422878-012010	12,0	12	11,70	12,00	62,00	110	1,00
2630386	422878-012030	12,0	12	11,70	12,00	62,00	110	3,00

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



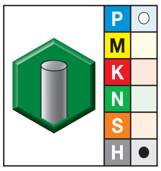




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

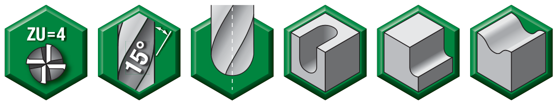
Series 7150 • Vision Plus

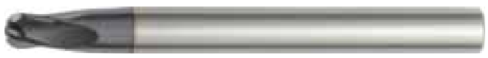


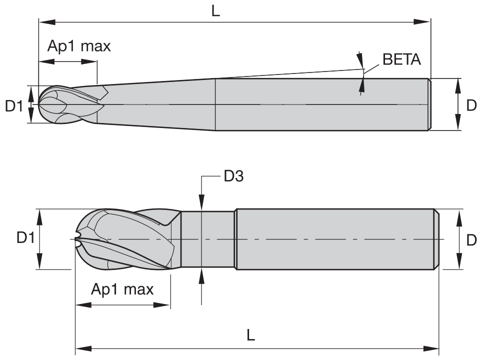
● first choice
○ alternate choice

grade TiAlN-RT1 TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L
1859880	715002000RT	2,0	3	2,00	38
1859881	715002500RT	2,5	3	3,00	38
1859882	715003000RT	3,0	3	3,00	38
1859904	715004001RT	4,0	4	4,00	50
1859906	715005001RT	5,0	5	5,00	50
1859907	715006002RT	6,0	6	6,00	50
1859908	715008003RT	8,0	8	8,00	63
1859909	715010004RT	10,0	10	10,00	76
1859910	715012005RT	12,0	12	12,00	76
1859911	715016006RT	16,0	16	16,00	89
1859912	715020007RT	20,0	20	20,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



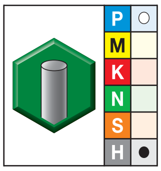




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7050 7060 • Vision Plus

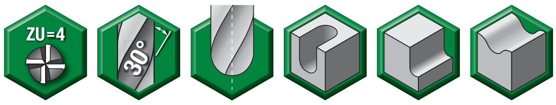


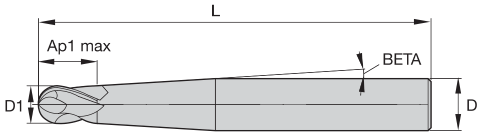
grade TiAlN-RT1
TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	BETA
1724321	705002001RT	2,0	4	—	2,00	2,00	63	2.5
2495913	706002001RT	2,0	4	—	2,00	2,00	63	3.5
1724322	705002501RT	2,5	4	—	2,50	2,50	63	2.5
2495914	706002501RT	2,5	4	—	2,50	2,50	63	3.0
1724323	705003002RT	3,0	6	—	3,00	3,00	75	2.5
2495915	706003002RT	3,0	6	—	3,00	3,00	75	1.5
1724324	705004002RT	4,0	6	—	4,00	4,00	75	2.5
2495916	706004002RT	4,0	6	—	4,00	4,00	75	1.5
1724325	705005002RT	5,0	6	—	5,00	5,00	75	2.5
2495917	706005002RT	5,0	6	—	5,00	5,00	75	1.5
1724326	705006004RT	6,0	10	—	6,00	6,00	100	2.5
2495918	706006004RT	6,0	10	—	6,00	6,00	100	1.5
1724327	705008004RT	8,0	10	—	8,00	8,00	100	2.5
2495919	706008004RT	8,0	10	—	8,00	8,00	100	1.5
1724328	705010005RT	10,0	12	—	10,00	10,00	125	2.5
2495920	706010005RT	10,0	12	—	10,00	10,00	125	1.5
1724329	705012006RT	12,0	16	—	12,00	12,00	125	2.5
2495921	706012006RT	12,0	16	—	12,00	12,00	125	1.5
1724330	705016006RT	16,0	16	15,00	16,00	48,00	125	—
1724361	705020007RT	20,0	20	19,00	20,00	60,00	150	—

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

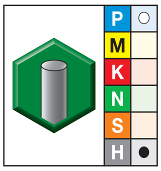




End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 422871 • Vision Plus

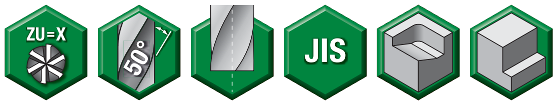


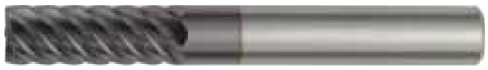
● first choice
○ alternate choice

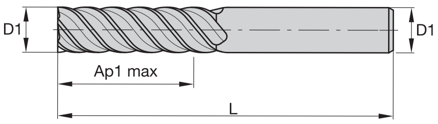
grade K10UF-DCHP
AlTiN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BETA
2343218	422871-030075	3,0	6	4,00	75	2.85
2343220	422871-030100	3,0	6	4,00	100	1.65
2343222	422871-040075	4,0	6	5,00	75	2.67
2343224	422871-040100	4,0	6	5,00	100	1.18
2343227	422871-050075	5,0	6	6,00	75	1.33
2343229	422871-050100	5,0	8	6,00	100	1.75
2343230	422871-060075	6,0	8	8,00	75	2.38
2343233	422871-060100	6,0	10	8,00	100	2.52
2343235	422871-080100	8,0	10	12,00	100	1.52
2343237	422871-080150	8,0	12	12,00	150	1.40
2343239	422871-100100	10,0	12	15,00	100	1.83
2343241	422871-100150	10,0	12	15,00	150	0.80

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



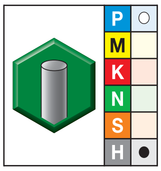




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

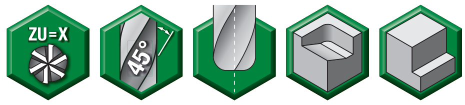
Series D618 • Vision Plus

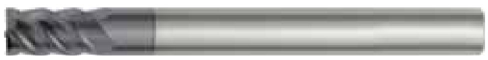


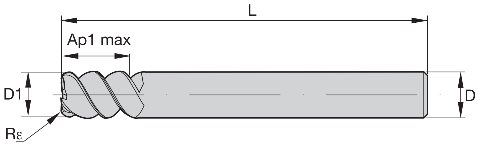
● first choice
○ alternate choice

grade TiAlN-RJ TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
2256338	D61803002RJ	3,0	4	8,00	50	4
2257304	D61804002RJ	4,0	6	12,00	57	4
2256340	D61805002RJ	5,0	6	13,00	57	4
2256341	D61806002RJ	6,0	6	15,00	60	6
2256342	D61807003RJ	7,0	8	20,00	75	6
2256353	D61808003RJ	8,0	8	20,00	75	6
2256354	D61810004RJ	10,0	10	25,00	80	6
2256355	D61812005RJ	12,0	12	30,00	100	6
2256356	D61816006RJ	16,0	16	40,00	110	6
2256357	D61820007RJ	20,0	20	45,00	120	6

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



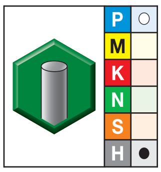




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 422837 422831 • Vision Plus

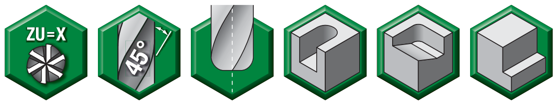


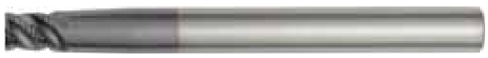
● first choice
○ alternate choice

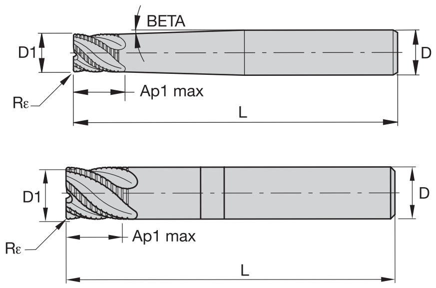
grade K10UF-DCHP
AlTiN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	ZU
2342495	422837-006005	6,0	6	13,00	57	0,50	6
2342388	422831-006005	6,0	6	18,00	62	0,50	6
2342497	422837-008005	8,0	8	19,00	63	0,50	6
2342390	422831-008005	8,0	8	24,00	68	0,50	6
2342499	422837-010005	10,0	10	22,00	72	0,50	6
2342392	422831-010005	10,0	10	30,00	80	0,50	6
2656458	422837-012005	12,0	12	26,00	83	0,50	6
2342501	422837-012010	12,0	12	26,00	83	1,00	6
2657057	422831-012005	12,0	12	36,00	93	0,50	6
2342394	422831-012010	12,0	12	36,00	93	1,00	6
2656459	422837-016005	16,0	16	32,00	92	0,50	6
2342502	422837-016010	16,0	16	32,00	92	1,00	6
2342396	422831-016010	16,0	16	48,00	108	1,00	6
2657058	422831-016005	16,0	16	48,00	108	0,50	6
2656460	422837-020005	20,0	20	38,00	104	0,50	8
2342505	422837-020010	20,0	20	38,00	104	1,00	8
2342398	422831-020010	20,0	20	60,00	126	1,00	8
2656461	422837-025005	25,0	25	45,00	121	0,50	8
2342400	422831-025015	25,0	25	75,00	150	1,50	8

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



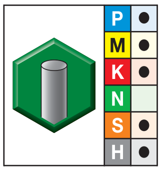




End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3–6	-0,030/-0,105	> 3–6	0/0,008
> 6–10	-0,040/-0,130	> 6–10	0/0,009
> 10–18	-0,050/-0,160	> 10–18	0/0,011
> 18–30	-0,065/-0,195	> 18–30	0/0,013

Series 7670 • Vision Plus

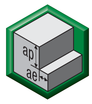
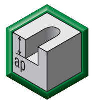
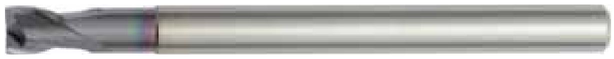


● first choice
○ alternate choice

grade TiAlN-LT1
TiAlN

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	ZU	BETA
1724582	**767004002LT**	4,0	6	—	4,00	4,00	75	0,75	3	2.5
1724556	**767005002LT**	5,0	6	—	5,00	5,00	75	0,75	3	2.5
1724558	**767006004LT**	6,0	10	—	6,00	6,00	100	0,75	4	2.5
1724559	**767008004LT**	8,0	10	—	8,00	8,00	100	0,75	4	2.5
1724560	**767010005LT**	10,0	12	—	10,00	10,00	125	0,75	4	2.5
1724590	**767012006LT**	12,0	16	—	12,00	12,00	125	1,00	4	2.5
1724621	**767016006LT**	16,0	16	15,00	16,00	48,00	125	1,00	6	—
1724622	**767020007LT**	20,0	20	19,00	20,00	60,00	150	1,25	6	—
1806404	**767025008LT**	25,0	25	24,00	25,00	75,00	150	1,25	6	—

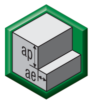
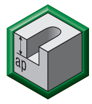
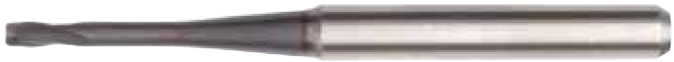
Series 75N2 • Vision Plus

Material Group															
		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,75 x D	0,1 x D	0,4 x D	160	–	180	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070
	4	0,75 x D	0,1 x D	0,4 x D	140	–	160	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062
H	1	0,75 x D	0,1 x D	0,4 x D	120	–	140	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062
	2	0,75 x D	0,05 x D	0,3 x D	100	–	130	fz	0,016	0,020	0,025	0,029	0,034	0,037	0,040
	3	0,75 x D	0,03 x D	0,2 x D	70	–	100	fz	0,013	0,016	0,019	0,023	0,026	0,029	0,032
	4	0,75 x D	0,01 x D	0,1 x D	50	–	70	fz	0,008	0,011	0,013	0,015	0,018	0,019	0,021

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

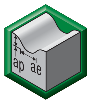
Application Data • Series 422875 • Vision Plus™

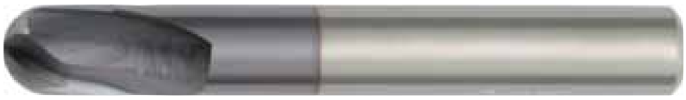
Series 422875 • Vision Plus

Material Group															
		Side Milling (A) and Slotting (B)			K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,5 x D	0,4 x D	0,3 x D	108	–	144	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070
	4	0,5 x D	0,4 x D	0,3 x D	81	–	135	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062
H	1	0,5 x D	0,4 x D	0,3 x D	72	–	126	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062
	2	0,5 x D	0,3 x D	0,2 x D	63	–	108	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047
	3	0,5 x D	0,15 x D	0,15 x D	54	–	81	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037
	4	0,5 x D	0,1 x D	0,1 x D	45	–	63	fz	0,006	0,008	0,011	0,013	0,018	0,021	0,025

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For ap/ae 0.05 x D, increase fz by 40%.
For better surface finish, reduce feed per tooth.

Series 7151 • Vision Plus



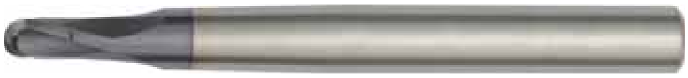


Material Group		Profile Milling		TiAlN				Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing									
		A		Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,05 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. *See page O205.*

Application Data • Series 7061 • Vision Plus™

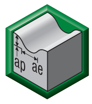
Series 7061 • Vision Plus

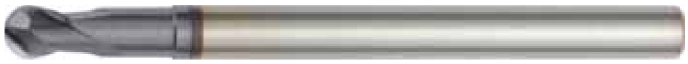


Material Group		Profile Milling		TiAlN				Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing									
		A		Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,05 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. *See page O205.*

Series 70N1 • Vision Plus



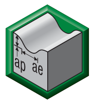


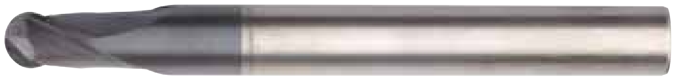
Material Group		Profile Milling		TiAlN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing										
		A		Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Application Data • Series 422869 422868 • Vision Plus™

Series 422869 422868 • Vision Plus

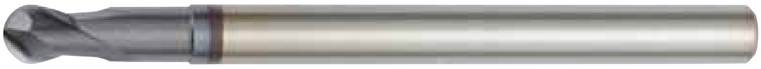




Material Group		Profile Milling		AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing										
		A		Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Series 422870 • Vision Plus

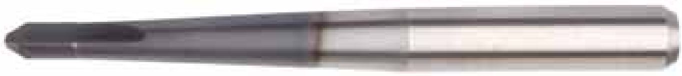


Material Group		Profile Milling		AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing										
		A		Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Application Data • Series 422873 • Vision Plus™

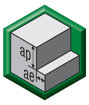
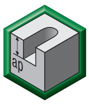
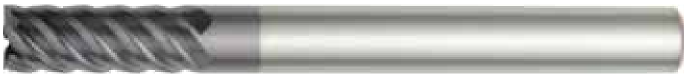
Series 422873 • Vision Plus



Material Group		Profile Milling		AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing										
		A		Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

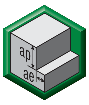
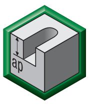
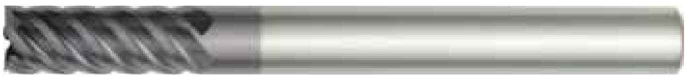
Series 7505 7545 7515 7525 • Vision Plus

																			
		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
Material Group		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	3	1 x D	0,4 x D	1 x D	120	–	160	fz	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0,104	0,111	0,125
	4	1 x D	0,4 x D	0,75 x D	90	–	150	fz	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
H	1	1 x D	0,4 x D	0,75 x D	80	–	140	fz	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
	2	1 x D	0,3 x D	0,5 x D	70	–	120	fz	0,018	0,022	0,027	0,037	0,044	0,051	0,057	0,063	0,067	0,071	0,078
	3	1 x D	0,15 x D	0,3 x D	60	–	90	fz	0,014	0,018	0,021	0,029	0,035	0,041	0,046	0,051	0,055	0,059	0,067
	4	1 x D	0,1 x D	0,15 x D	50	–	70	fz	0,009	0,012	0,014	0,019	0,023	0,027	0,031	0,034	0,037	0,039	0,044

*NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.*

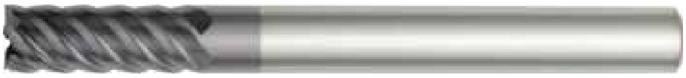
Application Data • Series 7515 • Vision Plus™

Series 7515 • Vision Plus

																		
		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
Material Group		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	2 x D	0,3 x D	0,75 x D	160	–	180	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,096	0,111	0,125
	4	2 x D	0,25 x D	0,5 x D	140	–	160	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097	0,107
H	1	2 x D	0,25 x D	0,5 x D	120	–	140	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097	0,107
	2	2 x D	0,2 x D	0,4 x D	80	–	130	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,063	0,071	0,078
	3	2 x D	0,1 x D	0,2 x D	70	–	100	fz	0,010	0,014	0,018	0,021	0,029	0,035	0,041	0,051	0,059	0,067
	4	2 x D	0,05 x D	0,05 x D	50	–	70	fz	0,007	0,009	0,012	0,014	0,019	0,023	0,027	0,034	0,039	0,044

*NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.*

Series 7525 • Vision Plus

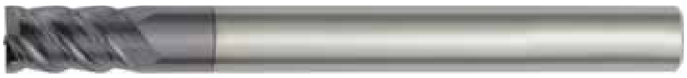


Material Group		Side Milling (A) and Slotting (B): A ap	A ae	B ap	TiAlN Cutting Speed — vc m/min: min		max	mm	D1 — Diameter: 3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	3 x D	0,2 x D	0,5 x D	160	–	180	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,096	0,111	0,125
P	4	3 x D	0,2 x D	0,3 x D	140	–	160	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097	0,107
H	1	3 x D	0,2 x D	0,3 x D	120	–	140	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097	0,107
H	2	3 x D	0,15 x D	0,2 x D	80	–	130	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,063	0,071	0,078
H	3	3 x D	0,05 x D	–	70	–	100	fz	0,010	0,014	0,018	0,021	0,029	0,035	0,041	0,051	0,059	0,067
H	4	3 x D	0,03 x D	–	50	–	70	fz	0,007	0,009	0,012	0,014	0,019	0,023	0,027	0,034	0,039	0,044

Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 7585 7595 • Vision Plus

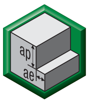
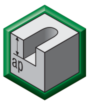
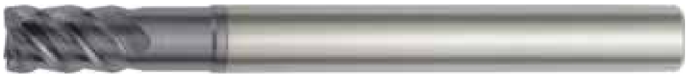


Material Group		Side Milling (A) and Slotting (B): A ap	A ae	B ap	TiAlN Cutting Speed — vc m/min: min		max	mm	D1 — Diameter: 4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	3	1 x D	0,4 x D	1 x D	120	–	160	fz	0,019	0,033	0,040	0,055	0,067	0,077	0,077	0,096	0,096	0,111	0,125
P	4	1 x D	0,4 x D	0,75 x D	90	–	150	fz	0,017	0,030	0,036	0,049	0,059	0,069	0,069	0,084	0,084	0,097	0,107
H	1	1 x D	0,4 x D	0,75 x D	80	–	140	fz	0,017	0,030	0,036	0,049	0,059	0,069	0,069	0,084	0,084	0,097	0,107
H	2	1 x D	0,3 x D	0,5 x D	70	–	120	fz	0,013	0,022	0,027	0,037	0,044	0,051	0,051	0,063	0,063	0,071	0,078
H	3	1 x D	0,15 x D	0,3 x D	60	–	90	fz	0,010	0,018	0,021	0,029	0,035	0,041	0,041	0,051	0,051	0,059	0,067
H	4	1 x D	0,1 x D	0,15 x D	50	–	70	fz	0,007	0,012	0,014	0,019	0,023	0,027	0,027	0,034	0,034	0,039	0,044

Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

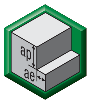
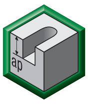
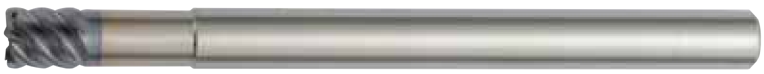
Series 75N5 • Vision Plus

																			
		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
Material Group		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	3	1 x D	0,4 x D	1 x D	120	–	160	fz	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0.,104	0,111	0,125
	4	1 x D	0,4 x D	0,75 x D	90	–	150	fz	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
H	1	1 x D	0,4 x D	0,75 x D	80	–	140	fz	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
	2	1 x D	0,3 x D	0,5 x D	70	–	120	fz	0,018	0,022	0,027	0,037	0,044	0,051	0,057	0,063	0,067	0,071	0,078
	3	1 x D	0,15 x D	0,3 x D	60	–	90	fz	0,014	0,018	0,021	0,029	0,035	0,041	0,046	0,051	0,055	0,059	0,067
	4	1 x D	0,1 x D	0,15 x D	50	–	70	fz	0,009	0,012	0,014	0,019	0,023	0,027	0,031	0,034	0,037	0,039	0,044

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

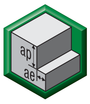
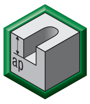
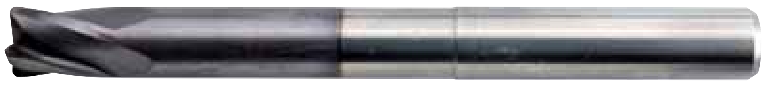
Application Data • Series 75N8 • Vision Plus™

Series 75N8 • Vision Plus

												
		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.				
		A		B	Cutting Speed — vc m/min				D1 — Diameter			
Material Group		ap	ap	ap	min		max	mm	6,0	8,0	10,0	12,0
P	3	0,75 x D	0,2 x D	0,2 x D	120	–	160	fz	0,040	0,055	0,067	0,077
	4	0,75 x D	0,2 x D	0,2 x D	90	–	150	fz	0,036	0,049	0,059	0,069
H	1	0,75 x D	0,2 x D	0,2 x D	80	–	140	fz	0,036	0,049	0,059	0,069
	2	0,75 x D	0,2 x D	0,2 x D	70	–	120	fz	0,027	0,037	0,044	0,051
	3	0,75 x D	0,1 x D	0,1 x D	60	–	90	fz	0,021	0,029	0,035	0,041
	4	0,75 x D	0,05 x D	0,05 x D	50	–	70	fz	0,014	0,019	0,023	0,027

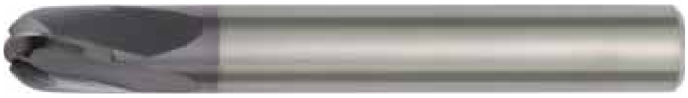
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 422876 422878 • Vision Plus

Material Group														
		Side Milling (A) and Slotting (B)			K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,5 x D	0,4 x D	0,3 x D	120	–	160	fz	0,026	0,033	0,040	0,055	0,067	0,077
P	4	0,5 x D	0,4 x D	0,3 x D	90	–	150	fz	0,024	0,030	0,036	0,049	0,059	0,069
H	1	0,5 x D	0,4 x D	0,3 x D	80	–	140	fz	0,024	0,030	0,036	0,049	0,059	0,069
H	2	0,5 x D	0,3 x D	0,2 x D	60	–	80	fz	0,018	0,022	0,027	0,037	0,044	0,051
H	3	0,5 x D	0,15 x D	0,15 x D	50	–	70	fz	0,014	0,018	0,021	0,029	0,035	0,041
H	4	0,5 x D	0,1 x D	0,1 x D	40	–	60	fz	0,009	0,012	0,014	0,019	0,023	0,027

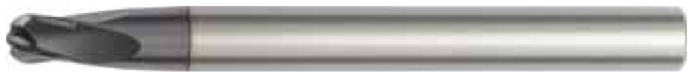
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For ap/ae 0,05 x D increase fz by 40%.
For better surface finish, reduce feed per tooth.

Series 7150 • Vision Plus

Material Group																	
		Profile Milling		TiAlN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing										
		A		Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
P	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
H	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
H	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Series 7050 7060 • Vision Plus



Material Group		Profile Milling		TiAlN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing										
		A		Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

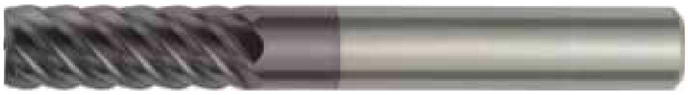
Application Data • Series 422871 • Vision Plus™

Series 422871 • Vision Plus

Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing						
		A		Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0
P	3	0,1 x D	0,05 x D	272	–	306	fz	0,052	0,070	0,089	0,109	0,150	0,182
	4	0,1 x D	0,05 x D	238	–	272	fz	0,048	0,064	0,081	0,099	0,134	0,162
H	1	0,07 x D	0,1 x D	200	–	280	fz	0,060	0,080	0,102	0,123	0,168	0,203
	2	0,05 x D	0,04 x D	161	–	276	fz	0,052	0,070	0,088	0,107	0,145	0,174
	3	0,03 x D	0,03 x D	174	–	261	fz	0,047	0,063	0,079	0,096	0,130	0,158
	4	0,03 x D	0,03 x D	145	–	203	fz	0,031	0,042	0,053	0,064	0,087	0,105

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Series D618 • Vision Plus

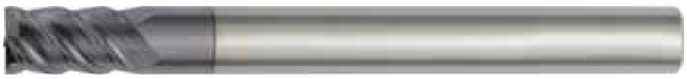


Material Group		Side Milling (A)		TiAlN				Recommended feed per tooth (fz = mm/th) for side milling (A).								
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	20,0
P	3	2 x D	0,15 x D	120	–	160	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,096	0,111
P	4	2 x D	0,15 x D	90	–	150	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097
H	1	2 x D	0,15 x D	80	–	140	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097
H	2	2 x D	0,15 x D	70	–	120	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,063	0,071
H	3	2 x D	0,1 x D	60	–	90	fz	0,010	0,014	0,018	0,021	0,029	0,035	0,041	0,051	0,059
H	4	2 x D	0,05 x D	50	–	70	fz	0,007	0,009	0,012	0,014	0,019	0,023	0,027	0,034	0,039

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Application Data • Series 422837 422831 • Vision Plus™

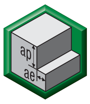
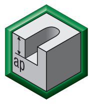
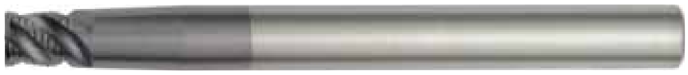
Series 422837 422831 • Vision Plus



Material Group		Side Milling (A)		K10UF-DCHP AlTiN				Recommended feed per tooth (fz = mm/th) for side milling (A).						
		A		Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	1,5 x D	0,2 x D	120	–	160	fz	0,040	0,055	0,067	0,077	0,096	0,111	0,125
P	4	1,5 x D	0,2 x D	90	–	150	fz	0,036	0,049	0,059	0,069	0,084	0,097	0,107
H	1	1,5 x D	0,2 x D	80	–	140	fz	0,036	0,049	0,059	0,069	0,084	0,097	0,107
H	2	1,5 x D	0,15 x D	60	–	80	fz	0,027	0,037	0,044	0,051	0,063	0,071	0,078
H	3	1,5 x D	0,1 x D	50	–	70	fz	0,021	0,029	0,035	0,041	0,051	0,059	0,067
H	4	1,5 x D	0,05 x D	40	–	60	fz	0,014	0,019	0,023	0,027	0,034	0,039	0,044

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.
For Series 422831, ap max = 2,5 x D by 50% ae.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

■ Series 7670 • Vision Plus

Material Group																	
		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 10%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	0,8 x D	0,5 x D	0,75 x D	160	–	180	fz	0,020	0,025	0,031	0,043	0,051	0,063	0,078	0,101	0,114
	4	0,8 x D	0,4 x D	0,5 x D	140	–	160	fz	0,018	0,023	0,028	0,038	0,046	0,056	0,069	0,088	0,098
	5	0,8 x D	0,5 x D	0,75 x D	60	–	100	fz	0,016	0,021	0,025	0,034	0,041	0,051	0,063	0,081	0,091
	6	0,8 x D	0,4 x D	0,5 x D	50	–	80	fz	0,014	0,017	0,021	0,029	0,034	0,042	0,051	0,065	0,071
M	1	0,8 x D	0,5 x D	0,75 x D	80	–	100	fz	0,020	0,025	0,031	0,043	0,051	0,063	0,078	0,101	0,114
	2	0,8 x D	0,4 x D	0,75 x D	60	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,051	0,063	0,081	0,091
	3	0,8 x D	0,4 x D	0,75 x D	60	–	80	fz	0,014	0,017	0,021	0,029	0,034	0,042	0,051	0,065	0,071
K	1	0,8 x D	0,5 x D	0,75 x D	120	–	160	fz	0,024	0,031	0,037	0,051	0,061	0,075	0,091	0,114	0,124
	2	0,8 x D	0,5 x D	0,75 x D	110	–	140	fz	0,020	0,025	0,031	0,043	0,051	0,063	0,078	0,101	0,114
	3	0,8 x D	0,4 x D	0,75 x D	100	–	130	fz	0,016	0,021	0,025	0,034	0,041	0,051	0,063	0,081	0,091
S	1	0,8 x D	0,4 x D	0,75 x D	90	–	115	fz	0,020	0,025	0,031	0,043	0,051	0,063	0,078	0,101	0,114
	2	0,8 x D	0,25 x D	0,3 x D	20	–	40	fz	0,011	0,014	0,017	0,022	0,027	0,033	0,042	0,054	0,061
	3	0,8 x D	0,4 x D	0,75 x D	50	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,051	0,063	0,081	0,091
	4	0,8 x D	0,3 x D	0,5 x D	45	–	65	fz	0,013	0,018	0,022	0,031	0,038	0,046	0,058	0,074	0,084
H	1	0,8 x D	0,5 x D	0,5 x D	120	–	140	fz	0,018	0,023	0,028	0,038	0,046	0,056	0,069	0,088	0,098
	2	0,8 x D	0,2 x D	0,3 x D	80	–	130	fz	0,014	0,017	0,021	0,029	0,034	0,042	0,051	0,065	0,071
	3	0,8 x D	0,15 x D	0,2 x D	70	–	100	fz	0,011	0,014	0,017	0,023	0,027	0,034	0,041	0,052	0,057

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For rougher tool with 6 flutes, use ap in slotting 60% of table value.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters on diameters >12mm.

Calculation Examples

Table of Factors for Speed Calculation of Ball Nose

Average Wall Angle	ap/D						
	0.003	0.006	0.010	0.016	0.020	0.025	0.030
0.0°	9.1	6.5	5.0	4.0	3.6	3.2	2.9
3.0°	6.2	4.9	4.0	3.3	3.0	2.8	2.6
5.0°	5.1	4.2	3.5	3.0	2.8	2.5	2.4
8.0°	4.1	3.4	3.0	2.6	2.4	2.3	2.1
10.0°	3.6	3.1	2.7	2.4	2.3	2.1	2.0
15.0°	2.8	2.5	2.2	2.0	1.9	1.8	1.7
20.0°	2.3	2.1	1.9	1.8	1.7	1.6	1.6
30.0°	1.7	1.6	1.5	1.4	1.4	1.3	1.3
40.0°	1.4	1.3	1.3	1.2	1.2	1.2	1.2
50.0°	1.2	1.2	1.1	1.1	1.1	1.1	1.1
55.0°	1.1	1.1	1.1	1.1	1.1	1.0	1.0

*For calculating real cutting speed, use formula: Basic cutting speed * Factor*

Choose the coefficient according to the ap/D and average wall angle.

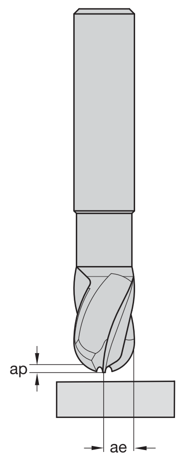
Example 1:
For Tool = 10mm and ap = 0,2mm for average wall angle 0°, ap/D ratio equal 0,2/10 = 0,02. Factor equal 3.6.

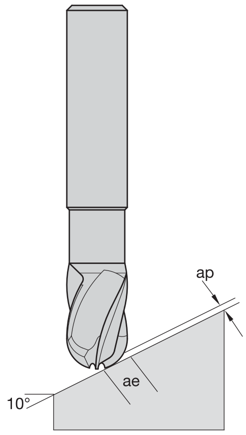
Example 2:
For Tool = 8mm and ap = 0,1mm for average wall angle 10°, ap/D ratio equal 0,1/8 = 0,0125. Factor will be between 2.7 and 2.4, choose 2.6.

Keep in mind shank diameter and length effect.

If tool length out of the chuck is more than 2 x D, please decrease feed per tooth by 15% each 1 x D.

Material Group	TiAlN or AlTiN Basic Cutting Speed Vc m/min		
	min		max
P3	160	–	180
P4	140	–	160
H1	100	–	140
H2	70	–	120
H3	60	–	90
H4	50	–	70





Application example #1 =
face milling a flat surface

D = 10mm

ap = 0,2mm

Average wall angle = 0°

Finishing H2

Starting vc from chart = 100

ap/D = 0.02

Factor from table =
3.6

vc to programme into machine = 100 * 3.6 = 360 m/min

RPM = 360* 1000/3.14/10 = 11460 RPM

Application example #2 =
face milling a 10° average wall angle

D = 8mm

ap = 0,1mm

Average wall angle = 10°

Finishing H2

Starting vc from chart = 100

ap/D = 0,1/8 = 0,0125

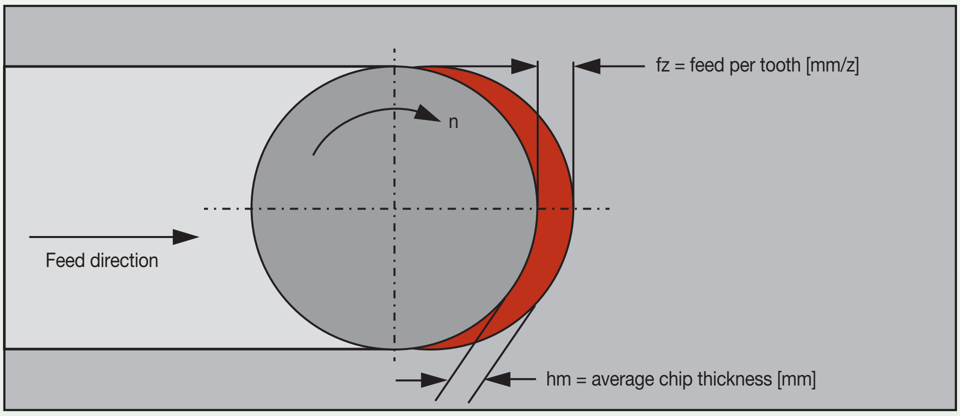
Factor from table =
2.6

vc to programme into machine = 100 * 2.6 = 260 m/min

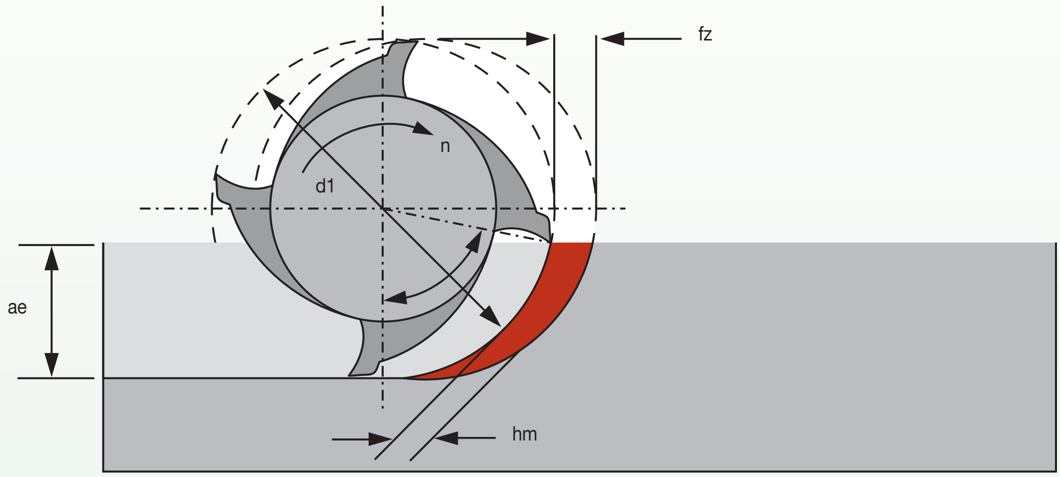
RPM = 260* 1000/3.14/10 = 7640 RPM

Conventional Slotting

- Full slotting limitations:
  - Usually not more then ap = 1 x D.
  - Conventional and climb milling at the same time.
  - High heat development on the tool and on the workpiece.
  - Difficult chip evacuation.
  - High radial forces.
- This means:
  - No constant chip thickness.
  - Low MRR.
  - Surface quality from the left to right side are different.
  - Limited tool life.
  - High power and torque requirements for the machine.



ae and Chip Thickness



To calculate average chip thickness:

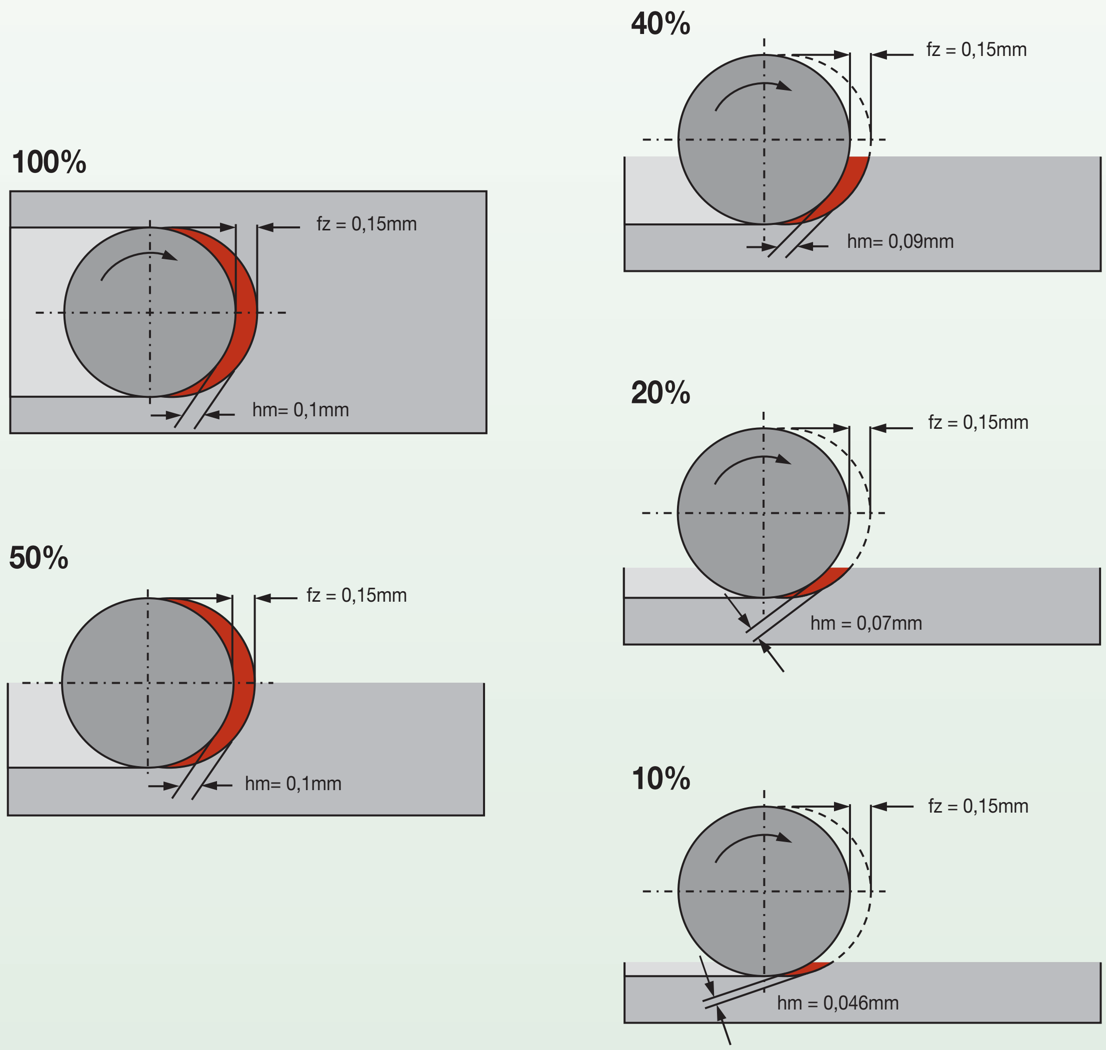
$$hm = fz \bullet \left(\sqrt{\frac{ae}{d1}}\right)$$

Simplified formula for shown application and 90° angles on the tool.
The chip thickness defines the load on the cutting edge.

ae and Chip Thickness

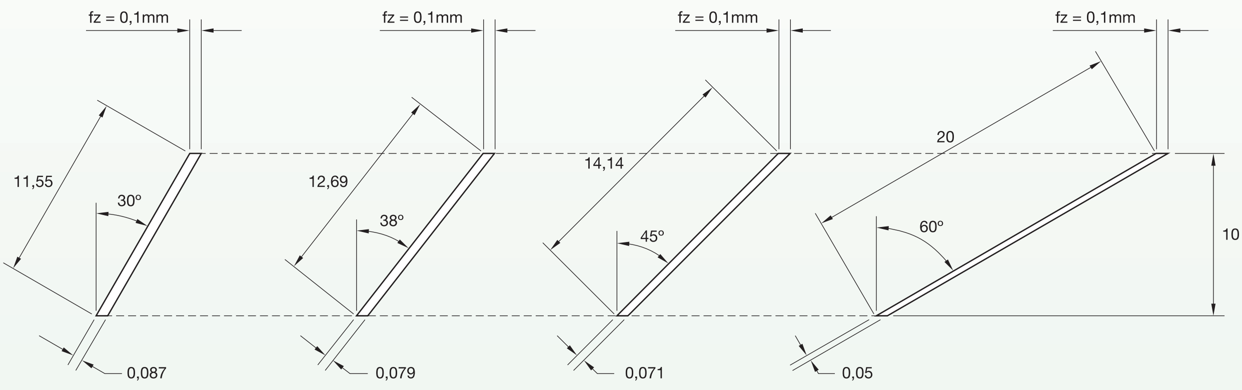
chip thinning effect		
ae	**programmed feed (fz)**	**chip thickness (hm)**
100%	0,15mm	0,1mm
50%	0,15mm	0,1mm
40%	0,15mm	0,09mm
20%	0,15mm	0,07mm
10%	0,15mm	0,046mm

The chip thickness needs to be compensated by feed.



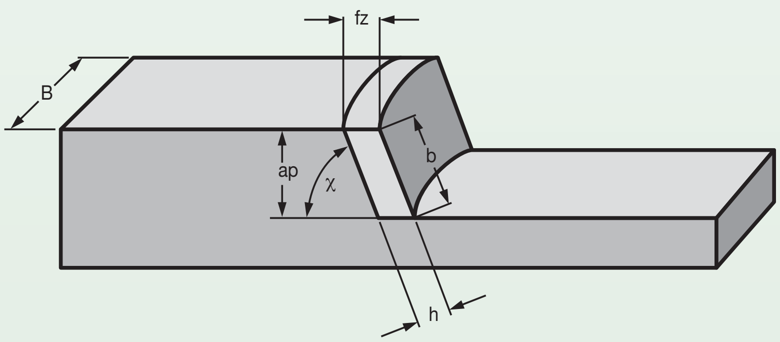
Helix Angle and Chip Thickness

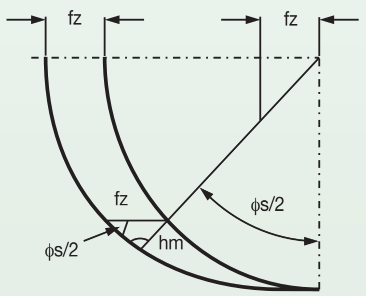
The chip thickness (h) depends on the helix angle of the cutting edge. If the feed fz is constant, the chip thickness gets thinner as helix angle rises. That means with more helix angle, the chip gets thinner — or you can rise feed rate to increase productivity and load to the cutting edge.



Calculation of Chip Thickness

The chip thickness (h) is not constant, but defines the load of the cutting edge. By reducing the load on the cutting edge, machining at higher speeds is possible through the machining parameters. For easier calculation, use an average chip thickness hm. When calculating machining data this way cutting data may be compromised because the workpiece is often a different shape.





$$hm = \frac{360°}{\pi \bullet \phi s} \bullet \frac{ae}{D} \bullet fz \bullet \sin \chi$$

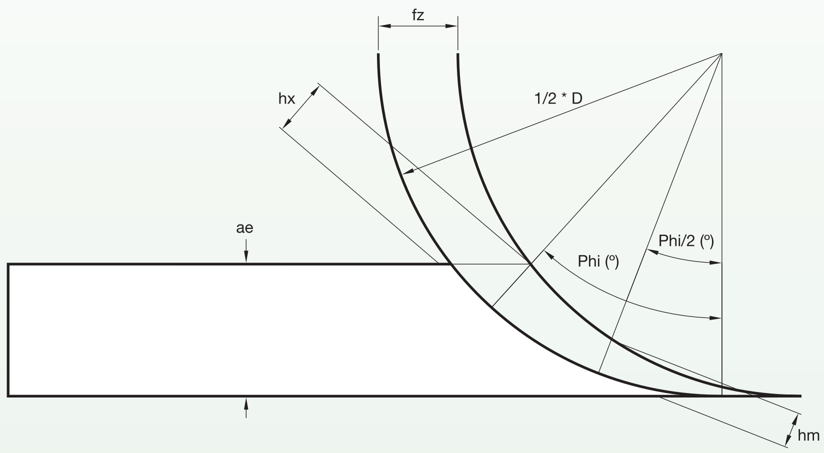
hm [mm]	=	average chip thickness
φs [°]	=	engagement angle
ae [mm]	=	width of engagement
D1 [mm]	=	outer diameter tool
fz [mm]	=	feed per tooth
χ [°]	=	lead angle
λ [°]	=	helix angle *

* Solid End Mills: χ = 90°-λ

NOTE: It makes no difference if the tool is solid or an indexable milling tool.

Differences between hm and hx

In conventional milling, it makes sense to calculate the load to the cutting edge through hm. With reducing the ae to very low values, you can calculate with the maximum chip thickness hx to make sure that the feed per tooth is set up correctly.



Conventional

$hm = 360°/\pi \cdot \phi s \cdot ae/D \cdot fz \cdot \sin x$

hm [mm]	=	average chip thickness
fs [°]	=	engagement angle
ae [mm]	=	width of engagement
D1 [mm]	=	outer diameter tool
fz [mm]	=	feed per tooth
χ [°]	=	lead angle
λ [°]	=	helix angle *

Smart Machining

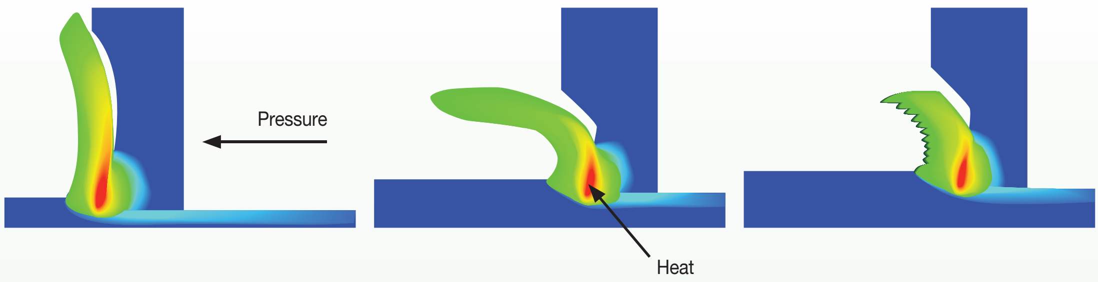
$hx = 360°/\pi \cdot \phi s \cdot 2 \cdot ae/D \cdot fz \cdot \sin x$

hx [mm]	=	maximum chip thickness
fs [°]	=	engagement angle
ae [mm]	=	width of engagement
D1 [mm]	=	outer diameter tool
fz [mm]	=	feed per tooth
χ [°]	=	lead angle
λ [°]	=	helix angle *

* Solid End Mills: $\chi = 90° - \lambda$

Trochoidal Milling can be performed with solid or indexable milling tools.

Cutting Speed

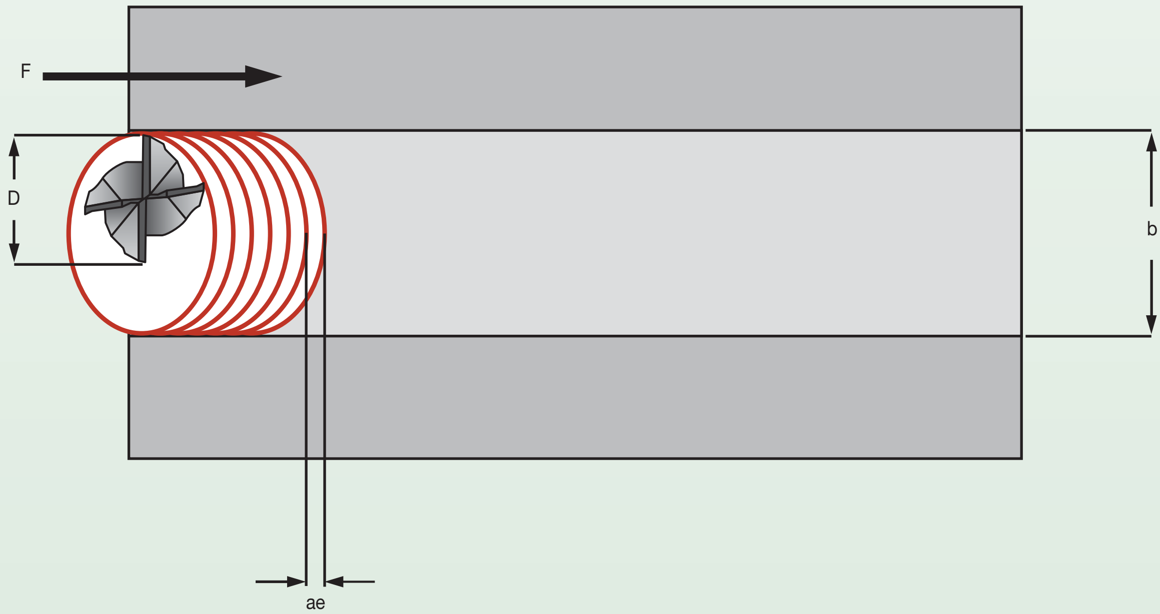


Reduced radial engagement influences the cutting speed, because the heat produced through the cutting process limits the cutting speed.

ae/D	full slot	50% ae	40% ae	30% ae	20% ae	10 % ae	5% ae	4% ae
speed factors	0,9	1	1,1	1,2	1,3	1,4	2,5	3
phi [°]	180	90	78,46	66,42	53,13	36,87	25,84	23,07

Static Trochoidal Milling for a Full Slot

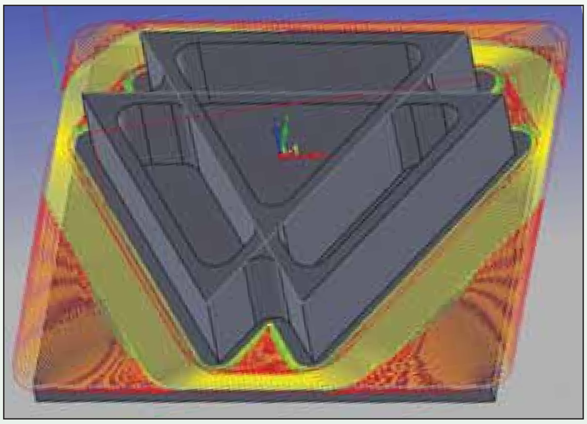
- Use a tool in which D < b.
- Programme circles in the CNC programme (as a cycle).
- After one circle, repeat the same with an offset.
- Optimise by shortening the lane “in the air” to a form like a “D”.

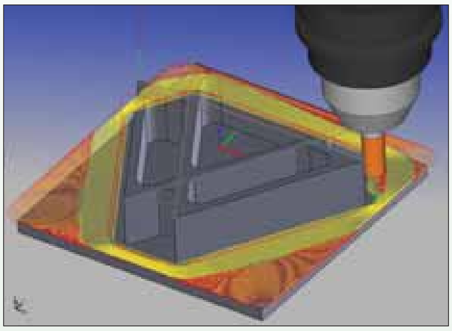


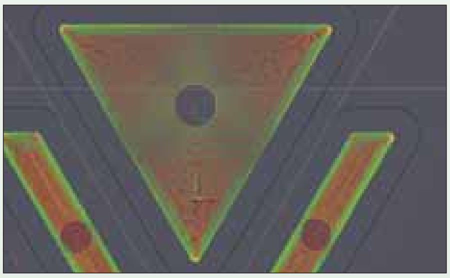
Trochoidal Milling can be performed with solid or indexable milling tools.

Dynamic Trochoidal Milling

• Transfer the basic idea control of chip thickness to dynamic processes.
• Dynamic adaption of feed in relation to ae and wrap angle through an intelligent CAM Software.
• Using helix interpolation, D-lanes, and morphing cycles.







Requirements

Static trochoidal milling
• Dynamic machine.
• CNC Programme.
• Modern tool.
• Cutting data for trochoidal machining.

Dynamic trochoidal milling
• Dynamic CNC machine.
• CAD/CAM optimisation software.
• Modern tool.
• Cutting data for trochoidal machining.

Benefits

- Constant chip thickness.
- Reduced arc/angle engagement (wrap angle).
- Tremendously reduced load on the cutting edge.
- Reduced temperature during the machining process.
- Higher cutting speed and feed per tooth possible.
- Reduced cycle time and increased tool life.
- Better chip evacuation.
- Better usage of the tool length.
- Less torque and power requirements for the machine.
- Less risk of spindle damages through torque fluctuation
  and reduced torque peaks caused by conventional milling processes.

In High-Performance Cutting (HPC), slow microcreeping can cause the cutting tool to be pulled out of the chuck, turning high-quality workpieces to scrap.

SAFE-λOCK®

Be on the safe side with SAFE-λOCK® in High-Performance Cutting (HPC).

- Highly accurate clamping due to positive connection.
- No loss of accuracy.
- No pullout or spinning of the tool.
- No damage to the workpiece or machine.
- Groove on tool shank is directed so the tool will be pulled into the chuck (depending on direction of rotation).

Order Information

WIDIA™ high-performance end mills with shank diameters of 12mm and larger are available with **SAFE-λOCK®** technology, as a special tool, upon request. Please contact your local customer service location to receive

Features
- Form-closed clamping.
- High accuracy clamping.
- Helical grooves.

Functions
- No pullout.
- Excellent runout.
- Adjustable clamping length.

Benefits
- Reduce scrap rate.
- Higher tool life.
- No need to change NC programme after regrinding.

Example for Highest Metal Removal Rates (MRR)

The VariMill II ER proprietary design with unequal flute spacing and unique core geometry for chatter-free machining enables slotting operations in titanium up to 1 x D.

SAFE-λOCK®
The safety belt for high-performance solid carbide end mills provide form-closed clamping with high accuracy and helical grooves for length adjustment.

WIDIA™ and the Machine Tool Industry (MTI)

Partners from Point to Part

Challenges are always better faced with a partner. Getting the most out of a manufacturing process means a 3-point partnership between the end user, the machine tool builder, and the tooling provider. The right partner works with you every step of the way, from the point of the spindle connection to the completed part.

Let WIDIA Machine Tool Industry (MTI) specialists be your partners. We'll work with you from pre-planning, time studies, and machine tool selection through setup, runoff, operator training, and process optimisation. The MTI team focuses simultaneously on engineering, process and application support, and tool selection. We look at the total solution to get you where you want and need to be in your manufacturing.

We have MTI specialists in more than 60 countries around the world, so there's always someone near you: **W-MTI.Solutions@WIDIA.com.**

Components of a Winning Strategy

Our mission is to build lasting relationships with all of the focused builders, end users, and dealers to provide continuous communications and to ensure we have their mind share. WIDIA is the number one choice of machine tool builders, dealers, and end users globally for total tooling solutions. We provide world class quality, service, and on-time delivery to meet and exceed your expectations

- Trust
- Innovation
- Dedicated Support
- Capability
- Engineered Solutions

Global Manufacturers

Our global organisation and network is ensuring a reliable support at the home of the machine tool builder and the final place of installation, and following the machines worldwide.

- Simultaneous engineering support from art to part.
- Seamless transition from the initial investment phase to full production by qualified technical hand-off to local WIDIA staff at the end user stage, guaranteeing satisfying continued service and support.
- Starter kits for machine tool equipment.

Global WIDIA MTI

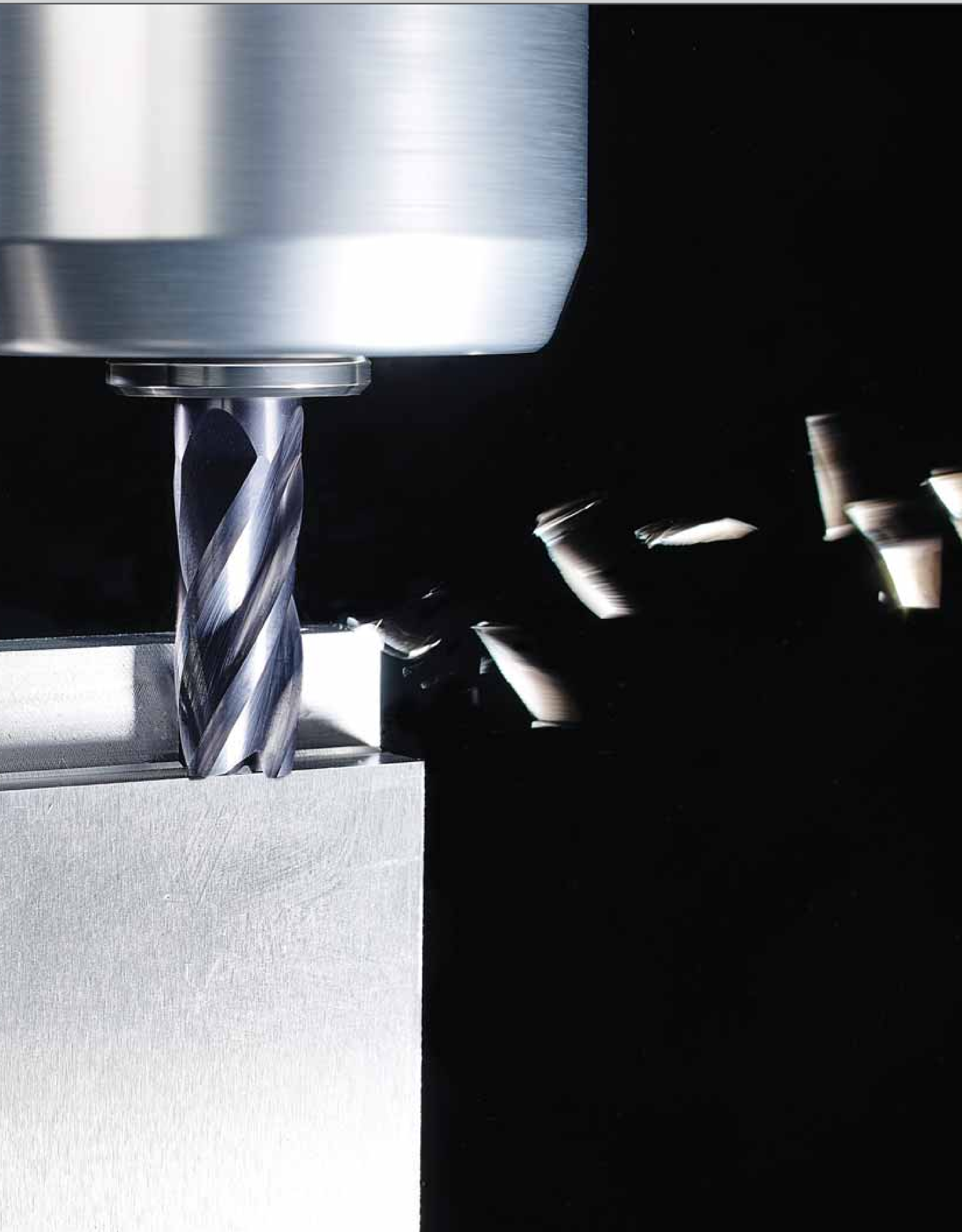
We will provide our customers with a total solution from spindle connection to the part. We include all brands of the WIDIA family of companies to enhance this total solution.

Global Machine Tool Builders

Providing machine tool builders with a long term expertise in the OEM business and an unreached bandwidth of competitive technical solutions, consisting of standard, as well as customised cutting tool technology.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

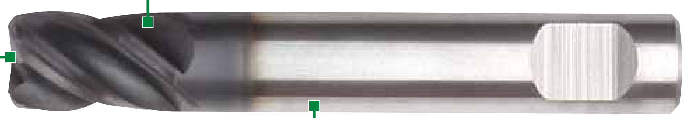


Solid End Milling • General Purpose Solid Carbide End Mills

NINA

NINA is an economic choice for high quality and performance when regrinding is not justified. Designed to minimise tool costs for applications when short lengths-of-cut are required. NINA has a short, compact design with minimised vibration and soft cut to support mill-turn machines. A state-of-the-art substrate and wide range of coatings offers high tool life and stable manufacturing on a wide range of workpiece materials. With different front end styles (sharp edge, corner chamfer, radii, ball nose, and chamfering tool), NINA covers a wide range of applications. Roughing and finishing with one tool reduces tool inventory and tool changes providing increased productivity and value.

- One tool for roughing and finishing operations.
- Milling at a value price when re-grinding is not justified.
- Stable, low-vibration solution with soft cut for mill-turn machines.
- Wide range of front ends and coatings.



NINA™ Series

- Economic price, low-cost carbide substrate.
- Excellent results for applications when short lengths-of-cut are required.
- Reduce tool stock and ease tool management.
- Wide range of applications and materials with one tool.
- Rough and finish with one tool.

323002/423002/323001/423001 Series

- 3-flute.
- Sharp edge front end.
- TiCN/AlTiN coating.
- For steel, stainless steel, cast iron, and aluminium.
- Centre cutting.

423004/423003 Series

- 4-flute.
- Chamfer end for improved tool life.
- AlTiN coating.
- For steel, stainless steel, and cast iron.
- Centre cutting.

423048/423047 Series

- 2-flute.
- Radii for improved tool life and wider application range.
- AlTiN coating.
- For steel, stainless steel, and non-ferrous.
- Centre cutting.

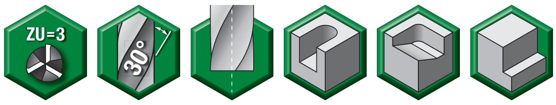
423039/423008 Series

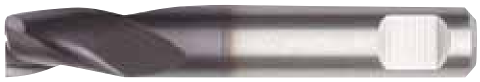
- 2-flute.
- Ball nose for 3D profiling.
- AlTiN coating.
- For steel, stainless steel, and non-ferrous.
- Centre cutting.

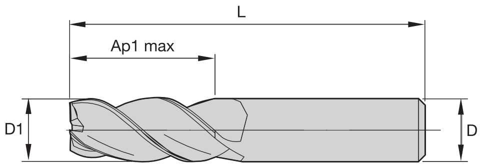
423036/423037 Series

- 4-flute.
- 90° point angle.
- AlTiN/TiAlN coating.
- For widest range of materials.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



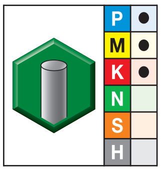


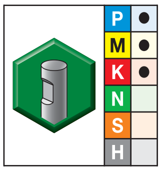


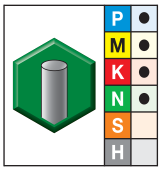
End Mill Tolerances

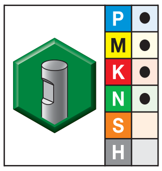
D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,04	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 423002 323002 423001 323001 • NINA







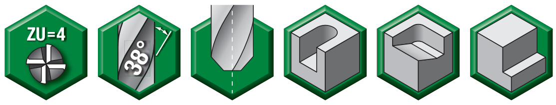


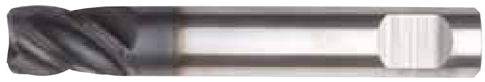
● first choice
○ alternate choice

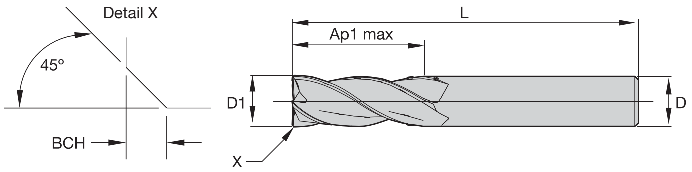
grade K30F-DCF TiAlN		grade K30F-DCF TiAlN		grade K30F-TiCN TiCN		grade K30F-TiCN TiCN					
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
2627990	423002-000020	2343352	423001-000020	2627800	323002-000020	2336740	323001-000020	2,0	6	4,00	38
2628043	423002-000030	2343354	423001-000030	2627801	323002-000030	2336747	323001-000030	3,0	6	5,00	38
2628044	423002-000040	2343356	423001-000040	2627802	323002-000040	2336753	323001-000040	4,0	6	7,00	38
2628045	423002-000050	2343358	423001-000050	2627983	323002-000050	2336759	323001-000050	5,0	6	8,00	38
2628046	423002-000060	2343360	423001-000060	2627984	323002-000060	2336765	323001-000060	6,0	6	8,00	38
2628047	423002-000080	2343362	423001-000080	2627985	323002-000080	2336771	323001-000080	8,0	8	11,00	43
2628048	423002-000100	2343364	423001-000100	2627986	323002-000100	2336777	323001-000100	10,0	10	13,00	50
2628049	423002-000120	2343366	423001-000120	2627987	323002-000120	2336783	323001-000120	12,0	12	15,00	55

NOTE: For application data, please see page P9.

- Centre cutting.
- HPC.
- Standard items listed. Additional styles and coatings made-to-order.



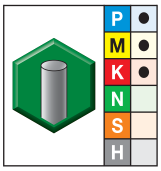


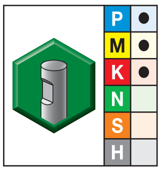


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,04	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 423004 423003 • NINA



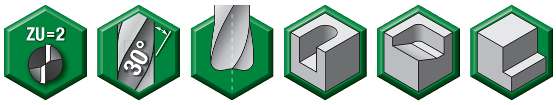


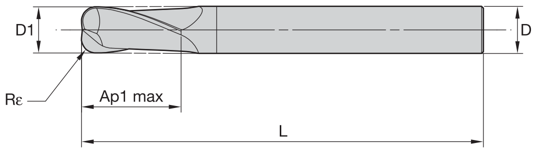
● first choice
○ alternate choice

grade K30F-DCHP AlTiN order #	grade K30F-DCHP AlTiN catalogue #	grade K30F-DCHP AlTiN order #	grade K30F-DCHP AlTiN catalogue #	D1	D	length of cut Ap1 max	length L	BCH
3657761	**423004-000040**	**3657756**	**423003-000040**	4,0	6	7,00	38	0,40
3657762	**423004-000060**	**3657757**	**423003-000060**	6,0	6	8,00	38	0,40
3657763	**423004-000080**	**3657758**	**423003-000080**	8,0	8	11,00	43	0,40
3657764	**423004-000100**	**3657759**	**423003-000100**	10,0	10	13,00	50	0,50
3657765	**423004-000120**	**3657760**	**423003-000120**	12,0	12	15,00	55	0,50

NOTE: For application data, please see page P9.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

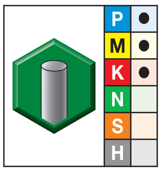


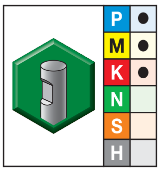


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,04	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 423048 423047 • NINA



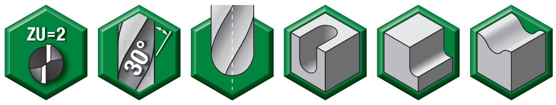


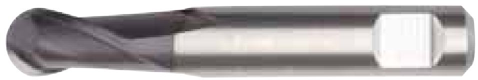
● first choice
○ alternate choice

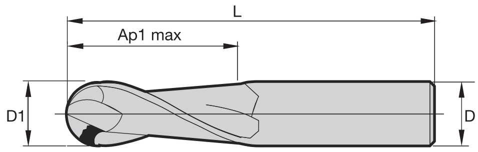
grade K30F-DCHP TiAlN order #	grade K30F-DCHP TiAlN catalogue #	grade K30F-DCHP TiAlN order #	grade K30F-DCHP TiAlN catalogue #	D1	D	length of cut Ap1 max	length L	Rε
2343564	423048-000020	2343548	423047-000020	2,0	6	4,00	38	0,50
2343566	423048-000030	2343550	423047-000030	3,0	6	5,00	38	0,50
2343568	423048-000040	2343552	423047-000040	4,0	6	7,00	38	0,50
2343570	423048-000050	2343554	423047-000050	5,0	6	8,00	38	0,50
2343572	423048-000060	2343556	423047-000060	6,0	6	8,00	38	1,00
2343574	423048-000080	2343558	423047-000080	8,0	8	11,00	43	2,00
2343576	423048-000100	2343560	423047-000100	10,0	10	13,00	50	3,00
2343579	423048-000120	2343562	423047-000120	12,0	12	15,00	55	3,00

NOTE: For application data, please see page P10.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



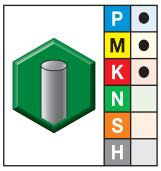


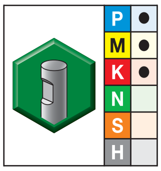


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,04	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 423039 423038 • NINA





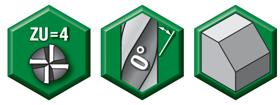
● first choice
○ alternate choice

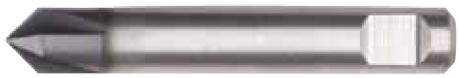
grade K30F-DCHP TiAlN order #	grade K30F-DCHP TiAlN catalogue #	grade K30F-DCHP TiAlN order #	grade K30F-DCHP TiAlN catalogue #	D1	D	length of cut Ap1 max	length L
2343531	423039-000020	2343514	423038-000020	2,0	6	4,00	38
2343533	423039-000030	2343516	423038-000030	3,0	6	5,00	38
2343535	423039-000040	2343519	423038-000040	4,0	6	7,00	38
2343537	423039-000050	2343521	423038-000050	5,0	6	8,00	38
2343539	423039-000060	2343523	423038-000060	6,0	6	8,00	38
2343541	423039-000080	2343525	423038-000080	8,0	8	11,00	43
2343543	423039-000100	2343527	423038-000100	10,0	10	13,00	50
2343545	423039-000120	2343529	423038-000120	12,0	12	15,00	55

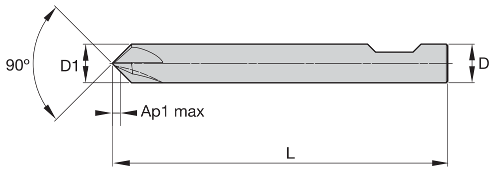
NOTE: For application data, please see page P10.

General Purpose Solid Carbide End Mills

- Non-centre cutting.
- Chamfering.
- Standard items listed. Additional styles and coatings made-to-order.



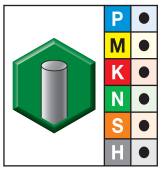


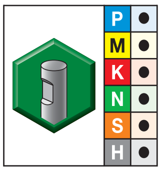


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,04	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 423036 423037 • NINA



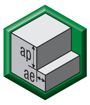


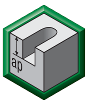
● first choice
○ alternate choice

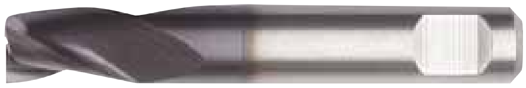
grade K30F-DCF TiAlN order #	grade K30F-DCF TiAlN catalogue #	grade K30F-DCHP AlTiN order #	grade K30F-DCHP AlTiN catalogue #	D1	D	length of cut Ap1 max	length L
2343508	**423036-000060**		**–**	6,0	6	1,00	38
	–	**2628498**	**423037-000060**	6,0	6	1,00	83
2343510	**423036-000080**		**–**	8,0	8	1,50	43
	–	**2628499**	**423037-000080**	8,0	8	1,50	104
2343512	**423036-000100**		**–**	10,0	10	2,00	50
	–	**2628500**	**423037-000100**	10,0	10	2,00	125

NOTE: For application data, please see page P11.

Series 423002 323002 423001 323001 • NINA





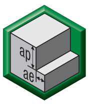


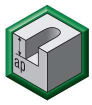
Material Group		Side Milling (A) and Slotting (B)			K30F-TICN TiCN			K30F-DCF TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min	–	max	min	–	max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	0	0,75 x D	0,5 x D	0,5 x D	150	–	200	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083
	1	0,75 x D	0,5 x D	0,5 x D	150	–	200	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083
	2	0,75 x D	0,5 x D	0,5 x D	140	–	190	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083
	3	0,75 x D	0,5 x D	0,5 x D	120	–	160	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070
	4	0,75 x D	0,5 x D	0,5 x D	90	–	150	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062
M	1	0,75 x D	0,5 x D	0,5 x D	90	–	115	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070
	2	0,75 x D	0,5 x D	0,5 x D	60	–	80	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056
K	1	0,75 x D	0,5 x D	0,5 x D	120	–	150	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083
	2	0,75 x D	0,5 x D	0,5 x D	110	–	140	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070
N	1	0,75 x D	0,5 x D	0,5 x D	500	–	2000	500	–	2000	fz	0,020	0,030	0,040	0,050	0,060	0,080	0,100	0,120
	2	0,75 x D	0,5 x D	0,5 x D	500	–	1500	500	–	1500	fz	0,018	0,027	0,036	0,045	0,054	0,072	0,090	0,108
	5	0,75 x D	0,5 x D	0,5 x D	250	–	1000	250	–	1000	fz	0,018	0,027	0,036	0,045	0,054	0,072	0,090	0,108

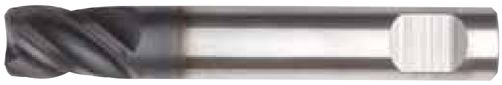
*NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.*

Application Data • Series 423004 423003 • NINA

Series 423004 423003 • NINA



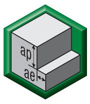


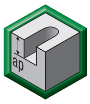


Material Group		Side Milling (A) and Slotting (B)			K30F-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min	–	max	mm	4,0	5,0	6,0	8,0	10,0	12,0
P	0	1 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
	1	1 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
	2	1 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083
	3	1 x D	0,5 x D	1 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070
	4	1 x D	0,5 x D	1 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062
M	1	1 x D	0,5 x D	1 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070
	2	1 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056
K	1	1 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083
	2	1 x D	0,5 x D	1 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070
	3	1 x D	0,5 x D	1 x D	110	–	130	fz	0,019	0,024	0,029	0,040	0,048	0,056
N	1	1 x D	0,5 x D	1 x D	500	–	2000	fz	0,040	0,050	0,060	0,080	0,100	0,120
	2	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,036	0,045	0,054	0,072	0,090	0,108
	3	1 x D	0,5 x D	1 x D	250	–	1000	fz	0,036	0,045	0,054	0,072	0,090	0,108

*NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.*

Series 423048 423047 • NINA



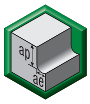


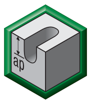
Material Group		Side Milling (A) and Slotting (B)			K30F-DCHP AlTiN Cutting Speed — vc m/min			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.	D1 — Diameter					
		A		B										
		ap	ae	ap	min	–	max	mm	4,0	5,0	6,0	8,0	10,0	12,0
P	0	0,75 x D	0,5 x D	0,5 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
P	1	0,75 x D	0,5 x D	0,5 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
P	2	0,75 x D	0,5 x D	0,5 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083
P	3	0,75 x D	0,5 x D	0,5 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070
P	4	0,75 x D	0,5 x D	0,5 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062
M	1	0,75 x D	0,5 x D	0,5 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070
M	2	0,75 x D	0,5 x D	0,5 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056
K	1	0,75 x D	0,5 x D	0,5 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083
K	2	0,75 x D	0,5 x D	0,5 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070
N	1	0,75 x D	0,5 x D	0,5 x D	500	–	2000	fz	0,040	0,050	0,060	0,080	0,100	0,120
N	2	0,75 x D	0,5 x D	0,5 x D	500	–	1500	fz	0,036	0,045	0,054	0,072	0,090	0,108
N	5	0,75 x D	0,5 x D	0,5 x D	250	–	1000	fz	0,036	0,045	0,054	0,072	0,090	0,108

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Application Data • Series 423039 423038 • NINA

Series 423039 423038 • NINA

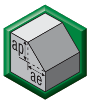


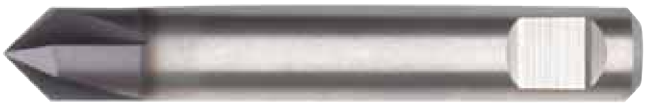


Material Group		Side Milling (A) and Slotting (B)			K30F-DCHP AlTiN Cutting Speed — vc m/min			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling	D1 — Diameter					
		A		B										
		ap	ae	ap	min	–	max	mm	4,0	5,0	6,0	8,0	10,0	12,0
P	0	0,75 x D	0,5 x D	0,5 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
P	1	0,75 x D	0,5 x D	0,5 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
P	2	0,75 x D	0,5 x D	0,5 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083
P	3	0,75 x D	0,5 x D	0,5 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070
P	4	0,75 x D	0,5 x D	0,5 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062
M	1	0,75 x D	0,5 x D	0,5 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070
M	2	0,75 x D	0,5 x D	0,5 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056
K	1	0,75 x D	0,5 x D	0,5 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083
K	2	0,75 x D	0,5 x D	0,5 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070
N	1	0,75 x D	0,5 x D	0,5 x D	500	–	2000	fz	0,040	0,050	0,060	0,080	0,100	0,120
N	2	0,75 x D	0,5 x D	0,5 x D	500	–	1500	fz	0,036	0,045	0,054	0,072	0,090	0,108
N	5	0,75 x D	0,5 x D	0,5 x D	250	–	1000	fz	0,036	0,045	0,054	0,072	0,090	0,108

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Series 423036 423037 • NINA





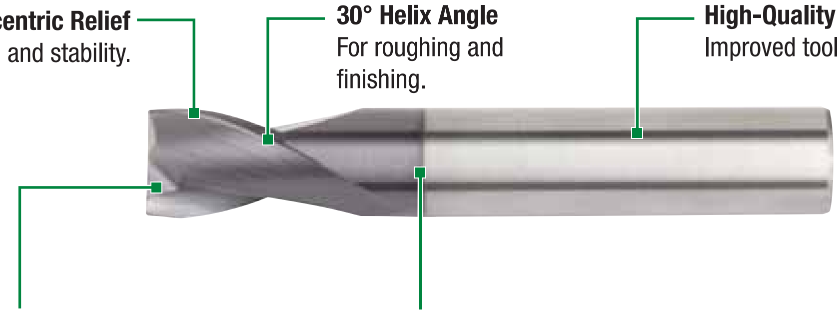
Material Group		Chamfer Milling		K30F-DCF TiAlN			K30F-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for chamfering (A)			
		A		Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter		
		ap	ae	min	–	max	min	–	max	mm	6,0	8,0	10,0
P	0	0,35 x D	0,35 x D	150	–	200	150	–	200	fz	0,035	0,048	0,058
P	1	0,35 x D	0,35 x D	150	–	200	150	–	200	fz	0,035	0,048	0,058
P	2	0,35 x D	0,35 x D	140	–	190	140	–	190	fz	0,035	0,048	0,058
P	3	0,35 x D	0,35 x D	120	–	160	120	–	160	fz	0,029	0,040	0,048
P	4	0,35 x D	0,35 x D	90	–	150	90	–	150	fz	0,026	0,036	0,043
P	5	0,35 x D	0,35 x D	60	–	100	60	–	100	fz	0,024	0,032	0,039
P	6	0,35 x D	0,35 x D	50	–	75	50	–	75	fz	0,020	0,027	0,032
M	1	0,35 x D	0,35 x D	90	–	115	90	–	115	fz	0,029	0,040	0,048
M	2	0,35 x D	0,35 x D	60	–	80	60	–	80	fz	0,024	0,032	0,039
M	3	0,35 x D	0,35 x D	60	–	70	60	–	70	fz	0,020	0,027	0,032
K	1	0,35 x D	0,35 x D	120	–	150	120	–	150	fz	0,035	0,048	0,058
K	2	0,35 x D	0,35 x D	110	–	140	110	–	140	fz	0,029	0,040	0,048
K	3	0,35 x D	0,35 x D	110	–	130	110	–	130	fz	0,024	0,032	0,039
N	1	0,35 x D	0,35 x D	500	–	2000	500	–	2000	fz	0,048	0,064	0,080
N	2	0,35 x D	0,35 x D	500	–	1500	500	–	1500	fz	0,043	0,058	0,072
N	3	0,35 x D	0,35 x D	500	–	1500	500	–	1500	fz	0,034	0,045	0,056
N	4	0,35 x D	0,35 x D	400	–	750	400	–	750	fz	0,038	0,051	0,064
N	5	0,35 x D	0,35 x D	250	–	1000	250	–	1000	fz	0,043	0,058	0,072
N	6	0,35 x D	0,35 x D	100	–	750	100	–	750	fz	0,048	0,064	0,080
N	7	0,35 x D	0,35 x D	100	–	750	100	–	750	fz	0,034	0,045	0,056
S	1	0,35 x D	0,35 x D	50	–	90	50	–	90	fz	0,029	0,040	0,048
S	2	0,35 x D	0,35 x D	25	–	40	25	–	40	fz	0,016	0,021	0,026
S	3	0,35 x D	0,35 x D	60	–	80	60	–	80	fz	0,024	0,032	0,039
S	4	0,35 x D	0,35 x D	50	–	60	50	–	60	fz	0,021	0,029	0,036
H	1	0,35 x D	0,35 x D	80	–	140	80	–	140	fz	0,026	0,036	0,043

VariMill GP

VariMill GP offers plunging, slotting, and profiling for a wide range of materials and applications. Designed to provide high metal removal rates and excellent surface conditions at a value price. A wide range of diameters, lengths, and corner styles (such as chamfered, sharp edge, and ball nose) are available from stock.

VariMill GP • 2-Flute

- General purpose tools for a wide range of workpiece materials.
- Roughing and finishing with one tool.
- Various lengths-of-cut and overall lengths with different front end designs available.
- Two flutes for high flexibility in unstable conditions.

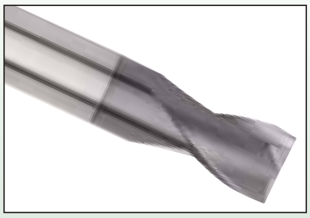


VariMill™ GP

- Increased manufacturing flexibility and reduced tooling cost.
- Fewer tool changes and high Metal Removal Rates (MRR).
- Eccentric relief for improved edge stability and high tool life.
- Easy and cost-efficient regrinding due to eccentric relief.

D002/D012 Series

- Centre cutting.
- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.

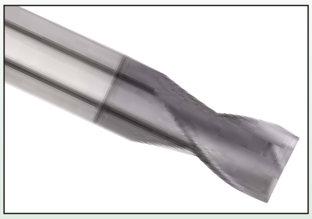


2819 Series

- Centre cutting.
- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.

4002/4012/4022 Series

- Centre cutting.
- Wide range of lengths-of-cut — regular, long, and extra long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.



D001/D011 Series

- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.

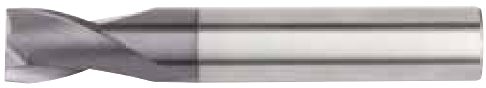
2838 Series

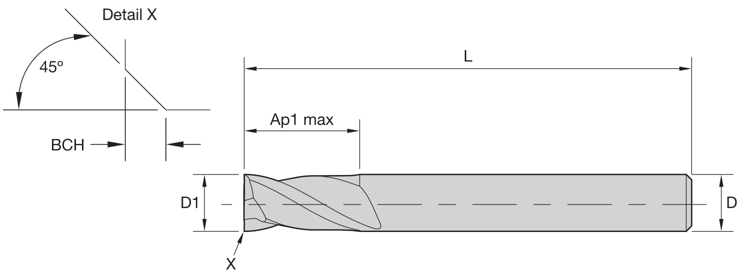
- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.

4001/4011/4021 Series

- Wide range of lengths-of-cut — regular, long, and extra long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.

- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.

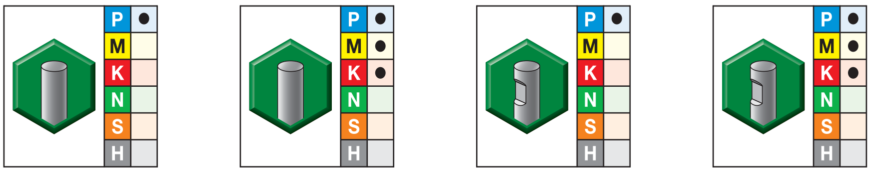




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D002 D012 • VariMill GP

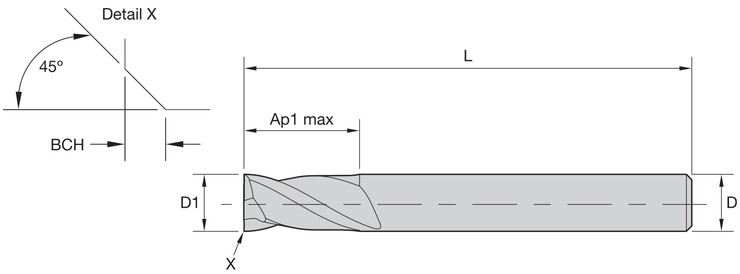


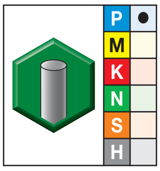
● first choice
○ alternate choice

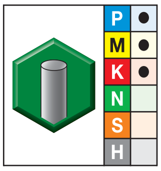
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5877567	D00200200T003	5877330	D00200200T003		–		–	2,0	6	3,00	50	–
5877568	D00200250T003	5877501	D00200250T003		–		–	2,5	6	3,00	50	–
5877569	D01200250T007	5877502	D01200250T007		–		–	2,5	6	7,00	57	–
5877571	D00200300T004	5877503	D00200300T004		–		–	3,0	6	4,00	50	–
5877572	D01200300T007	5877504	D01200300T007		–		–	3,0	6	7,00	57	–
5877573	D00200350T004	5877505	D00200350T004		–		–	3,5	6	4,00	50	–
5877574	D00200400T005	5877506	D00200400T005		–		–	4,0	6	5,00	54	0,10
5877575	D01200400T008	5877507	D01200400T008		–		–	4,0	6	8,00	57	0,10
5877576	D00200450T005	5877509	D00200450T005		–		–	4,5	6	5,00	54	0,10
5877577	D01200450T008	5877510	D01200450T008		–		–	4,5	6	8,00	57	0,10
5877578	D00200500T006	5877511	D00200500T006		–		–	5,0	6	6,00	54	0,10
5877579	D01200500T010	5877512	D01200500T010		–		–	5,0	6	10,00	57	0,10
5877581	D00200600T007	5877513	D00200600T007		–		–	6,0	6	7,00	54	0,10
5877582	D01200600T010	5877514	D01200600T010		–		–	6,0	6	10,00	57	0,10
5877583	D00200700T008	5877515	D00200700T008		–		–	7,0	8	8,00	58	0,10
5877584	D01200700T013	5877516	D01200700T013		–		–	7,0	8	13,00	63	0,10
5877585	D00200800T009	5877517	D00200800T009		–		–	8,0	8	9,00	58	0,20
5877586	D01200800T016	5877518	D01200800T016		–		–	8,0	8	16,00	63	0,20
5877588	D00200900T010	5877520	D00200900T010		–		–	9,0	10	10,00	66	0,20
5877589	D01200900T016	5877521	D01200900T016		–		–	9,0	10	16,00	72	0,20

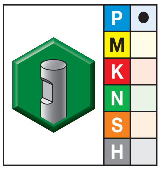
(continued)

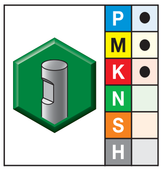
(Series D002 D012 • VariMill GP — continued)









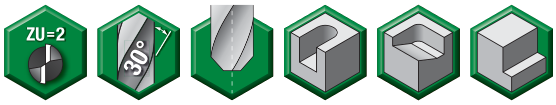


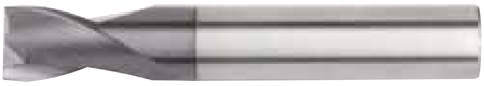
● first choice
○ alternate choice

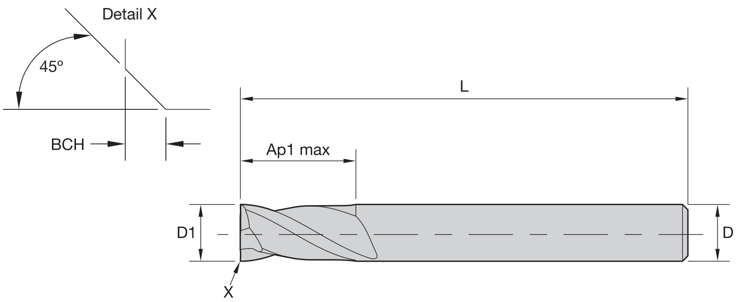
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5877590	D0021000T011	5877522	D0021000T011		–		–	10,0	10	11,00	66	0,20
5877591	D0121000T019	5877523	D0121000T019		–		–	10,0	10	19,00	72	0,20
5877592	D0021200T012	5877524	D0021200T012	5877556	D0021200W012	5877535	D0021200W012	12,0	12	12,00	73	0,30
5877593	D0121200T022	5877525	D0121200T022	5877557	D0121200W022	5877537	D0121200W022	12,0	12	22,00	83	0,30
5877594	D0021400T014	5877526	D0021400T014	5877558	D0021400W014	5877538	D0021400W014	14,0	14	14,00	75	0,30
5877595	D0121400T022	5877527	D0121400T022	5877559	D0121400W022	5877539	D0121400W022	14,0	14	22,00	83	0,30
5877596	D0021600T016	5877529	D0021600T016	5877560	D0021600W016	5877540	D0021600W016	16,0	16	16,00	82	0,30
5877597	D0121600T026	5877530	D0121600T026	5877561	D0121600W026	5877551	D0121600W026	16,0	16	26,00	92	0,30
5877598	D0021800T018	5877531	D0021800T018	5877563	D0021800W018	5877552	D0021800W018	18,0	18	18,00	84	0,30
5877599	D0121800T026	5877532	D0121800T026	5877564	D0121800W026	5877553	D0121800W026	18,0	18	26,00	92	0,30
5877601	D0022000T020	5877533	D0022000T020	5877565	D0022000W020	5877554	D0022000W020	20,0	20	20,00	92	0,30
5877602	D0122000T032	5877534	D0122000T032	5877566	D0122000W032	5877555	D0122000W032	20,0	20	32,00	104	0,30

NOTE: For application data, please see page P23.

- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



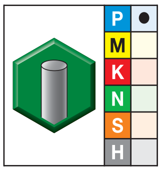


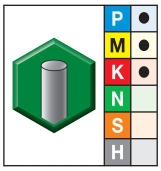


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 2819 • VariMill GP



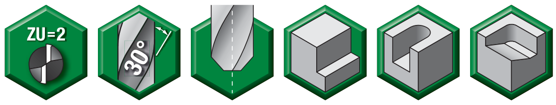


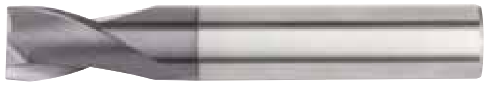
● first choice
○ alternate choice

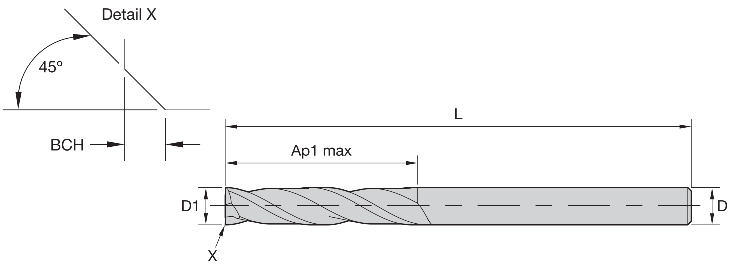
grade UNCOATED order #	grade UNCOATED catalogue #	grade TiAlN TiAlN order #	grade TiAlN TiAlN catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5877617	28190300T007	5877603	28190300T007	3,0	3	8,00	50	—
5877618	28190400T008	5877604	28190400T008	4,0	4	8,00	50	0,10
5877619	28190500T010	5877605	28190500T010	5,0	5	10,00	50	0,10
5877620	28190600T010	5877606	28190600T010	6,0	6	10,00	57	0,10
5877621	28190700T013	5877607	28190700T013	7,0	7	13,00	60	0,10
5877622	28190800T016	5877608	28190800T016	8,0	8	16,00	63	0,20
5877623	28190900T016	5877609	28190900T016	9,0	9	16,00	67	0,20
5877624	28191000T019	5877610	28191000T019	10,0	10	19,00	72	0,20
5877625	28191200T022	5877611	28191200T022	12,0	12	22,00	83	0,30
5877626	28191400T022	5877612	28191400T022	14,0	14	22,00	83	0,30
5877627	28191500T026	5877613	28191500T026	15,0	15	26,00	92	0,30
5877628	28191600T026	5877614	28191600T026	16,0	16	26,00	92	0,30
5877629	28191800T026	5877615	28191800T026	18,0	18	26,00	92	0,30
5877630	28192000T032	5877616	28192000T032	20,0	20	32,00	104	0,30

NOTE: For application data, please see page P23.

- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



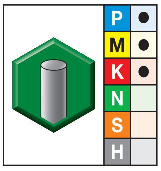




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4002 4012 • VariMill GP

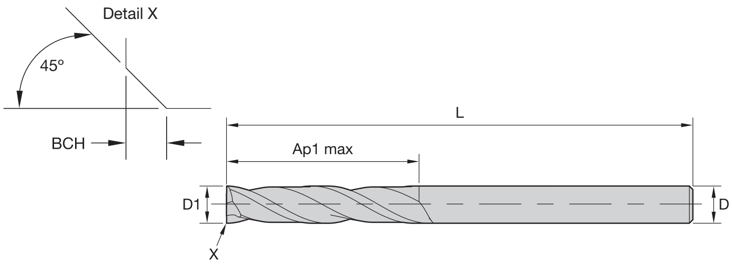


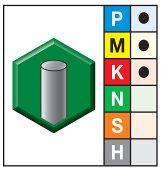
● first choice
○ alternate choice

order #	catalogue # (grade TiAlN TiAlN)	D1	D	length of cut Ap1 max	length L	BCH
5873484	40020100T004	1,0	3	4,00	38	—
5873485	40020150T004	1,5	3	4,00	38	—
5873486	40020180T004	1,8	3	4,00	38	—
5873487	40020200T006	2,0	3	6,30	38	—
5873488	40020250T006	2,5	3	6,30	38	—
5873489	40020300T009	3,0	3	9,50	38	—
5873490	40020300T019	3,0	3	19,00	63	—
5873491	40120300T025	3,0	3	25,00	75	—
5873492	40020350T012	3,5	4	12,00	50	—
5873493	40020400T012	4,0	4	12,00	50	0,10
5873494	40020400T019	4,0	4	19,00	63	0,10
5873495	40120400T031	4,0	4	31,00	75	0,10
5873496	40020450T014	4,5	6	14,00	50	0,10
5873497	40020480T014	4,8	6	14,00	50	0,10
5873498	40020500T014	5,0	5	14,00	50	0,10
5873499	40020500T020	5,0	5	20,00	63	0,10
5873500	40120500T031	5,0	5	31,00	100	0,10
5873501	40020550T014	5,5	6	14,00	50	0,10
5873502	40020600T016	6,0	6	16,00	50	0,10
5873503	40020600T028	6,0	6	28,00	76	0,10

(continued)

(Series 4002 4012 • VariMill GP — continued)



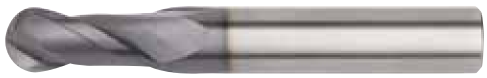


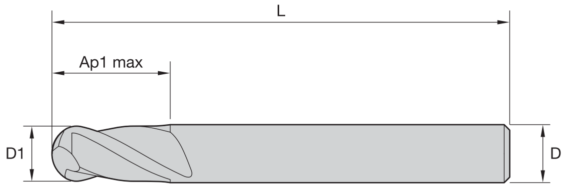
● first choice
○ alternate choice

grade TiAlN TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5873504	**40120600T038**	6,0	6	38,00	100	0,10
5873505	**40020700T020**	7,0	7	20,00	63	0,10
5873506	**40020800T020**	8,0	8	20,00	63	0,20
5873507	**40020800T028**	8,0	8	28,00	76	0,20
5873508	**40120800T041**	8,0	8	41,00	100	0,20
5873509	**40020900T020**	9,0	9	20,00	63	0,20
5873510	**40021000T022**	10,0	10	22,00	72	0,20
5873511	**40021000T032**	10,0	10	32,00	89	0,20
5873512	**40121000T045**	10,0	10	45,00	100	0,20
5873513	**40021100T025**	11,0	11	25,00	76	0,30
5873514	**40021200T025**	12,0	12	25,00	76	0,30
5873515	**40021200T045**	12,0	12	45,00	100	0,30
5873516	**40121200T075**	12,0	12	75,00	150	0,30
5873517	**40021400T032**	14,0	14	32,00	83	0,30
5873518	**40021400T050**	14,0	14	50,00	100	0,30
5873519	**40121400T075**	14,0	14	75,00	150	0,30
5873520	**40021600T032**	16,0	16	32,00	89	0,30
5873531	**40021600T056**	16,0	16	56,00	110	0,30
5873532	**40121600T075**	16,0	16	75,00	150	0,30
5873533	**40021800T038**	18,0	18	38,00	100	0,30
5873534	**40021800T060**	18,0	18	60,00	125	0,30
5873535	**40121800T075**	18,0	18	75,00	150	0,30
5873536	**40022000T038**	20,0	20	38,00	104	0,30
5873537	**40022000T056**	20,0	20	56,00	125	0,30
5873538	**40122000T075**	20,0	20	75,00	150	0,30

NOTE: For application data, please see pages P23-P24.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

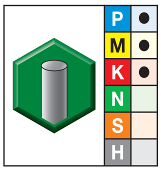




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D001 D011 • VariMill GP

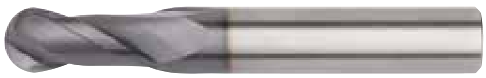


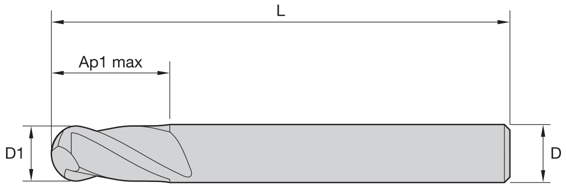
● first choice
○ alternate choice

grade TiAlN order #	TiAlN catalogue #	D1	D	length of cut Ap1 max	length L
5880362	D0110200T006	2,0	6	6,00	57
5880363	D0010300T004	3,0	6	4,00	50
5880364	D0110300T007	3,0	6	7,00	57
5880365	D0010400T005	4,0	6	5,00	54
5880366	D0110400T008	4,0	6	8,00	57
5880367	D0110500T010	5,0	6	10,00	57
5880368	D0110600T010	6,0	6	10,00	57
5880369	D0110700T013	7,0	8	13,00	63
5880370	D0110800T016	8,0	8	16,00	63
5880381	D0111000T019	10,0	10	19,00	72
5880382	D0111200T022	12,0	12	22,00	83
5880383	D0111400T022	14,0	14	22,00	83
5880384	D0111600T026	16,0	16	26,00	92
5880385	D0012000T020	20,0	20	20,00	92
5880386	D0112000T032	20,0	20	32,00	104

NOTE: For application data, please see pages P25.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

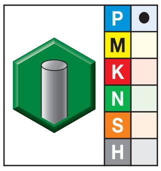


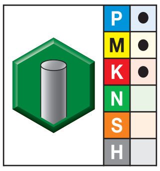


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 2838 • VariMill GP



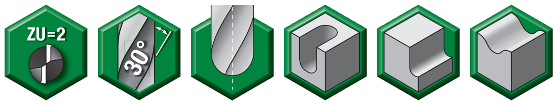


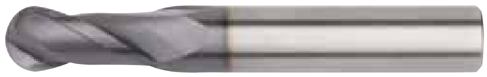
● first choice
○ alternate choice

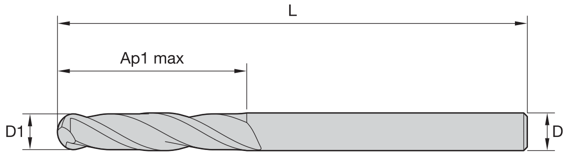
grade UNCOATED order #	grade UNCOATED catalogue #	grade TiAlN TiAlN order #	grade TiAlN TiAlN catalogue #	D1	D	length of cut Ap1 max	length L
	–	5880451	28380200T007	2,0	2	7,00	50
5880462	28380300T007	5880452	28380300T007	3,0	3	7,00	50
5880463	28380400T008	5880453	28380400T008	4,0	4	8,00	50
5880464	28380500T010	5880454	28380500T010	5,0	5	10,00	50
5880465	28380600T010	5880455	28380600T010	6,0	6	10,00	57
5880466	28380800T016	5880456	28380800T016	8,0	8	16,00	63
5880467	28381000T019	5880457	28381000T019	10,0	10	19,00	72
5880468	28381200T022	5880458	28381200T022	12,0	12	22,00	83
5880469	28381400T022	5880459	28381400T022	14,0	14	22,00	83
5880470	28381600T026	5880460	28381600T026	16,0	16	26,00	92
5880471	28382000T032	5880461	28382000T032	20,0	20	32,00	104

NOTE: For application data, please see page P25.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



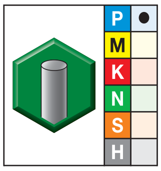




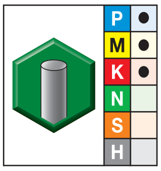
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4001 4011 4021 • VariMill GP



grade UNCOATED



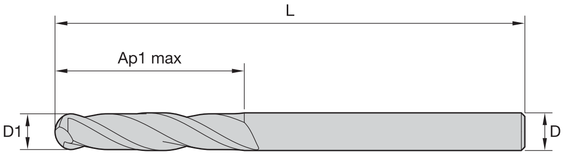
grade TiAlN
TiAlN

● first choice
○ alternate choice

grade UNCOATED order #	grade UNCOATED catalogue #	grade TiAlN order #	grade TiAlN catalogue #	D1	D	length of cut Ap1 max	length L
5880425	40010100T004	5880387	40010100T004	1,0	3	4,00	38
5880426	40010150T005	5880388	40010150T005	1,5	3	5,00	38
5880427	40010200T006	5880389	40010200T006	2,0	3	6,30	38
5880428	40010250T007	5880390	40010250T007	2,5	3	7,00	38
5880429	40010300T009	5880391	40010300T009	3,0	3	9,50	38
	–	5880392	40010350T012	3,5	4	12,00	50
5880430	40010400T012	5880393	40010400T012	4,0	4	12,00	50
5880431	40110400T019	5880395	40110400T019	4,0	4	19,00	63
5880432	40210400T031	5880396	40210400T031	4,0	4	31,00	75
5880433	40010500T014		–	5,0	5	14,00	50
	–	5880397	40210500T014	5,0	6	14,00	50
5880435	40010600T020	5880398	40010600T020	6,0	6	20,00	63
5880436	40110600T028	5880399	40110600T028	6,0	6	28,00	76
5880437	40210600T038	5880400	40210600T038	6,0	6	38,00	100
5880438	40010800T020	5880401	40010800T020	8,0	8	20,00	63
5880439	40110800T028	5880402	40110800T028	8,0	8	28,00	76
5880440	40210800T040	5880403	40210800T040	8,0	8	40,00	100
5880441	40011000T022	5880404	40011000T022	10,0	10	22,00	76
5880442	40111000T032	5880405	40111000T032	10,0	10	32,00	89
5880443	40211000T045	5880406	40211000T045	10,0	10	45,00	100

(continued)

(Series 4001 4011 4021 • VariMill GP — continued)



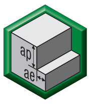
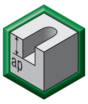
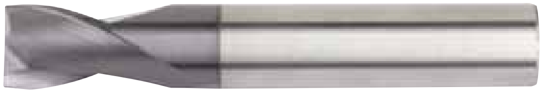
● first choice
○ alternate choice

grade UNCOATED		grade TiAlN TiAlN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5880444	40011200T025	5880407	40011200T025	12,0	12	25,00	75
5880445	40111200T045	5880408	40111200T045	12,0	12	45,00	100
5880446	40211200T075	5880409	40211200T075	12,0	12	75,00	150
5880447	40011400T032	5880410	40011400T032	14,0	14	32,00	89
5880448	40011600T032	5880411	40011600T032	16,0	16	32,00	89
5880449	40012000T038	5880412	40012000T038	20,0	20	38,00	100
5880450	40112000T075	5880413	40112000T075	20,0	20	75,00	150

NOTE: For application data, please see pages P25-P26.

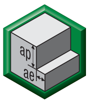
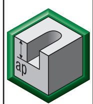
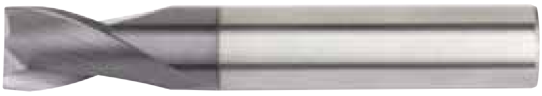
General Purpose Solid Carbide End Mills

■ Series D002 D012 2819 4002 • TiAlN • VariMill GP

Material Group																					
		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.													
		A		B	Cutting Speed — vc m/min				D1 — Diameter												
		ap	ae	ap	min		max	mm	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

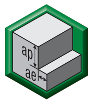
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

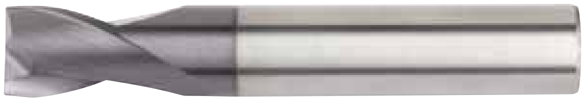
■ Series D002 D012 2819 4002 • Uncoated • VariMill GP

Material Group																	
		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	0,5 x D	112	–	152	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4012 • TiAlN • VariMill GP

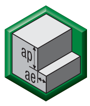


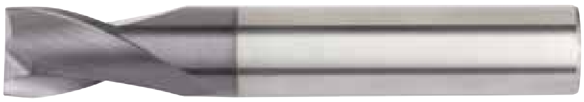


Material Group		Side Milling (A)		TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A).												
		A		Cutting Speed — vc m/min				D1 — Diameter											
		ap	ae	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4012 • Uncoated • VariMill GP

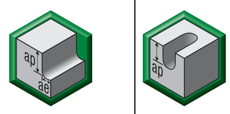


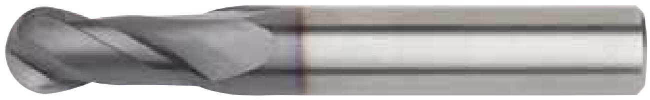


Material Group		Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D001 D011 2838 4001 • TiAlN • VariMill GP

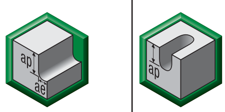


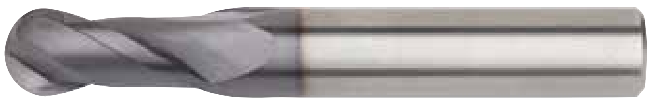


Material Group		Side Milling (A) and Slotting (B)			TiAlN				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed – vc m/min				D1 – Diameter												
		ap	ae	ap	min		max	mm	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	1	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	2	Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	3	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
P	4	Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
M	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
K	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D001 D011 2838 4001 • Uncoated • VariMill GP



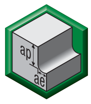


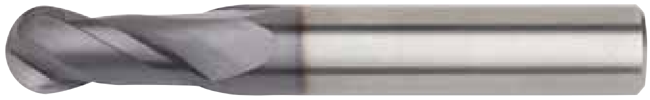
Material Group		Side Milling (A) and Slotting (B)			uncoated				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed – vc m/min				D1 – Diameter									
		ap	ae	ap	min		max	mm	1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
P	1	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
P	2	Ap1 max	0,1 x D	0,5 x D	112	–	152	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

General Purpose Solid Carbide End Mills

Series 4011 4021 • TiAlN • VariMill GP

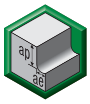


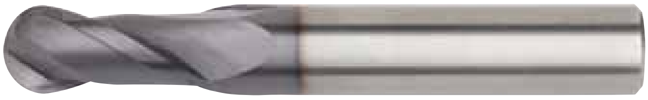


Material Group		Side Milling (A)		TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A).												
		A		Cutting Speed — vc m/min				D1 — Diameter											
		ap	ae	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4011 4021 • Uncoated • VariMill GP





Material Group		Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	120	–	160	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	112	–	152	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Tooling Systems

ERICKSON™

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

ERICKSON™ Toolholders

WIDIA™ proudly offers premium quality ERICKSON toolholder products, so you can be sure that you're buying the best the industry has to offer. The entire portfolio — including steep taper, HSK, straight shank extensions, collets, sleeves, and accompanying products — offers high productivity, increased accuracy, and application flexibility.

Designed for both manual and automatic tool changing, ERICKSON interfaces are ideally suited for most machine tools and feature a compact and rigid construction guaranteed to handle high torque and deliver optimal metal removal rates.

To learn more about our innovations, contact your local Authorised Distributor or visit **www.widia.com.**

WIDIA™

Solid Carbide End Mills

WIDIA™ offers a complete line of 3-flute general-purpose solid carbide end mill tools

General purpose offers plunging, slotting, and profiling for a wide range of materials and applications. Designed to provide high Metal Removal Rates (MRR) and excellent surface conditions at economic pricing. For a complete line of comprehensive tools, visit **widia.com**.

NOVO KNOWS ART TO PART TO PROFIT

Being as productive and profitable as possible is your fundamental goal. With the addition of NOVO™ to your team, your goal can be achieved. NOVO possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

NOVO can ensure you have the right tools on your machines, in the right sequence. This results in flawless execution that accelerates every job, and maximises every shift.

01 THE DIGITAL SOURCE FOR DELIVERING SMART MACHINING SOLUTIONS

widia.com/novo

NOVO™

WIDIA-Hanita™ Means Quality

WIDIA-Hanita™ solid carbide end mill products have a strong history of providing revolutionary and innovative solutions for your most extreme solid end milling challenges.

EXTREME **CHALLENGES.** EXTREME **RESULTS.**

As an industry-leading manufacturer of carbide round tools, WIDIA-Hanita™ offers a complete portfolio of precision-engineered products with solutions for a wide range of workpiece materials at **widia.com**.

The VariMill™ line offers superior performance high-speed machining.

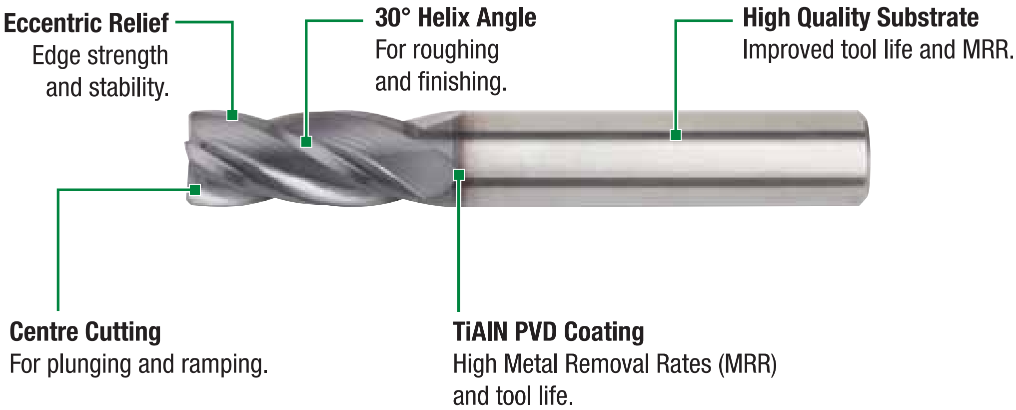
- The versatile 2- and 4-flute general-purpose line, VariMill™ GP, is ideal for a wide range of materials.
- The 4-flute VariMill I™ offers plunging, slotting, and profiling at the highest possible feed rates for a wide range of materials.
- The 5-flute VariMill II™ end mills are the proven leader in the field of high-performance, chatter-free machining.
- The 5-flute VariMill II™ ER end mills are specifically designed for machining high-performance aerospace materials.
- The 7-flute VariMill III™ ER high-performance tool has true finishing capabilities for walls and floors.

VariMill GP

VariMill GP offers plunging, slotting, and profiling for a wide range of materials and applications. Designed to provide high metal removal rates and excellent surface conditions at a value price. A wide range of diameters, lengths, and corner styles (such as chamfered, sharp edge, and ball nose) are available from stock.

VariMill GP • 4-Flute

- General purpose tools for a wide range of workpiece materials.
- Roughing and finishing with one tool.
- Various lengths-of-cut and overall lengths with different front-end designs available.
- Four flutes for high Metal Removal Rates (MRR) and tool life.

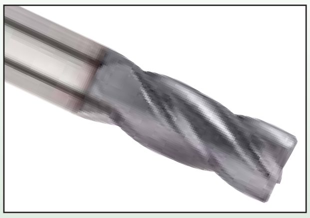


VariMill™ GP

- Increased manufacturing flexibility and reduced tooling cost.
- Less tool changes and high Metal Removal Rates (MRR).
- One tool required for roughing and finishing.
- Eccentric relief for improved edge stability and high tool life.
- Easy and cost-efficient regrinding due to eccentric relief.

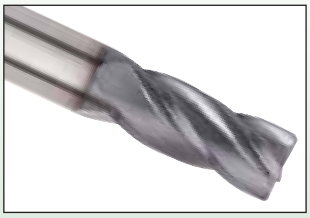
D004/D014 Series

- Centre cutting.
- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.



2528 Series

- Centre cutting.
- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.

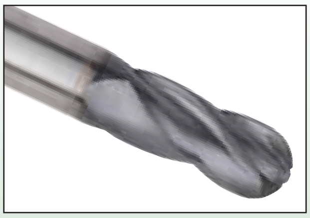


4004/4014/4024 Series

- Centre cutting.
- Wide range of lengths-of-cut — regular, long, and extra long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.

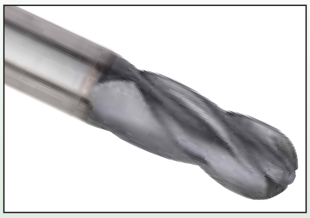
D010 Series

- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



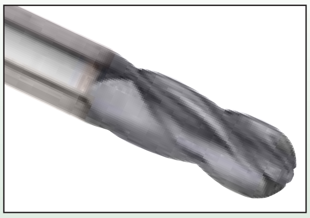
2848 Series

- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.

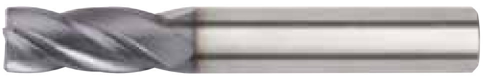


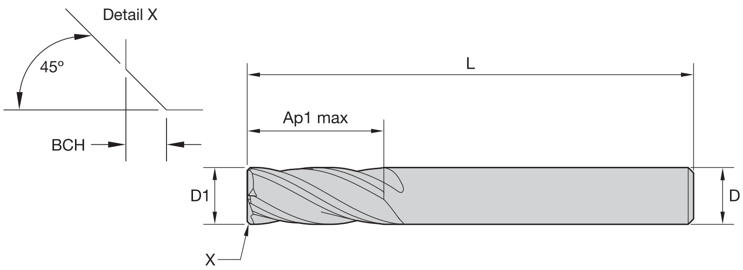
4000/4010 Series

- Wide range of lengths-of-cut — regular and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.

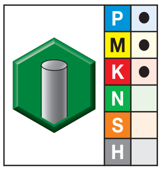


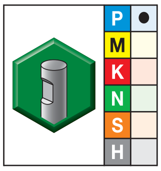


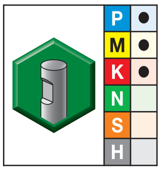
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D004 D014 • VariMill GP





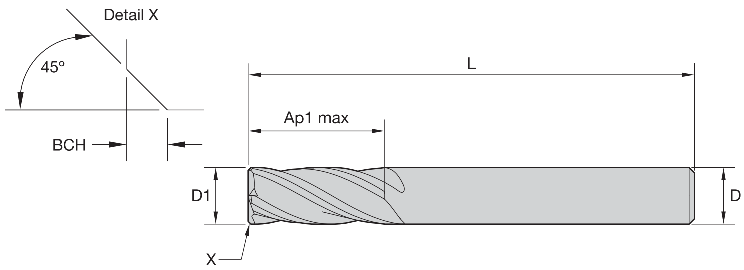


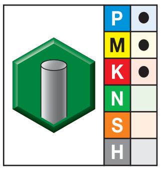
● first choice
○ alternate choice

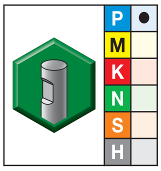
grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5825894	D0040200T004	—		—		2,0	6	4,00	50	—
5825895	D0140200T007	—		—		2,0	6	7,00	57	—
5825896	D0140250T008	—		—		2,5	6	8,00	57	—
5825897	D0040300T005	—		—		3,0	6	5,00	50	—
5825898	D0140300T008	—		—		3,0	6	8,00	57	—
5825899	D0140350T010	—		—		3,5	6	10,00	57	—
5825900	D0040400T008	—		—		4,0	6	8,00	54	0,10
5825931	D0140400T011	—		—		4,0	6	11,00	57	0,10
5825932	D0140450T011	—		—		4,5	6	11,00	57	0,10
5825933	D0040500T009	—		—		5,0	6	9,00	54	0,10
5825934	D0140500T013	—		—		5,0	6	13,00	57	0,10
5825935	D0140550T013	—		—		5,5	6	13,00	57	0,10
5825936	D0040600T010	—		—		6,0	6	10,00	54	0,10
5825937	D0140600T013	—		—		6,0	6	13,00	57	0,10
5825938	D0140650T016	—		—		6,5	8	16,00	63	0,10
5825939	D0040700T011	—		—		7,0	8	11,00	58	0,10
5825940	D0140700T016	—		—		7,0	8	16,00	63	0,10
5825941	D0140750T019	—		—		7,5	8	19,00	63	0,10
5825942	D0040800T012	—		—		8,0	8	12,00	58	0,20
5825943	D0140800T019	—		—		8,0	8	19,00	63	0,20

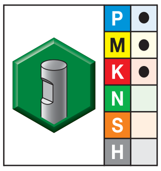
(continued)

(Series D004 D014 • VariMill GP — continued)







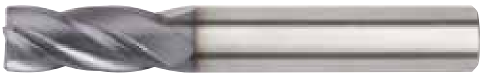


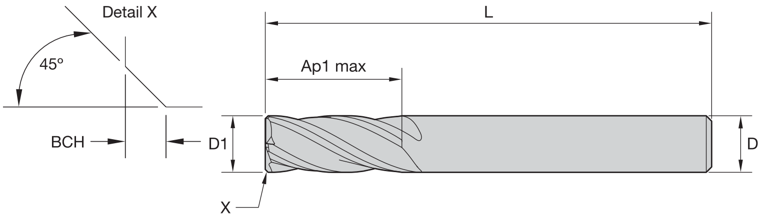
● first choice
○ alternate choice

grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5825944	D0040900T013	–		–		9,0	10	13,00	66	0,20
5825945	D0140900T019	–		–		9,0	10	19,00	72	0,20
5825946	D0041000T014	–		–		10,0	10	14,00	66	0,20
5825947	D0141000T022	–		–		10,0	10	22,00	72	0,20
5825948	D0041200T016	5825968	D0041200W016	5825958	D0041200W016	12,0	12	16,00	73	0,30
5825949	D0141200T026	5825969	D0141200W026	5825959	D0141200W026	12,0	12	26,00	83	0,30
5825950	D0041400T018	5825970	D0041400W018	5825960	D0041400W018	14,0	14	18,00	75	0,30
5825951	D0141400T026	5825971	D0141400W026	5825961	D0141400W026	14,0	14	26,00	83	0,30
5825952	D0041600T022	5825972	D0041600W022	5825962	D0041600W022	16,0	16	22,00	82	0,30
5825953	D0141600T032	5825973	D0141600W032	5825963	D0141600W032	16,0	16	32,00	92	0,30
5825954	D0041800T024	5825974	D0041800W024	5825964	D0041800W024	18,0	18	24,00	84	0,30
5825955	D0141800T032	5825975	D0141800W032	5825965	D0141800W032	18,0	18	32,00	92	0,30
5825956	D0042000T026	5825976	D0042000W026	5825966	D0042000W026	20,0	20	26,00	92	0,30
5825957	D0142000T038	5825977	D0142000W038	5825967	D0142000W038	20,0	20	38,00	104	0,30

NOTE: For application data, please see pages P40–P41.

- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.

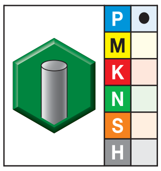


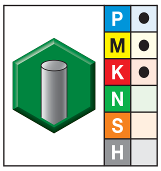


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 2528 • VariMill GP



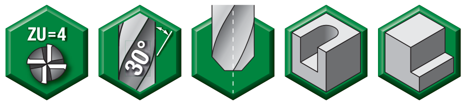


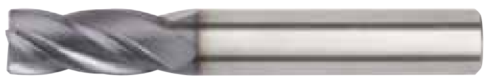
● first choice
○ alternate choice

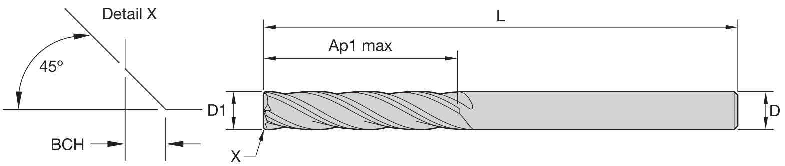
grade UNCOATED order #	grade UNCOATED catalogue #	grade TiAlN TiAlN order #	grade TiAlN TiAlN catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5825993	25280400T011	5825978	25280400T011	4,0	4	11,00	50	0,10
5825994	25280500T013	5825979	25280500T013	5,0	5	13,00	50	0,10
5825995	25280600T013	5825980	25280600T013	6,0	6	13,00	57	0,10
5825996	25280800T019	5825981	25280800T019	8,0	8	19,00	63	0,20
5825997	25281000T022	5825982	25281000T022	10,0	10	22,00	72	0,20
5825988	25281200T026	5825983	25281200T026	12,0	12	26,00	83	0,30
5825989	25281400T026	5825984	25281400T026	14,0	14	26,00	83	0,30
5825990	25281600T032	5825985	25281600T032	16,0	16	32,00	92	0,30
5825991	25281800T032	5825986	25281800T032	18,0	18	32,00	92	0,30
5825992	25282000T038	5825987	25282000T038	20,0	20	38,00	104	0,30

NOTE: For application data, please see page P41.

- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



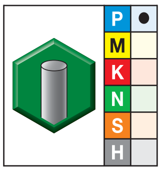


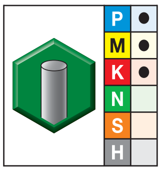


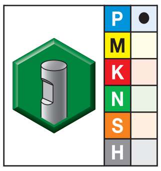
End Mill Tolerances

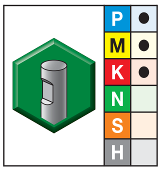
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4004 4014 4024 • VariMill GP









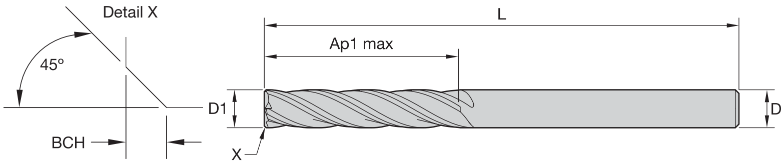
● first choice
○ alternate choice

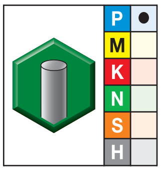
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5826085	40040100T004	5826016	40040100T004	–		–		1,0	3	4,00	38	–
5826086	40040150T004	5826017	40040150T004	–		–		1,5	3	4,00	38	–
5826087	40040200T006	5826018	40040200T006	–		–		2,0	3	6,30	38	–
5826088	40040250T006	5826019	40040250T006	–		–		2,5	3	6,30	38	–
5826089	40040300T009	5826020	40040300T009	–		–		3,0	3	9,50	38	–
5826090	40140300T019	5826021	40140300T019	–		–		3,0	3	19,00	63	–
5826101	40240300T025	5826022	40240300T025	–		–		3,0	3	25,00	75	–
5826102	40040350T012	5826023	40040350T012	–		–		3,5	4	12,00	50	–
5826103	40040400T011	5826024	40040400T011	–		–		4,0	4	11,00	50	0,10
–		5826025	40140400T019	–		–		4,0	4	19,00	63	0,10
–		5826026	40240400T031	–		–		4,0	4	31,00	75	0,10
5826104	40040450T014	5826027	40040450T014	–		–		4,5	5	14,00	50	0,10
–		5826028	40040500T013	–		–		5,0	5	13,00	50	0,10
5826105	40040500T020	5826029	40040500T020	–		–		5,0	5	20,00	63	0,10
–		5826030	40140500T030	–		–		5,0	5	30,00	75	0,10
–		5826031	40240500T031	–		–		5,0	5	31,00	100	0,10
5826106	40040600T016	5826032	40040600T016	–		–		6,0	6	16,00	50	0,10
5826107	40140600T028	5826033	40140600T028	–		–		6,0	6	28,00	75	0,10
5826108	40240600T038	5826034	40240600T038	–		–		6,0	6	38,00	100	0,10
–		5826035	40040700T020	–		–		7,0	8	20,00	63	0,10

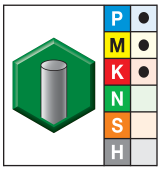
(continued)

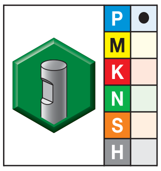
General Purpose Solid Carbide End Mills

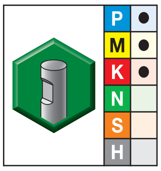
(Series 4004 4014 4024 • VariMill GP — continued)









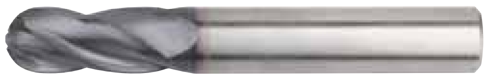


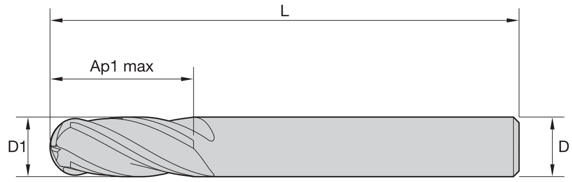
● first choice
○ alternate choice

grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN						
order #	**catalogue #**	**order #**	**catalogue #**	**order #**	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**length of cut Ap1 max**	**length L**	**BCH**
5826109	40040800T020	5826036	40040800T020	—		—		8,0	8	20,00	50	0,20
5826110	40140800T028	5826037	40140800T028	—		—		8,0	8	28,00	75	0,20
5826111	40240800T041	5826038	40240800T041	—		—		8,0	8	41,00	100	0,20
—		5826039	40040900T020	—		—		9,0	9	20,00	63	0,20
5826113	40041000T022	5826040	40041000T022	—		—		10,0	10	22,00	72	0,20
5826114	40141000T032	5826041	40141000T032	—		—		10,0	10	32,00	89	0,20
5826115	40241000T045	5826042	40241000T045	—		—		10,0	10	45,00	100	0,20
5826116	40041200T025	—		5826141	40041200W025	5826070	40041200W025	12,0	12	25,00	75	0,30
—		5826043	40041200T025	—		—		12,0	12	25,00	89	0,30
5826117	40141200T045	5826044	40141200T045	5826142	40141200W045	5826071	40141200W045	12,0	12	45,00	100	0,30
5826118	40241200T075	5826045	40241200T075	5826143	40241200W075	5826072	40241200W075	12,0	12	75,00	150	0,30
5826119	40041400T032	5826046	40041400T032	5826144	40041400W032	5826073	40041400W032	14,0	14	32,00	83	0,30
5826120	40141400T050	5826047	40141400T050	5826146	40141400W050	5826074	40141400W050	14,0	14	50,00	100	0,30
5826121	40241400T075	5826049	40241400T075	5826147	40241400W075	5826075	40241400W075	14,0	14	75,00	150	0,30
5826122	40041600T032	5826061	40041600T032	5826148	40041600W032	5826076	40041600W032	16,0	16	32,00	92	0,30
5826123	40141600T056	5826062	40141600T056	5826149	40141600W056	5826077	40141600W056	16,0	16	56,00	110	0,30
5826124	40241600T075	5826063	40241600T075	5826150	40241600W075	5826078	40241600W075	16,0	16	75,00	150	0,30
5826125	40041800T038	5826064	40041800T038	5826151	40041800W038	5826079	40041800W038	18,0	18	38,00	100	0,30
5826126	40141800T060	5826065	40141800T060	5826152	40141800W060	5826080	40141800W060	18,0	18	60,00	125	0,30
5826127	40241800T075	5826066	40241800T075	5826153	40241800W075	5826081	40241800W075	18,0	18	75,00	150	0,30
5826128	40042000T038	5826067	40042000T038	5826154	40042000W038	5826082	40042000W038	20,0	20	38,00	104	0,30
5826129	40142000T056	5826068	40142000T056	5826155	40142000W056	5826083	40142000W056	20,0	20	56,00	125	0,30
5826130	40242000T075	5826069	40242000T075	5826156	40242000W075	5826084	40242000W075	20,0	20	75,00	150	0,30

NOTE: For application data, please see pages P40–P41.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

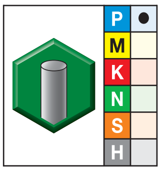


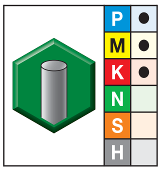


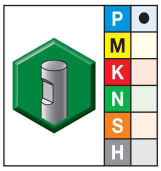
End Mill Tolerances

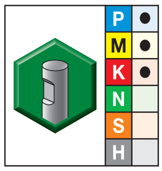
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D010 • VariMill GP









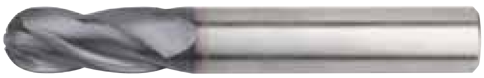
● first choice
○ alternate choice

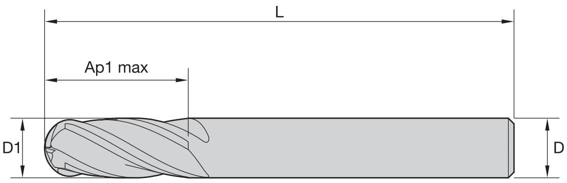
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN					
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5825604	D0100300T008	5825527	D0100300T008		–		–	3,0	6	8,00	57
5825605	D0100400T011	5825528	D0100400T011		–		–	4,0	6	11,00	57
5825606	D0100500T013	5825529	D0100500T013		–		–	5,0	6	13,00	57
5825607	D0100600T013	5825530	D0100600T013		–		–	6,0	6	13,00	57
5825608	D0100800T019	5825531	D0100800T019		–		–	8,0	8	19,00	63
5825609	D0101000T022	5825532	D0101000T022		–		–	10,0	10	22,00	72
5825610	D0101200T026	5825533	D0101200T026	5825589	D0101200W026	5825540	D0101200W026	12,0	12	26,00	83
5825611	D0101400T026	5825534	D0101400T026	5825590	D0101400W026	5825541	D0101400W026	14,0	14	26,00	83
5825612	D0101600T032	5825536	D0101600T032	5825591	D0101600W032	5825542	D0101600W032	16,0	16	32,00	92
5825613	D0101800T032	5825538	D0101800T032	5825592	D0101800W032	5825543	D0101800W032	18,0	18	32,00	92
5825614	D0102000T038	5825539	D0102000T038	5825593	D0102000W038	5825544	D0102000W038	20,0	20	38,00	104

NOTE: For application data, please see page P42.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.

ZU=4 DIN 6528





End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 2848 • VariMill GP

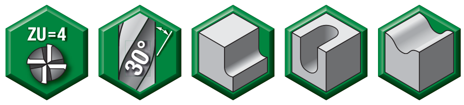
	grade UNCOATED	grade TiAlN
P	●	●
M		●
K		●
N		
S		
H		

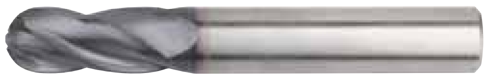
● first choice
○ alternate choice

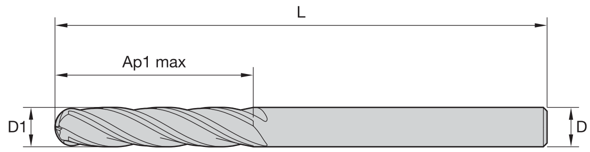
grade UNCOATED order #	grade UNCOATED catalogue #	grade TiAlN order #	grade TiAlN catalogue #	D1	D	length of cut Ap1 max	length L
5825594	28480400T011	5825545	28480400T011	4,0	4	11,00	50
5825595	28480500T013	5825546	28480500T013	5,0	5	13,00	50
5825596	28480600T013	5825547	28480600T013	6,0	6	13,00	57
5825597	28480800T019	5825548	28480800T019	8,0	8	19,00	63
5825598	28481000T022	5825549	28481000T022	10,0	10	22,00	72
5825599	28481200T026	5825550	28481200T026	12,0	12	26,00	83
5825600	28481400T026	5825551	28481400T026	14,0	14	26,00	83
5825601	28481600T032	5825552	28481600T032	16,0	16	32,00	92
5825602	28481800T032	5825553	28481800T032	18,0	18	32,00	92
5825603	28482000T038	5825554	28482000T038	20,0	20	38,00	104

NOTE: For application data, please see *page P42.*

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



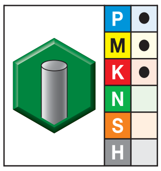




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4000 4010 • VariMill GP

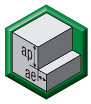
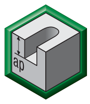
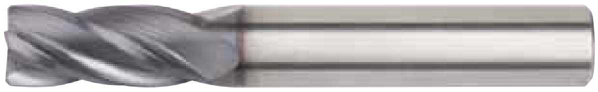


● first choice
○ alternate choice

order # (grade TiAlN)	catalogue # (TiAlN)	D1	D	length of cut Ap1 max	length L
5825555	40000200T006	2,0	3	6,30	38
5825556	40000300T020	3,0	3	20,00	75
5825557	40000400T014	4,0	4	14,00	50
5825558	40100400T025	4,0	4	25,00	75
5825559	40000500T016	5,0	5	16,00	50
5825560	40100500T030	5,0	5	30,00	75
5825573	40000600T016	6,0	6	16,00	50
5825574	40100600T019	6,0	6	19,00	63
5825575	40100600T030	6,0	6	30,00	75
5825576	40000800T019	8,0	8	19,00	63
5825577	40100800T040	8,0	8	40,00	100
5825578	40001000T022	10,0	10	22,00	72
5825579	40101000T040	10,0	10	40,00	100
5825580	40001200T025	12,0	12	25,00	75
5825581	40101200T045	12,0	12	45,00	150
5825583	40001400T032	14,0	14	32,00	83
5825584	40101400T050	14,0	14	50,00	100
5825585	40001600T032	16,0	16	32,00	89
5825586	40101600T065	16,0	16	65,00	150
5825587	40001800T038	18,0	18	38,00	100
5825588	40102000T056	20,0	20	56,00	125

NOTE: For application data, please see pages P42–P43.

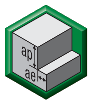
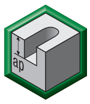
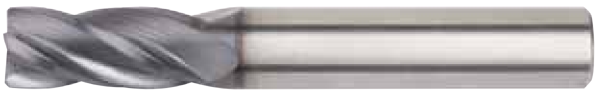
Series D004 4004 • TiAlN • VariMill GP

Material Group		Side Milling (A) and Slotting (B)			TiAlN				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed — vc m/min				D1 — Diameter												
		ap	ae	ap	min		max	mm	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

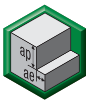
Series D004 4004 • Uncoated • VariMill GP

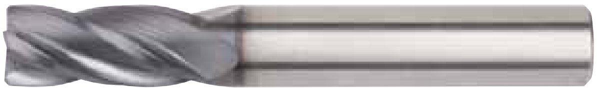




Material Group		Side Milling (A) and Slotting (B)			uncoated				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	mm	1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	0,5 x D	112	–	152	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D014 2528 4014 4024 • TiAlN • VariMill GP

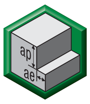


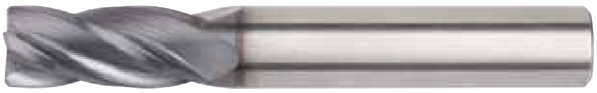


Material Group		Side Milling (A)		TiAlN				Recommended feed per tooth (fz = mm/th) for side milling (A).											
		A		Cutting Speed — vc m/min				D1 — Diameter											
		ap	ae	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	1	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	2	Ap1 max	0,1 x D	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	3	Ap1 max	0,1 x D	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
P	4	Ap1 max	0,1 x D	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
M	2	Ap1 max	0,1 x D	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
K	2	Ap1 max	0,1 x D	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions.For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D014 2528 4014 4024 • Uncoated • VariMill GP

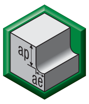


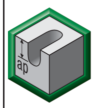


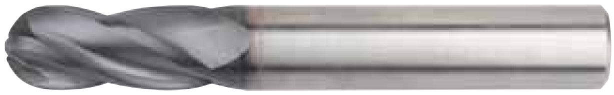
Material Group		Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
P	1	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
P	2	Ap1 max	0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D010 2848 4000 • TiAlN • VariMill GP





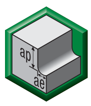


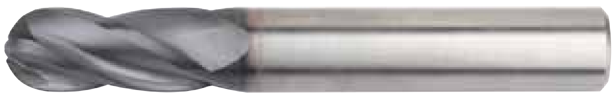
Material Group		Side Milling (A) and Slotting (B): A ap	A ae	B ap	TiAlN Cutting Speed — vc m/min: min		max	mm	D1 — Diameter: 3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
									Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	1	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	2	Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	3	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
P	4	Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
M	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
K	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Application Data • Series 4010 • VariMill™ GP

Series 4010 • TiAlN • VariMill GP

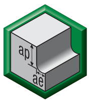


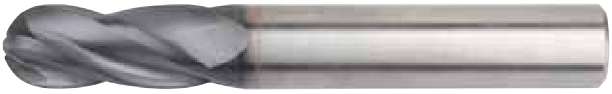


Material Group		Side Milling (A): A ap	A ae	TiAlN Cutting Speed — vc m/min: min		max	mm	D1 — Diameter: 3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
								Recommended feed per tooth (fz = mm/th) for side milling (A).										
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	1	Ap1 max	0,1 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	2	Ap1 max	0,1 x D	140	–	190	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
P	3	Ap1 max	0,1 x D	120	–	160	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
P	4	Ap1 max	0,1 x D	90	–	150	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
M	2	Ap1 max	0,1 x D	60	–	80	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
K	2	Ap1 max	0,1 x D	110	–	140	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4010 • Uncoated • VariMill GP





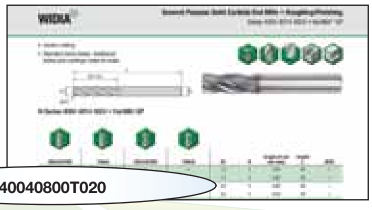
Material Group		Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

WIDIA HANITA

How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



4004	0800	T	020
List	Diameter mm	Shank Style	Ap1 max mm

4004 – List

- **D002** = 2FL Chamfer DIN 6527 — Short
- **D012** = 2FL Chamfer DIN 6527 — Long
- **2819** = 2FL Chamfer DIN 6528
- **4002** = 2FL Chamfer Factory Standard — Short/Regular
- **4012** = 2FL Chamfer Factory Standard — Long
- **4022** = 2FL Chamfer Factory Standard — Extra Long
- **D001** = 2FL Ball Nose DIN 6527 Short
- **D011** = 2FL Ball Nose DIN 6527 Long
- **2838** = 2FL Ball Nose DIN 6528
- **4001** = 2FL Ball Nose Factory Standard — Short/Regular
- **4011** = 2FL Ball Nose Factory Standard — Long
- **4021** = 2FL Ball Nose Factory Standard — Extra Long
- **D004** = 4FL Chamfer DIN 6527 — Short
- **D014** = 4FL Chamfer DIN 6527 — Long
- **2528** = 4FL Chamfer DIN 6528
- **4004** = 4FL Chamfer Factory Standard — Short/Regular
- **4014** = 4FL Chamfer Factory Standard — Long
- **4024** = 4FL Chamfer Factory Standard — Extra Long
- **D000** = 4FL Ball Nose DIN 6527 — Short
- **D010** = 4FL Ball Nose DIN 6527 — Long

T – Shank Style

- **T** = Plain Shank
- **W** = Weldon® Shank

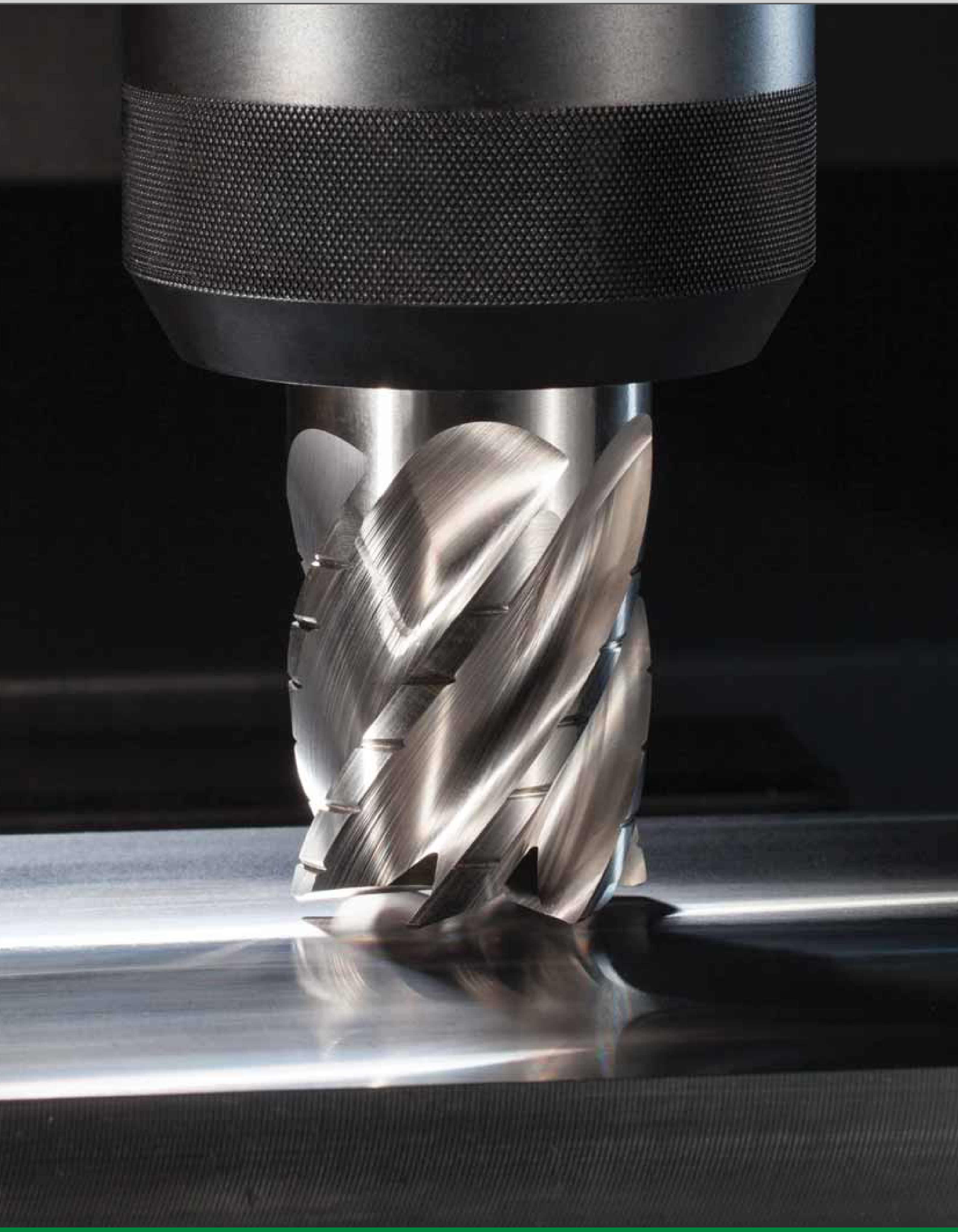
Solid Carbide-Tipped End Mills

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

WIDIA-Hanita™ carbide-tipped end mills can provide unique advantages over solid tools, especially in large diameter sizes. They can be run at the same high cutting speeds as solid carbide but are usually less costly because of their steel body. The tougher body also absorbs shock, which enables it to perform well in conventional machines with less-than-rigid setups. Our in-house brazing capabilities and expertise provide our customers with flexibility in using carbide-tipped cutting edges on many styles, geometries, and sizes of standard and custom solution tooling.

- Available up to a diameter of 250mm.
- Continuous edge carbide diameter of up to 300mm.
- Centre cutting geometries available.
- Maximum helix angle is 45°.
- Available in multiple spindle connections.
- Outstanding custom solutions capabilities.

To learn more about our innovations, contact your local Authorised Distributor or visit **widia.com**.



Solid End Milling • High-Performance High-Speed Steel (HSS-E/PM)

WavCut

WavCut tools for machining titanium are best suited for applications in aerospace and energy, providing high Metal Removal Rates (MRR) and increased tool life. The special wave design of these 5-, 6-, and 8-fluted end mills require less horsepower during roughing and semi-finishing, and provide excellent chip formation. Since chips evacuate easily, WavCut tools do not recut chips thus increasing tool life. Also, the edges change the radial cutting edge position without changing the diameter.

- Centre cutting offering excellent performance in roughing applications, especially in titanium.
- Capable of deep-slotting cuts for high Metal Removal Rates (MRR).
- Special wave design for excellent chip formation and evacuation preventing re-cutting of chips.

Special wave design helps chip formation.

Centre cutting for plunging and ramping.

35° helix for roughing.

High cobalt and vanadium content PM HSS providing superior wear resistance and red hardness.

WavCut™ Series

- Benefit from reliable and trouble-free machining results using HSS WavCut cutter.
- Drastically reduce the risk of re-cutting chips, especially with vertical machines having multiple spindles.
- Increase stock removal rates over regular roughing tools due to reduced horsepower consumption.

660W Series

- 4-flute 35° helix for slotting.
- 6-flute 35° helix, for slotting, and in certain cases, pocketing and profiling.
- Centre cutting, chamfered corner, uncoated.

Other featured HSS Series

- Sophisticated roughing profiles capable of dealing with common chip formation challenges.
- High cobalt and vanadium content PM HSS providing superior wear resistance and red hardness.

6N06 Series

- 4- and 5-flute, 30° helix.
- Fine pitch style roughing profile.
- Centre cutting and chamfered corner.

6N70 Series

- 3- and 6-flute, 30° helix.
- Fine pitch style roughing profile.
- Centre cutting and chamfered corner.

6NL6 Series

- 4- and 5-flute, 30° helix.
- Extended neck for long-reach applications.
- Fine pitch style roughing profile.

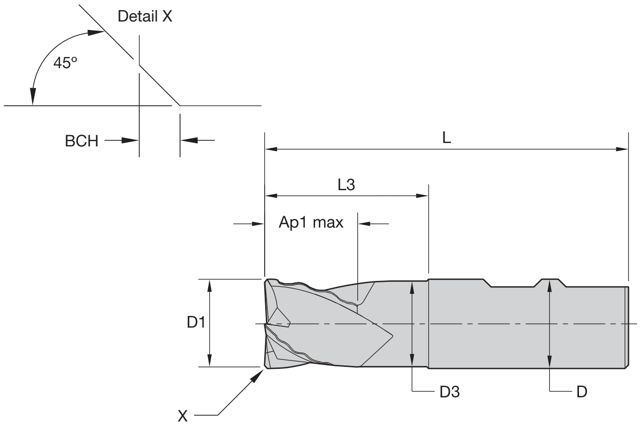
1N0MJJ

- 4-flute.
- 30° helix.
- Square corner.
- JIS standard.
- Centre cutting.

1N77 Series

- 4-flute.
- 38° helix.
- Unequal flute spacing.
- Centre cutting.

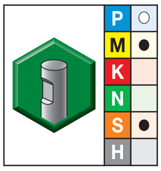
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,05/-0,05	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013
		> 30–50	0/0,016

Series 664W 660W 661W • WavCut I



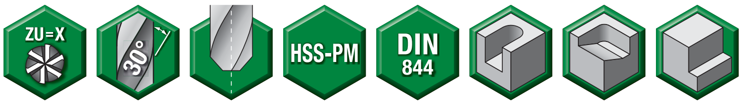
● first choice
○ alternate choice

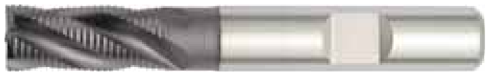
grade UNCOATED-WW

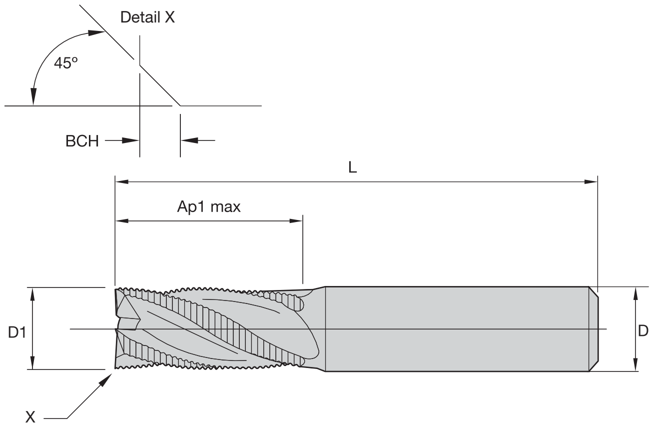
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	BCH	ZU
3871691	664W25008WW	25,0	25	23	26,00	46,00	102	1,00	5
3871692	660W25008WW	25,0	25	23	45,00	65,00	121	1,00	5
3871833	661W25008WW	25,0	25	23	90,00	110,00	166	1,00	6
3871834	664W32009WW	32,0	32	30	32,00	52,00	112	1,00	6
3871835	660W32009WW	32,0	32	30	53,00	73,00	133	1,00	6
3871836	661W32009WW	32,0	32	30	100,00	110,00	170	1,00	6
3871837	664W40009WW	40,0	32	–	38,00	58,00	118	1,00	6
3871838	660W40009WW	40,0	32	–	56,00	65,00	125	1,00	6
3871839	661W40009WW	40,0	32	–	100,00	110,00	170	1,00	6
3871840	664W50000WW	50,0	50	47	40,00	60,00	140	1,00	6
3871841	660W50000WW	50,0	50	47	75,00	95,00	175	1,00	6
3871842	661W50000WW	50,0	50	47	110,00	130,00	210	1,00	8

NOTE: For application data, please see page Q10.

- Centre cutting.
- Fine pitch.
- Standard items listed. Additional styles and coatings made-to-order.



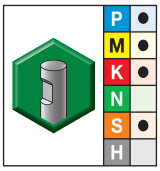




End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,12/-0,12	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 6N06

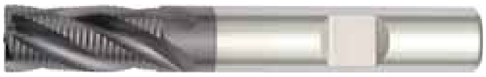


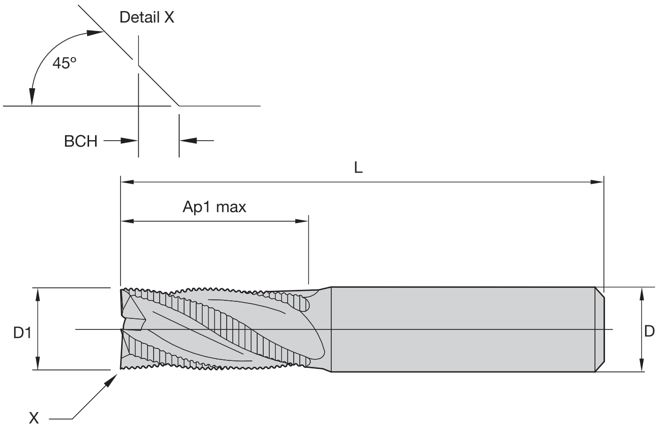
● first choice
○ alternate choice

grade TiAlN-LW TiAlN order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
1660373	6N0606002LW	6,0	6	13,00	57	0,25	4
1660389	6N0608004LW	8,0	10	19,00	69	0,25	4
1660397	6N0609004LW	9,0	10	19,00	69	0,25	4
1660405	6N0610004LW	10,0	10	22,00	72	0,25	4
1660413	6N0611005LW	11,0	12	22,00	79	0,25	4
1660421	6N0612005LW	12,0	12	26,00	83	0,35	4
1660437	6N0614005LW	14,0	12	26,00	83	0,35	4
1660453	6N0616006LW	16,0	16	32,00	92	0,35	4
1660471	6N0618006LW	18,0	16	32,00	92	0,35	4
1660479	6N0620007LW	20,0	20	38,00	104	0,35	4
1660487	6N0622007LW	22,0	20	38,00	104	0,50	5
1660497	6N0625008LW	25,0	25	45,00	121	0,50	5
1660507	6N0630008LW	30,0	25	45,00	121	0,50	5

NOTE: For application data, please see page Q10.

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.

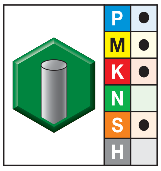


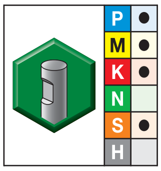


End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,12/-0,12	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 6N70



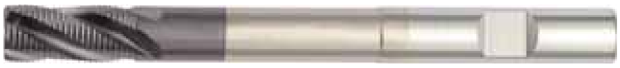


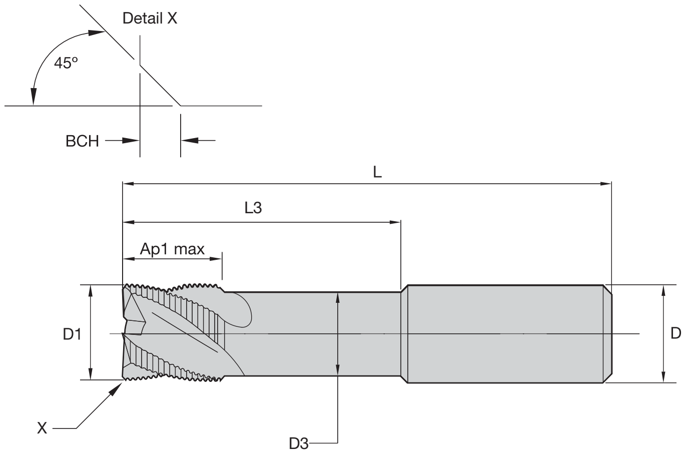
● first choice
○ alternate choice

grade TiAIN-LT TiAIN order #	grade TiAIN-LT TiAIN catalogue #	grade TiAIN-LW TiAIN order #	grade TiAIN-LW TiAIN catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
2990812	6N7006002LT	1660596	6N7006002LW	6,0	6	13,00	57	0,25	4
2992083	6N7008004LT	1660598	6N7008004LW	8,0	10	19,00	69	0,25	4
1981089	6N7010004LT	1660600	6N7010004LW	10,0	10	22,00	72	0,25	4
1981090	6N7012005LT	1660602	6N7012005LW	12,0	12	26,00	83	0,35	4
3078687	6N7014005LT	–		14,0	12	26,00	83	–	4
–		1660604	6N7014005LW	14,0	12	26,00	83	0,35	4
1717017	6N7016006LT	1660606	6N7016006LW	16,0	16	32,00	92	0,35	4
3077681	6N7018006LT	–		18,0	16	32,00	92	–	4
–		1660608	6N7018006LW	18,0	16	32,00	92	0,35	4
1716039	6N7020007LT	1660610	6N7020007LW	20,0	20	38,00	104	0,35	4
2992087	6N7025008LT	1660612	6N7025008LW	25,0	25	45,00	121	0,50	4
3078692	6N7032009LT	–		32,0	20	53,00	133	–	6
–		1660614	6N7032009LW	32,0	32	53,00	133	0,50	6

NOTE: For application data, please see page Q11.

- Centre cutting.
- Fine pitch.
- Standard items listed. Additional styles and coatings made-to-order.

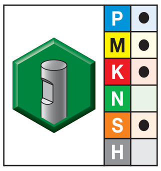




End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,12/-0,12	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 6NL6



● first choice
○ alternate choice

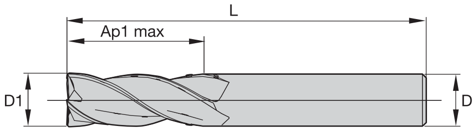
grade TiAlN-LW
TiAlN

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	BCH	ZU
1660617	**6NL610004LW**	10,0	10	10	22,00	69,00	110	0,25	4
1660623	**6NL612005LW**	12,0	12	12	26,00	78,00	125	0,35	4
1660629	**6NL616006LW**	16,0	16	15	32,00	87,00	138	0,35	4
1660635	**6NL620007LW**	20,0	20	20	38,00	108,00	160	0,35	4
1660640	**6NL625008LW**	25,0	25	25	45,00	155,00	216	0,50	5

NOTE: For application data, please see page Q11.

WIDIA HANITA

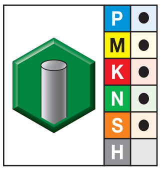
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,02/-0,0	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 1N0M JJ

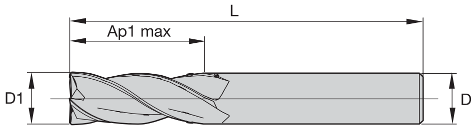


● first choice
○ alternate choice

grade TiAlN-LJ TiAlN					
order #	**catalogue #**	**D1**	**D**	**length of cut Ap1 max**	**length L**
2605576	**1N0M03002LJ**	3,0	6	10,00	50
2605577	**1N0M04003LJ**	4,0	8	12,00	60
2605578	**1N0M05003LJ**	5,0	8	15,00	60
2605579	**1N0M06003LJ**	6,0	8	15,00	60
2605580	**1N0M08004LJ**	8,0	10	20,00	65
2605581	**1N0M10004LJ**	10,0	10	25,00	75
2605582	**1N0M12005LJ**	12,0	12	30,00	80
2605583	**1N0M14006LJ**	14,0	16	35,00	90
2605584	**1N0M16006LJ**	16,0	16	40,00	95
2605585	**1N0M18007LJ**	18,0	20	40,00	105
2605586	**1N0M20007LJ**	20,0	20	45,00	110
2605587	**1N0M22007LJ**	22,0	20	45,00	125

NOTE: For application data, please see page Q12.

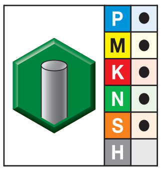
- Centre cutting.
- Unequal flute spacing.
- Standard items listed. Additional styles and coatings made-to-order.

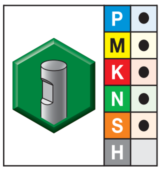


End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,04/-0,0	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 1N77 • VariMill



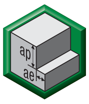


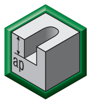
● first choice
○ alternate choice

grade TiCN-CT TiCN order #	catalogue #	grade TiCN-CW TiCN order #	catalogue #	D1	D	length of cut Ap1 max	length L
2605715	1N7706002CT	2605716	1N7706002CW	6,0	6	13,00	57
2605717	1N7708004CT	2605718	1N7708004CW	8,0	10	19,00	69
2605719	1N7710004CT	2605720	1N7710004CW	10,0	10	22,00	72
2605721	1N7712005CT	2605722	1N7712005CW	12,0	12	26,00	83
2605823	1N7714005CT	2605824	1N7714005CW	14,0	12	26,00	83
2605825	1N7716006CT	2605826	1N7716006CW	16,0	16	32,00	92
2605827	1N7718006CT	2605828	1N7718006CW	18,0	16	32,00	92
2605829	1N7720007CT	2605830	1N7720007CW	20,0	20	38,00	104
2605831	1N7722007CT	2605832	1N7722007CW	22,0	20	38,00	104
2605843	1N7725008CT	2605844	1N7725008CW	25,0	25	45,00	121
2605845	1N7730008CT	2605846	1N7730008CW	30,0	25	45,00	121

NOTE: For application data, please see page Q13.

Series 664W 660W 661W • WavCut I



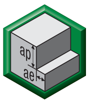


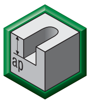
Material Group		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.				
		A		B	Cutting Speed — vc m/min				D1 — Diameter			
		ap	ae	ap	min		max	mm	25,0	32,0	40,0	50,0
P	5	1,5 x D	0,4 x D	1 x D	10	–	14	fz	0,091	0,105	0,124	0,146
M	1	1,5 x D	0,4 x D	1 x D	10	–	14	fz	0,114	0,131	0,155	0,182
	2	1,5 x D	0,4 x D	1 x D	10	–	12	fz	0,091	0,105	0,124	0,146
S	3	1,5 x D	0,4 x D	0,75 x D	6	–	11	fz	0,091	0,105	0,124	0,146
	4	1,5 x D	0,4 x D	0,75 x D	6	–	11	fz	0,084	0,096	0,114	0,134

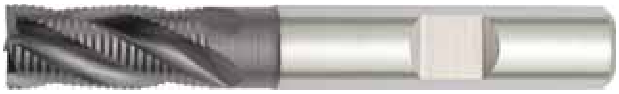
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Application Data • Series 6N06

Series 6N06



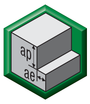
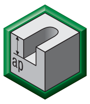
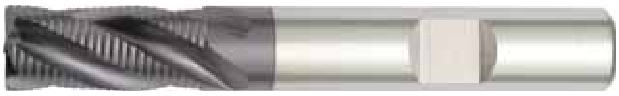




Material Group		Side Milling (A) and Slotting (B)			TiCN			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	min		max	mm	6,0	8,0	10,0	12,0	16,0	18,0	20,0	25,0	30,0
P	1	1,5 x D	0,5 x D	1 x D	56	–	64	70	–	80	fz	0,046	0,062	0,072	0,079	0,097	0,104	0,109	0,119	0,143
	2	1,5 x D	0,5 x D	1 x D	48	–	64	60	–	80	fz	0,046	0,062	0,072	0,079	0,097	0,104	0,109	0,119	0,143
	3	1,5 x D	0,5 x D	1 x D	40	–	56	50	–	70	fz	0,038	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,131
	5	1,5 x D	0,5 x D	1 x D	20	–	28	25	–	35	fz	0,031	0,042	0,048	0,054	0,067	0,073	0,078	0,087	0,105
M	1	1,5 x D	0,5 x D	1 x D	20	–	28	25	–	35	fz	0,038	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,131
	2	1,5 x D	0,5 x D	1 x D	20	–	24	25	–	30	fz	0,031	0,042	0,048	0,054	0,067	0,073	0,078	0,087	0,105
	3	1,5 x D	0,5 x D	1 x D	12	–	16	15	–	20	fz	0,026	0,035	0,040	0,045	0,055	0,059	0,062	0,068	0,082
K	1	1,5 x D	0,5 x D	1 x D	56	–	64	70	–	80	fz	0,046	0,062	0,072	0,079	0,097	0,104	0,109	0,119	0,143
	2	1,5 x D	0,5 x D	1 x D	40	–	56	50	–	70	fz	0,038	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,131
S	1	1,5 x D	0,5 x D	1 x D	12	–	24	15	–	30	fz	0,038	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,131
	2	1,5 x D	0,5 x D	1 x D	4	–	12	5	–	15	fz	0,021	0,027	0,032	0,036	0,045	0,048	0,052	0,059	0,071
	3	1,5 x D	0,5 x D	1 x D	12	–	22	15	–	28	fz	0,031	0,042	0,048	0,054	0,067	0,073	0,078	0,087	0,105
	4	1,5 x D	0,5 x D	1 x D	12	–	22	15	–	28	fz	0,027	0,038	0,045	0,050	0,062	0,067	0,071	0,080	0,096

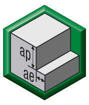
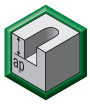
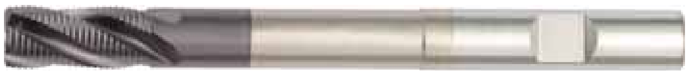
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 6N70

																	
		Side Milling (A) and Slotting (B)			TiAIN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
Material Group		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	18,0	20,0	25,0	32,0
P	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,058	0,078	0,090	0,099	0,121	0,130	0,137	0,149	0,190
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,058	0,078	0,090	0,099	0,121	0,130	0,137	0,149	0,190
	3	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,048	0,065	0,076	0,084	0,105	0,113	0,121	0,137	0,175
	5	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,039	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,140
M	1	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,048	0,065	0,076	0,084	0,105	0,113	0,121	0,137	0,175
	2	1,5 x D	0,5 x D	1 x D	25	–	30	fz	0,039	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,140
	3	1,5 x D	0,5 x D	1 x D	15	–	20	fz	0,033	0,044	0,051	0,056	0,068	0,073	0,078	0,085	0,109
K	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,058	0,078	0,090	0,099	0,121	0,130	0,137	0,149	0,190
	2	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,048	0,065	0,076	0,084	0,105	0,113	0,121	0,137	0,175
S	1	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,048	0,065	0,076	0,084	0,105	0,113	0,121	0,137	0,175
	2	1,5 x D	0,5 x D	1 x D	5	–	15	fz	0,026	0,034	0,040	0,045	0,056	0,060	0,065	0,074	0,094
	3	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,039	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,140
	4	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,034	0,048	0,056	0,062	0,077	0,083	0,089	0,100	0,128

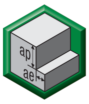
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

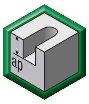
Series 6NL6

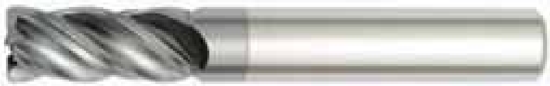
													
		Side Milling (A) and Slotting (B)			TiAIN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.					
		A		B	Cutting Speed — vc m/min				D1 — Diameter				
Material Group		ap	ae	ap	min		max	mm	10,0	12,0	16,0	20,0	25,0
P	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,063	0,070	0,085	0,096	0,104
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,063	0,070	0,085	0,096	0,104
	3	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,053	0,059	0,073	0,085	0,096
	5	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,042	0,047	0,059	0,068	0,076
M	1	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,053	0,059	0,073	0,085	0,096
	2	1,5 x D	0,5 x D	1 x D	25	–	30	fz	0,042	0,047	0,059	0,068	0,076
	3	1,5 x D	0,5 x D	1 x D	15	–	20	fz	0,035	0,039	0,048	0,054	0,060
K	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,063	0,070	0,085	0,096	0,104
	2	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,053	0,059	0,073	0,085	0,096
S	1	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,053	0,059	0,073	0,085	0,096
	2	1,5 x D	0,5 x D	1 x D	5	–	15	fz	0,028	0,031	0,039	0,045	0,051
	3	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,042	0,047	0,059	0,068	0,076
	4	1,5 x D	0,5 x D	1 x D	10	–	20	fz	0,039	0,043	0,054	0,062	0,070

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 1N0M JJ



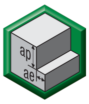
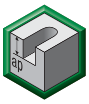
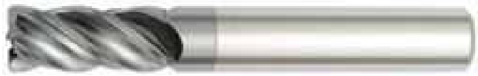




Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min	–	max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,029	0,039	0,058	0,078	0,090	0,099	0,121	0,137	0,149
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,029	0,039	0,058	0,078	0,090	0,099	0,121	0,137	0,149
	3	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,024	0,032	0,048	0,065	0,076	0,084	0,105	0,121	0,137
	5	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,020	0,026	0,039	0,052	0,061	0,067	0,084	0,097	0,109
M	1	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,024	0,032	0,048	0,065	0,076	0,084	0,105	0,121	0,137
	2	1,5 x D	0,5 x D	1 x D	25	–	30	fz	0,020	0,026	0,039	0,052	0,061	0,067	0,084	0,097	0,109
	3	1,5 x D	0,5 x D	1 x D	15	–	20	fz	0,017	0,022	0,033	0,044	0,051	0,056	0,068	0,078	0,085
K	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,029	0,039	0,058	0,078	0,090	0,099	0,121	0,137	0,149
	2	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,024	0,032	0,048	0,065	0,076	0,084	0,105	0,121	0,137
N	1	1,5 x D	0,5 x D	1 x D	300	–	375	fz	0,042	0,055	0,079	0,104	0,125	0,144	0,192	0,240	0,300
	2	1,5 x D	0,5 x D	1 x D	230	–	300	fz	0,034	0,044	0,063	0,083	0,100	0,115	0,154	0,192	0,240
S	1	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,024	0,032	0,048	0,065	0,076	0,084	0,105	0,121	0,137
	2	1,5 x D	0,5 x D	0,5 x D	5	–	15	fz	0,013	0,018	0,026	0,034	0,040	0,045	0,056	0,065	0,074
	3	1,5 x D	0,5 x D	1 x D	15	–	28	fz	0,020	0,026	0,039	0,052	0,061	0,067	0,084	0,097	0,109
	4	1,5 x D	0,5 x D	0,5 x D	15	–	28	fz	0,016	0,022	0,034	0,048	0,056	0,062	0,077	0,089	0,100

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 1N77 • VariMill

Material Group																	
		Side Milling (A) and Slotting (B)			TiCN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	14,0	16,0	20,0	25,0	30,0
P	1	1,5 x D	0,5 x D	1 x D	56	–	64	fz	0,058	0,078	0,090	0,099	0,111	0,121	0,137	0,149	0,149
	2	1,5 x D	0,5 x D	1 x D	48	–	64	fz	0,058	0,078	0,090	0,099	0,111	0,121	0,137	0,149	0,149
	3	1,5 x D	0,5 x D	1 x D	40	–	56	fz	0,048	0,065	0,076	0,084	0,095	0,105	0,121	0,137	0,137
	5	1,5 x D	0,5 x D	1 x D	20	–	28	fz	0,039	0,052	0,061	0,067	0,076	0,084	0,097	0,109	0,109
M	1	1,5 x D	0,5 x D	1 x D	20	–	28	fz	0,048	0,065	0,076	0,084	0,095	0,105	0,121	0,137	0,137
	2	1,5 x D	0,5 x D	1 x D	20	–	24	fz	0,039	0,052	0,061	0,067	0,076	0,084	0,097	0,109	0,109
	3	1,5 x D	0,5 x D	1 x D	12	–	16	fz	0,033	0,044	0,051	0,056	0,062	0,068	0,078	0,085	0,085
K	1	1,5 x D	0,5 x D	1 x D	56	–	64	fz	0,058	0,078	0,090	0,099	0,111	0,121	0,137	0,149	0,149
	2	1,5 x D	0,5 x D	1 x D	40	–	56	fz	0,048	0,065	0,076	0,084	0,095	0,105	0,121	0,137	0,137
N	1	1,5 x D	0,5 x D	1 x D	240	–	300	fz	0,079	0,104	0,125	0,144	0,168	0,192	0,240	0,300	0,300
	2	1,5 x D	0,5 x D	1 x D	184	–	240	fz	0,063	0,083	0,100	0,115	0,134	0,154	0,192	0,240	0,240
S	1	1,5 x D	0,5 x D	1 x D	12	–	24	fz	0,048	0,065	0,076	0,084	0,095	0,105	0,121	0,137	0,137
	2	1,5 x D	0,5 x D	1 x D	4	–	12	fz	0,026	0,034	0,040	0,045	0,050	0,056	0,065	0,074	0,074
	3	1,5 x D	0,5 x D	1 x D	12	–	22	fz	0,039	0,052	0,061	0,067	0,076	0,084	0,097	0,109	0,109
	4	1,5 x D	0,5 x D	0,5 x D	12	–	22	fz	0,034	0,048	0,056	0,062	0,070	0,077	0,089	0,100	0,100

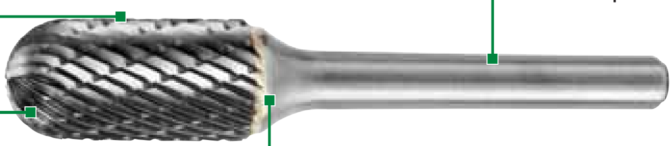
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Solid End Milling • Burs

Carbide Burs

WIDIA™ carbide burs are manufactured in compliance with USCTI standards and are the highest quality in the industry, delivering excellent performance and safety. Our unique manufacturing process ensures exceptional tool life with the reliability to operate safely at high speeds. WIDIA burs offer a comprehensive portfolio of sizes and shapes for all applications and workpiece materials.

- Complete selection of shapes and cut styles for all materials and applications.
- Solid shank and brazed-on steel styles.
- Highest quality materials and construction deliver exceptional tool life.
- Wide array of sizes and shank lengths.
- Available in multiple size and style kits.
- Use of industry-standard USCTI codes for easy identification.

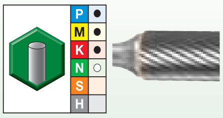


Standard Cut Styles

Standard Cut (Right-Hand Spiral)

The WIDIA™ standard (right-hand spiral) cut produces a smooth finish for general-purpose use on steel, cast iron, and other ferrous and non-ferrous materials.

Most WIDIA carbide burs are available in the right-hand spiral design.

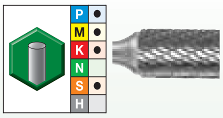


Master Cut (Double Cut)

The WIDIA exclusive **master cut,** with its chisel-type cutting edge, is a machine-ground tool built to exacting tolerances of concentricity, size, and shape. This accuracy, when combined with precision grinders, results in smooth-running, fast metal removal, and fine finishes. The right- and left-hand helical flutes combine to produce a chisel-type cutting tooth. This results in faster penetration and stock removal with minimal bounce or chatter.

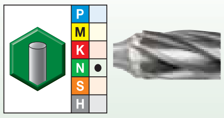
The master cut design also produces an easy-to-handle granular-type chip in most metals, as opposed to the conventional sliver-type chips.

Throughout its life, the master cut gives faster stock removal and less operator fatigue, and maintains a good finish on the widest possible variety of workpiece materials.



Aluminium Cut

The WIDIA **aluminium cut** burs are outstanding on soft or non-ferrous type materials. Use the aluminium cut design on aluminium, magnesium, brass, lead, and most plastics.

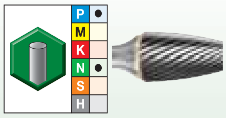


Special Cut Styles

Coarse Cut

Coarse cut burs are favored for applications in softer materials such as brass, lead, annealed low-carbon steels, and some aluminium alloys. The combination of fewer flutes with greater depths provides the chip clearance necessary for these materials.

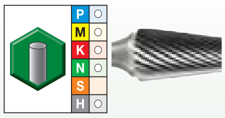
Available as specials.



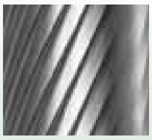
Fine Cut RHS

The **WIDIA fine cut right-hand spiral** is used in applications where stock removal is light and workpiece finish is critical. A greater number of flutes reduces chip load and provides excellent control in deburring small, intricate areas.

Available as specials.

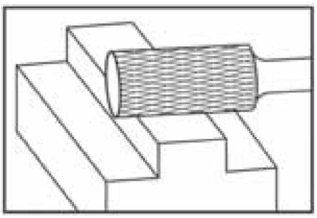


How to select a Bur

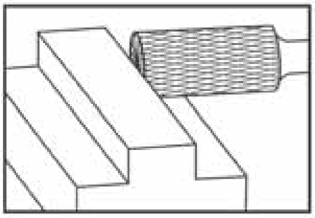
Applications	Material	Cut	
Efficient stock removal — deburring, finishing, and cleaning.	Ferrous metals Non-ferrous metals	Double Master Cut	
Heavy stock removal — deburring, milling, cleaning, and machining.	Non-ferrous metal: aluminium alloys Plastics	Aluminium Cut	
Medium stock removal — deburring, milling, cleaning, and finishing.	Non-ferrous metal: aluminium alloys Plastics Hard rubber	Coarse Cut Special Cut Style	
Medium stock removal — deburring, milling, cleaning, and finishing.	Non-Hardened steel >45 HRC Hardened steel >45 HRC: stainless steel High-temperature resistant metals: nickel, cobalt, titanium Non-ferrous light metals: brass, copper, and zinc Hardened >45 HRC: cast iron	Single Cut	
Light stock removal — fine deburring and fine finishing.	Hardened steel >45 HRC	Fine Cut Special Cut Style	

Bur Shapes

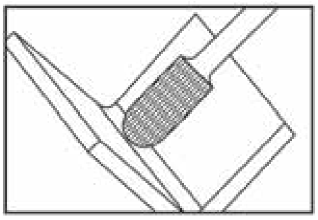
A Shape



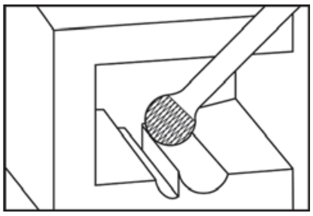
B Shape



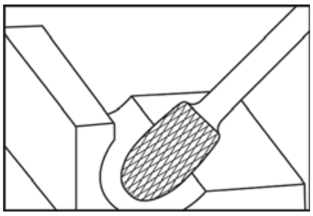
C Shape



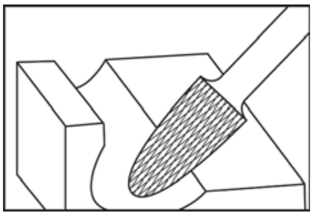
D Shape



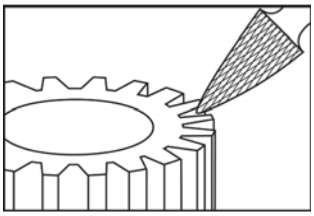
E Shape



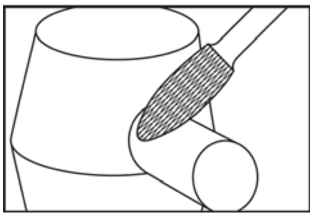
F Shape



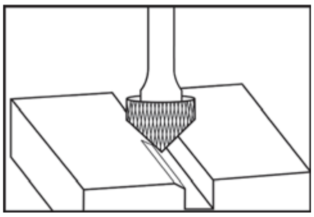
G Shape



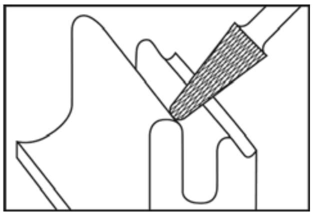
H Shape



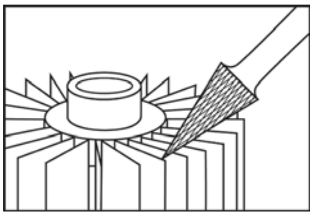
K Shape



L Shape

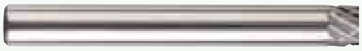


M Shape

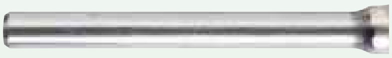


Shank Styles

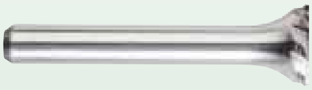
A Shank
3mm solid carbide shank



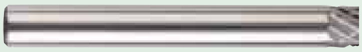
B Shank
3mm hardened steel shank



C Shank
6mm hardened steel shank



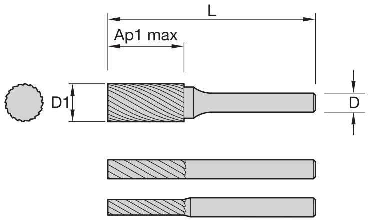
D Shank
3mm solid carbide shank

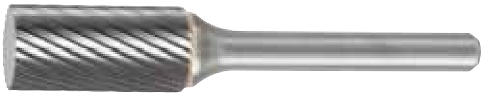


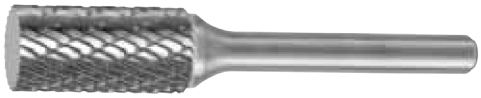
Bur Cutting Speeds

Bur Diameter	Recommended Cutting Speed (RPM)	Maximum Cutting Speed (RPM)
1,6mm	60,000–90,000	100,000
3,0mm	40,000–70,000	90,000
4,8mm	35,000–60,000	80,000
6,4mm	30,000–50,000	70,000
8,0mm	20,000–40,000	68,000
9,5mm	20,000–40,000	66,000
11,1mm	15,000–40,000	58,000
12,7mm	15,000–40,000	50,000
15,9mm	12,000–25,000	40,000
19,1mm	10,000–20,000	33,000
25,4mm	7,500–20,000	25,000
28,8mm	7,000–13,000	20,000
38,1mm	5,000–10,000	17,000
44,5mm	4,500–9,000	14,000
50,8mm	4,000–8,000	12,500

- Cylindrical shape.
- No end cut.
- Shank styles A, B, and C — see page R5 for shank style definitions.




Single Cut

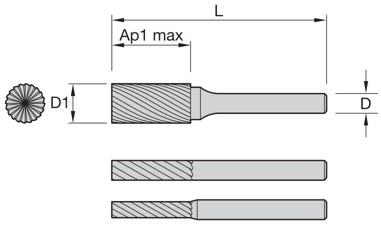

Master Cut

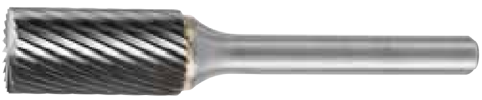

Aluminium Cut

■ Series SA-M Cylindrical

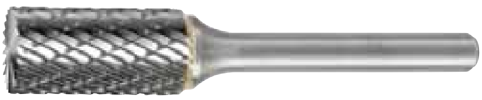
	Single Cut		Master Cut		Aluminium Cut					length	
USCTI Number	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	L	shank style
SA-41M	3009447	M40222	1598896	M41222	–		1,6	3,0	4,8	38,1	A
SA-42M	3009448	M40223	1293458	M41223	–		2,4	3,0	11,1	38,1	A
SA-43M	2736521	M40224	2270852	M41224	–		3,0	3,0	14,3	31,8	A
SA-11M	–		2991270	M41225	–		3,1	6,0	12,7	50,8	C
SA-52M	–		1977421	M41226	–		4,0	3,0	12,7	38,1	A
SA-53M	2961525	M40227	2949031	M41227	–		4,8	3,0	12,7	38,1	A
SA-14M	2736516	M40228	1293727	M41228	–		4,8	6,0	15,9	50,8	C
SA-1M	2736509	M40229	1977519	M41229	2987350	M40551	6,0	6,0	15,9	50,8	C
SA-51M	2736505	M40230	–		–		6,4	3,0	4,8	36,5	B
SA-51M-2	–		1977415	M41231	–		6,4	3,0	12,7	44,5	B
SA-2M	2991245	M40232	2735696	M41232	–		7,9	6,0	19,1	63,5	C
SA-3M	2736500	M40233	1293733	M41233	2736260	M40552	9,5	6,0	19,1	63,5	C
SA-4M	–		2979468	M41235	–		11,1	6,0	25,4	69,9	C
SA-5M	2990411	M40237	2219983	M41237	2736256	M40553	12,7	6,0	25,4	69,9	C
SA-6M	2736488	M40239	2987343	M41239	2991264	M40555	15,9	6,0	25,4	69,9	C
SA-16M	–		2735681	M41241	–		19,1	6,0	19,1	69,9	C
SA-7M	3009451	M40242	–		–		19,1	6,0	25,4	69,9	C
SA-9M	–		3009494	M41245	–		25,4	6,0	25,4	69,9	C

- Cylindrical shape.
- With end cut.
- Shank styles A, B, and C — see page R5 for shank style definitions.





Single Cut

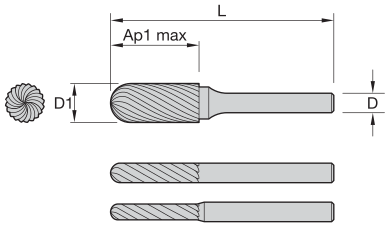


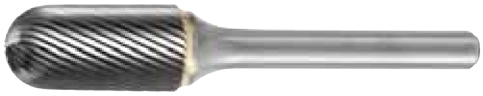
Master Cut

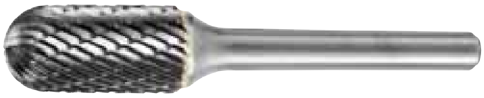
Series SB-M Cylindrical with End Cut

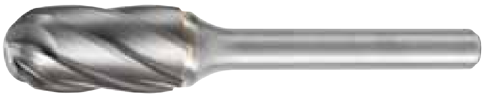
USCTI Number	Single Cut order #	Single Cut catalogue #	Master Cut order #	Master Cut catalogue #	D1	D	Ap1 max	length L	shank style
SB-41M	–		**2894606**	**M41261**	1,6	3,0	6,4	38,1	A
SB-42M	–		**2991812**	**M41262**	2,4	3,0	11,1	38,1	A
SB-43M	**3009453**	**M40263**	**2220466**	**M41263**	3,0	3,0	14,3	38,1	A
SB-52M	–		**2991813**	**M41265**	4,0	3,0	12,7	38,1	A
SB-53M	–		**3009496**	**M41266**	4,8	3,0	12,7	38,1	A
SB-14M	**3009454**	**M40267**	–		4,8	6,0	15,9	50,8	C
SB-1M	**2986664**	**M40268**	**2987342**	**M41268**	6,0	6,0	15,9	50,8	C
SB-51M	–		**2987341**	**M41269**	6,4	3,0	4,8	36,5	B
SB-51M-2	–		**2987340**	**M41270**	6,4	3,0	6,4	44,5	B
SB-2M	**2981749**	**M40271**	**2987339**	**M41271**	7,9	6,0	19,1	63,5	C
SB-3M	**2979470**	**M40272**	**2987338**	**M41272**	9,5	6,0	19,1	63,5	C
SB-5M	**2736421**	**M40274**	**2987337**	**M41274**	12,7	6,0	25,4	69,9	C
SB-5M-2	–		**3324689**	**M41275**	12,7	8,0	25,4	76,2	C
SB-6M	–		**2991272**	**M41276**	15,9	6,0	25,4	69,9	C
SB-6M-2	–		**3324690**	**M41277**	15,9	8,0	25,4	76,2	C
SB-9M	**2736416**	**M40282**	–		25,4	6,0	25,4	69,9	C

- Cylindrical shape.
- Ball nose end cut.
- Shank styles A, B, and C — see page R5 for shank style definitions.




Single Cut

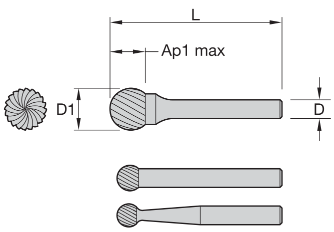

Master Cut


Aluminium Cut

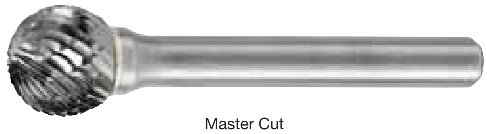
Series SC-M Cylindrical Ball Nose

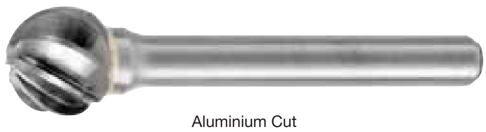
	Single Cut		Master Cut		Aluminium Cut						
USCTI Number	**order #**	**catalogue #**	**order #**	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**Ap1 max**	**length L**	**shank style**
SC-41M	**2991248**	**M40303**	**2990415**	**M41303**	–		2,4	3,0	11,1	38,1	A
SC-42M	**2736319**	**M40304**	**1977373**	**M41304**	–		3,0	3,0	14,3	38,1	A
SC-52M	–		**2735503**	**M41306**	–		4,0	3,0	12,7	38,1	A
SC-53M	–		**2894604**	**M41307**	–		4,8	3,0	12,7	38,1	A
SC-14M	–		**2991273**	**M41308**	–		4,8	6,0	15,9	50,8	C
SC-1M	**2730690**	**M40309**	**1977546**	**M41309**	**2730007**	**M40559**	6,0	6,0	15,9	50,8	C
SC-51M	**2991249**	**M40310**	**2894603**	**M41310**	–		6,4	3,0	12,7	44,5	B
SC-2M	–		**2729973**	**M41311**	–		7,9	6,0	19,1	63,5	C
SC-3M	–		**1977548**	**M41312**	**2730002**	**M40560**	9,5	6,0	19,1	63,5	C
SC-4M	–		**2987336**	**M41314**	–		11,1	6,0	25,4	69,9	C
SC-5M	**2736314**	**M40316**	**1977549**	**M41316**	**2987349**	**M40561**	12,7	6,0	25,4	69,9	C
SC-5M-2	–		**3009499**	**M41317**	–		12,7	8,0	25,4	76,2	C
SC-6M	–		**2991274**	**M41318**	–		15,9	6,0	25,4	69,9	C
SC-6M-2	–		**3005591**	**M41319**	–		15,9	8,0	25,4	76,2	C
SC-7M	–		**2991275**	**M41320**	–		19,1	6,0	25,4	69,9	C

- Ball shape.
- Shank styles A, B, and C — see page R5 for shank style definitions.




Single Cut

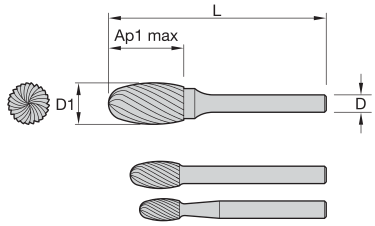

Master Cut

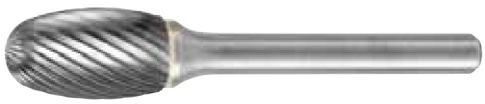

Aluminium Cut

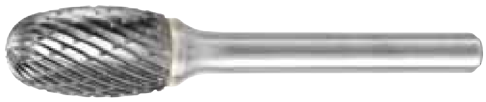
Series SD-M BALL

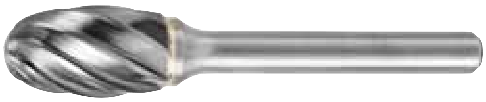
	Single Cut		Master Cut		Aluminium Cut						
USCTI Number	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style
SD-40M	1293470	M40342	–		–		1,6	3,0	1,6	38,1	A
SD-41M	2656784	M40343	2729868	M41343	–		2,4	3,0	2,4	38,1	A
SD-42M	2730572	M40344	2729863	M41344	–		3,0	3,0	3,0	38,1	A
SD-53M	–		2973335	M41345	–		4,8	3,0	4,8	38,1	A
SD-14M	3009458	M40346	2987335	M41346	–		4,8	6,0	4,8	50,8	C
SD-1M	2730567	M40347	2729860	M41347	3009484	M40567	6,0	6,0	6,0	50,8	C
SD-51M	–		2729855	M41348	–		6,4	3,0	6,4	38,1	B
SD-2M	2991252	M40349	2987334	M41349	–		7,9	6,0	7,9	51,6	C
SD-3M	–		2991276	M41350	2991265	M40568	9,5	6,0	9,5	52,8	C
SD-4M	–		2990416	M41351	–		11,1	6,0	11,1	54,4	C
SD-5M	2991254	M40352	2729850	M41352	–		12,7	6,0	12,7	56,0	C
SD-5M-2	3324657	M40353	–		–		12,7	8,0	12,7	62,3	C
SD-6M	2991255	M40354	3009500	M41354	–		15,9	6,0	15,9	58,7	C
SD-6M-2	–		–		2991266	M40572	15,9	8,0	15,9	65,1	C
SD-7M	–		2729840	M41356	–		19,1	6,0	19,1	61,9	C

- Egg shape.
- Shank styles A, B, and C — see page R5 for shank style definitions.




Single Cut

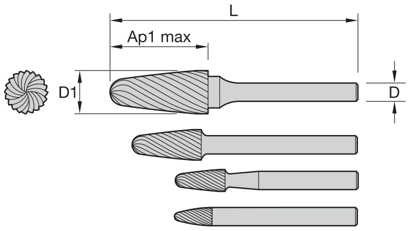

Master Cut

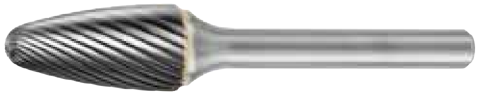

Aluminium Cut

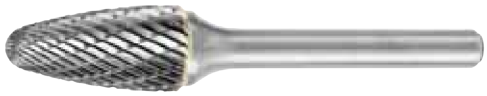
Series SE-M EGG

	Single Cut		Master Cut		Aluminium Cut						
USCTI Number	**order #**	**catalogue #**	**order #**	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**Ap1 max**	**length L**	**shank style**
SE-41M	**2991803**	**M40368**	**2729793**	**M41368**	–		3,0	3,0	5,6	38,1	A
SE-53M	–		**2991815**	**M41369**	–		4,8	3,0	7,1	38,1	A
SE-1M	–		**2969583**	**M41372**	–		6,0	6,0	9,5	50,8	C
SE-51M	**2991256**	**M40370**	**2987333**	**M41370**	–		6,4	3,0	9,5	41,3	B
SE-3M	–		**2991277**	**M41371**	–		9,5	6,0	15,9	60,3	C
SE-5M	**2730515**	**M40373**	**1977570**	**M41373**	**2987348**	**M40574**	12,7	6,0	22,2	66,7	C
SE-5M-2	–		**3324697**	**M41374**	–		12,7	8,0	25,4	76,2	C
SE-6M	–		**2991278**	**M41375**	–		15,9	6,0	25,4	69,9	C
SE-7M	–		**2991816**	**M41377**	–		19,1	6,0	25,4	69,9	C

- Round nose tree shape.
- Shank styles A, B, and C — see page R5 for shank style definitions.




Single Cut

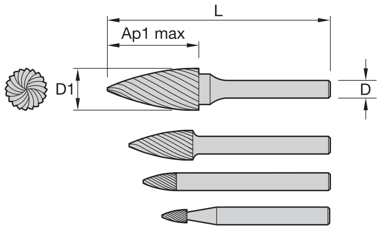

Master Cut

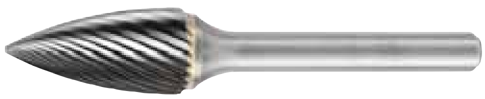

Aluminium Cut

Series SF-M Round Nose Tree

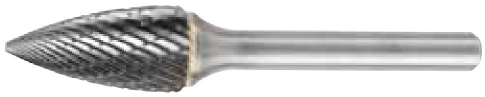
	Single Cut		Master Cut		Aluminium Cut						
USCTI Number	**order #**	**catalogue #**	**order #**	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**Ap1 max**	**length L**	**shank style**
SF-41M	–		**3009502**	**M41395**	–		3,0	3,0	3,4	38,1	A
SF-42M	**2987354**	**M40396**	**1977374**	**M41396**	–		3,0	3,0	12,7	38,1	A
SF-53M	–		**2729701**	**M41397**	–		4,8	3,0	12,7	38,1	B
SF-1M	**2730426**	**M40398**	**2987331**	**M41398**	**3009487**	**M40576**	6,0	6,0	15,9	50,8	C
SF-51M	**2730421**	**M40399**	**1977417**	**M41399**	–		6,4	3,0	12,7	44,5	A
SF-3M	**2730416**	**M40400**	**3526093**	**M41400**	–		9,5	6,0	19,1	63,5	C
SF-4M	–		**1977555**	**M41401**	–		11,1	6,0	25,4	69,9	C
SF-13M	–		**1293748**	**M41402**	–		12,7	6,0	19,1	63,5	C
SF-5M	**2526554**	**M40403**	**1977556**	**M41403**	**1977630**	**M40578**	12,7	6,0	25,4	69,9	C
SF-5M-2	–		**3009503**	**M41405**	–		12,7	8,0	25,4	76,2	C
SF-6M	**3009463**	**M40406**	**2202572**	**M41406**	–		15,9	6,0	25,4	69,9	C

- Pointed tree shape.
- Shank styles A, B, and C — see page R5 for shank style definitions.





Single Cut

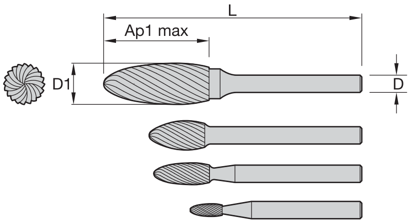


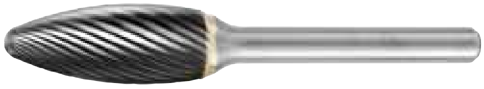
Master Cut

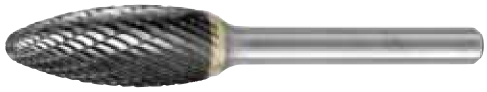
Series SG-M Pointed Tree

USCTI Number	Single Cut order #	Single Cut catalogue #	Master Cut order #	Master Cut catalogue #	D1	D	Ap1 max	length L	shank style
SG-41M-2	2991258	M40428	–		3,0	3,0	6,4	38,1	C
SG-41M-2	–		1293463	M41428	3,0	3,0	6,4	38,1	A
SG-43M	2730335	M40430	–		3,0	3,0	9,5	38,1	C
SG-44M	3009465	M40431	–		3,0	3,0	12,7	38,1	C
SG-44M	–		1534016	M41431	3,0	3,0	12,7	38,1	A
SG-53M	–		2894601	M41432	4,8	3,0	12,7	38,1	A
SG-1M	–		2987329	M41433	6,0	6,0	15,9	50,8	C
SG-51M	2991261	M40434	–		6,4	3,0	12,7	69,9	C
SG-51M	–		1293476	M41434	6,4	3,0	12,7	69,9	B
SG-2M	–		2987327	M41435	7,9	6,0	19,1	63,5	C
SG-3M	2981799	M40436	2987326	M41436	9,5	6,0	19,1	63,5	C
SG-5M	–		2729591	M41439	12,7	6,0	25,4	69,9	C
SG-5M-2	–		3324707	M41442	12,7	8,0	25,4	76,2	C

- Flame shape.
- Shank styles A and C — see page R5 for shank style definitions.




Single Cut

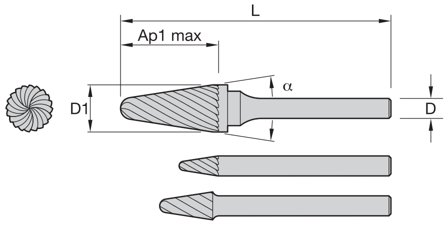

Master Cut

Series SH-M Flame

USCTI Number	Single Cut order #	Single Cut catalogue #	Master Cut order #	Master Cut catalogue #	D1	D	Ap1 max	length L	shank style
SH-41M	**2991807**	**M40452**	**1977378**	**M41452**	3,0	3,0	6,4	38,1	A
SH-53M	**–**		**1977429**	**M41453**	4,8	3,0	9,5	38,1	A
SH-2M	**3009471**	**M40454**	**2991284**	**M41454**	7,9	6,0	19,1	63,5	C
SH-5M	**2987353**	**M40455**	**2987323**	**M41455**	12,7	6,0	31,8	76,2	C
SH-6M	**–**		**2987322**	**M41457**	15,9	6,0	36,5	81,0	C

Burs

- Included angle shape.
- Shank styles A and C — see page R5 for shank style definitions.



Single Cut

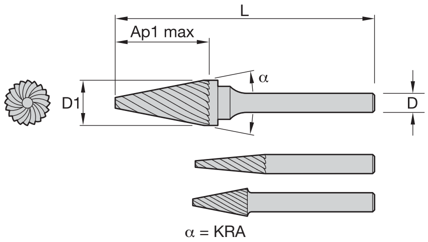
Master Cut

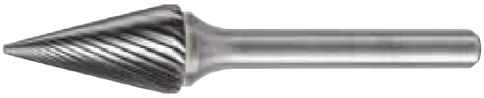
Aluminium Cut

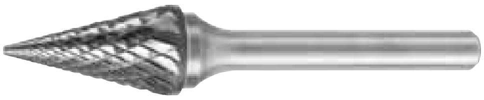
Series SL-M Included Angle

	Single Cut		Master Cut		Aluminium Cut							
USCTI Number	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style	KRA
SL-41M	–		**2729483**	**M41473**	–		3,0	3,0	9,5	38,1	A	8
SL-42M	**2730232**	**M40474**	**1977385**	**M41474**	–		3,0	3,0	12,7	38,1	A	8
SL-53M	**2730227**	**M40475**	–		–		4,8	3,0	12,7	38,1	A	14
SL-1M	–		**2729472**	**M41476**	–		6,0	6,0	15,9	50,8	C	14
SL-2M	**2991809**	**M40477**	**1977572**	**M41477**	–		7,9	6,0	22,2	69,9	C	14
SL-3M	**3009475**	**M40478**	**1977573**	**M41478**	**2978948**	**M40582**	9,5	6,0	27,0	74,6	C	14
SL-4M	**2730217**	**M40479**	**1293770**	**M41479**	**2729982**	**M40584**	12,7	6,0	31,8	76,2	C	14
SL-4M-2	–		**2729457**	**M41480**	–		12,7	8,0	31,8	82,6	C	14
SL-6M	–		–		**2991268**	**M40585**	15,9	6,0	33,3	81,0	C	14

- Pointed cone shape.
- Shank styles A, B, and C — see page R5 for shank style definitions.



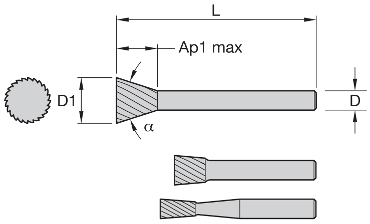

Single Cut


Master Cut

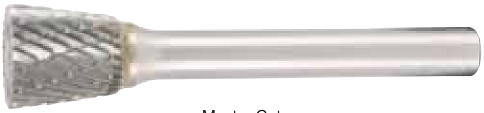
Series SM-M Pointed Cone

	Single Cut		Master Cut							
USCTI Number	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style	KRA
SM-41M	**2730149**	**M40496**	**2990417**	**M41496**	3,0	3,0	9,5	38,1	A	12
SM-42M	**2987352**	**M40497**	**1977382**	**M41497**	3,0	3,0	11,1	38,1	A	14
SM-43M	**2990413**	**M40498**	**1293468**	**M41498**	3,0	3,0	15,9	38,1	A	7
SM-2M	–		**1977564**	**M41501**	6,0	6,0	19,1	50,8	C	14
SM-3M	–		**2990418**	**M41502**	6,0	6,0	25,4	50,8	C	10
SM-51M	**2730139**	**M40503**	**1977419**	**M41503**	6,4	3,0	12,7	47,6	B	22
SM-4M	–		**2872844**	**M41504**	9,5	6,0	15,9	63,5	C	28
SM-5M	–		**1977567**	**M41505**	12,7	6,0	22,2	69,9	C	28

- Inverted taper shape.
- Shank styles A and C — see page R5 for shank style definitions.



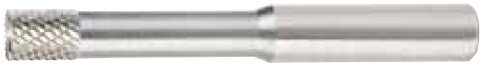

Single Cut


Master Cut

Series SN-M Inverted Taper

USCTI Number	Single Cut order #	Single Cut catalogue #	Master Cut order #	Master Cut catalogue #	D1	D	Ap1 max	length L	shank style	KRA
SN-42M	**3009478**	**M40516**	**3139827**	**M41516**	3,0	3,0	4,8	38,1	A	10
SN-1M	–		**2991818**	**M41519**	6,0	6,0	7,9	50,8	C	10
SN-51M	–		**2894600**	**M41518**	6,4	3,0	6,4	38,1	A	10
SN-4M	**3019444**	**M40521**	–		12,7	6,0	12,7	57,2	C	28
SN-7M	–		**3009511**	**M41525**	19,1	6,0	15,9	60,3	C	30

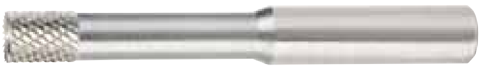
- Fine master-cut style.
- Cylindrical shape.
- Series IGT has no end cut.
- Series IGT-EC has end cut.
- Solid carbide construction.


Master Cut

Series IGT Internal Grinding Tool

Master Cut order #	Master Cut catalogue #	D1	D	Ap1 max	length L
2735469	M42006	1,6	3,2	3,2	38,1
2735464	M42007	2,0	3,2	4,0	38,1
2735459	M42008	2,4	3,2	4,0	38,1
2735454	M42009	2,8	3,2	4,8	38,1
2735449	M42010	3,2	3,2	4,8	38,1
2735411	M42019	3,6	4,8	5,6	50,8
2735406	M42020	4,0	4,8	5,6	50,8
2735401	M42021	4,4	4,8	6,4	50,8
2735396	M42022	4,8	4,8	6,4	50,8
2735443	M42012	5,6	6,4	7,1	50,8
2735439	M42013	6,0	6,4	7,9	50,8
2735432	M42014	6,4	6,4	7,9	50,8
2735427	M42015	7,1	6,4	8,7	63,5
2735423	M42016	7,9	6,4	8,7	63,5
2735417	M42018	9,5	6,4	9,5	63,5

Series IGT-EC Internal Grinding Tool


Master Cut

Series IGT-EC Internal Grinding Tool

Master Cut order #	Master Cut catalogue #	D1	D	Ap1 max	length L
2735391	M42023	1,6	3,2	3,2	38,1
2735386	M42024	2,0	3,2	4,0	38,1
2735381	M42025	2,4	3,2	4,0	38,1
2735376	M42026	2,8	3,2	4,8	38,1
2735371	M42027	3,2	3,2	4,8	38,1
2735326	M42036	3,6	4,8	5,6	50,8
2735320	M42037	4,0	4,8	5,6	50,8
2735316	M42038	4,4	4,8	6,4	50,8
2735310	M42039	4,8	4,8	6,4	50,8
2735366	M42028	5,2	6,4	7,1	50,8
2735361	M42029	5,6	6,4	7,1	50,8
2735357	M42030	6,0	6,4	7,9	50,8
2735352	M42031	6,4	6,4	7,9	50,8
2735346	M42032	7,1	6,4	8,7	63,5
2735341	M42033	7,9	6,4	8,7	63,5
2735336	M42034	8,7	6,4	9,5	63,5
2735331	M42035	9,5	6,4	9,5	63,5

- Shank styles A, B, and C — see page R5 for shank style definitions.
- Assortment of bur styles for multiple applications.
- Most popular metric sizes.

Series Bur Sets

order number	catalogue number	D1	D	quantity	shank style	cut style	includes
2736241	M40589	3,0	3	9	A	Master	SA-42M, SA-43M, SC-41M, SC-42M, SD-42M, SE-41M, SF-42M, SG-42M, SM-43M
2987345	M40590	3,0	3	9	B	Master	SA-42M, SA-43M, SC-41M, SC-42M, SD-42M, SE-41M, SF-42M, SG-42M, SM-43M
2736231	M40592	6,0	3	9	B	Master	SA-51M, SB-51M, SC-51M, SD-51M, SE-51M, SF-51M, SG-51M, SM-51M, SN-51M
3009488	M40595	6,0	6	8	C	Master	SA-1M, SC-1M, SD-1M, SE-1M, SF-1M, SG-1M, SL-1M, SM-2M
2736217	M40596	9,5	6	8	C	Standard	SA-3M, SC-3M, SD-3M, SE-3M, SF-3M, SG-3M, SL-3M, SM-4M
2736212	M40597	9,5	6	8	C	Master	SA-3M, SC-3M, SD-3M, SE-3M, SF-3M, SG-3M, SL-3M, SM-4M
2736206	M40598	12,0	6	8	C	Master	SA-5M, SC-5M, SD-5M, SE-5M, SF-5M, SG-5M, SL-4M, SM-5M

Good for You, Better for the Environment!

The WIDIA Carbide Recycling Program can turn accumulated scrap carbide tooling in your shop into cash.

Carbide Recycling

EXTREME **CHALLENGES.** EXTREME **RESULTS.**

We pay cash for used carbide tooling, including coated or non-coated carbide inserts, drills, end mills, reamers, and taps, regardless of brand.

It's good for the environment and a responsible way to dispose of scrap carbide.

Our carbide recycling program features:

- Easy-to-use web portal that shows what your scrap carbide is worth before sending it to us.
- Online forms that make it easy to ship scrap carbide to WIDIA.
- Green Box™ containers for safe, convenient shipping of scrap carbide to WIDIA.
- Cash payment for used carbide tooling.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

Holemaking

HOLEMAKING PRODUCTS

Holemaking Made Easy and Economical

From sturdy, general-purpose solid carbide drills to high-precision fine boring systems, we offer the most comprehensive line of holemaking products available on the market today. If you need unmatched performance and reliability, look no further than our wide range of solid carbide, modular, and indexable drills, and hole finishing products.

Solid Carbide Drills

- VariDrill™
- TOP DRILL S™ for Steel
- TOP DRILL S™ for Cast Iron
- TOP DRILL S+™
- TOP DRILL S+ 12 x D
- TOP DRILL Deep-Hole Drill
- TOP DRILL G™

Modular Drills

- TOP DRILL M1™
- Spade Blades

Indexable Drills

- Top Cut 4™

Hole Finishing

- Reaming Tools
- ROTAFLEX™ Boring System
- Countersinking Tools

WIDIA

Added Value for Your Performance

Increase of Productivity and Efficiency

- Material and application-specific solutions.
- Maximum metal removal rates and repeatability.
- Standardised design platforms for special tools based on “proven solutions” for individual optimisations and combination tools.

Optimised Purchase

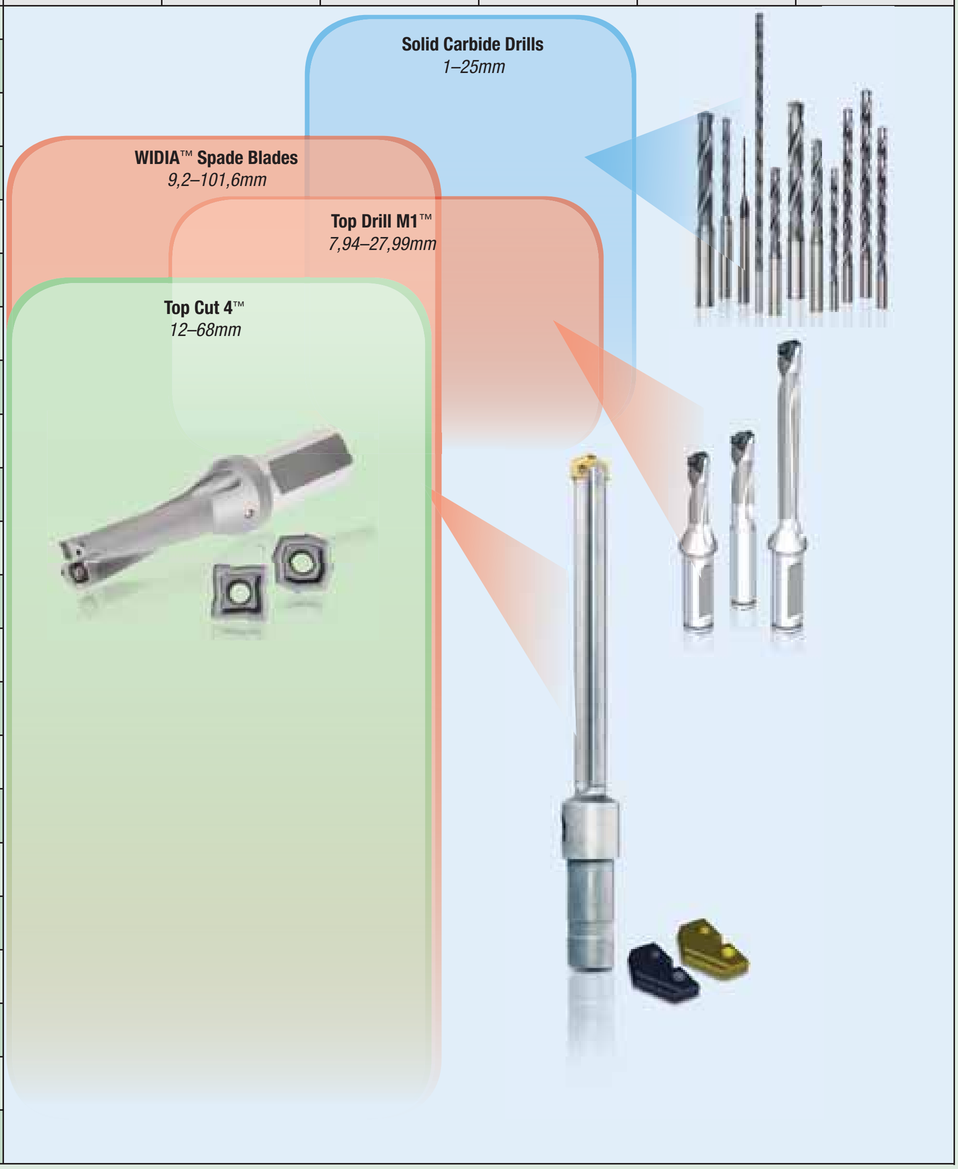
- Broad selection of holemaking tools.
- Integrated into a full range of cutting tools and service offers.
- Onsite service for an efficient development and implementation of machining solutions.

Control of Total Tooling Costs

- High tool utilisation through material and application-specific solutions.
- Process-safe regrinding service.
- Reduction of stocks through efficient modular concepts.
- Multiple platforms per application to achieve the most cost-efficient solution.

Select the Correct Holemaking Product Platform for Your Application

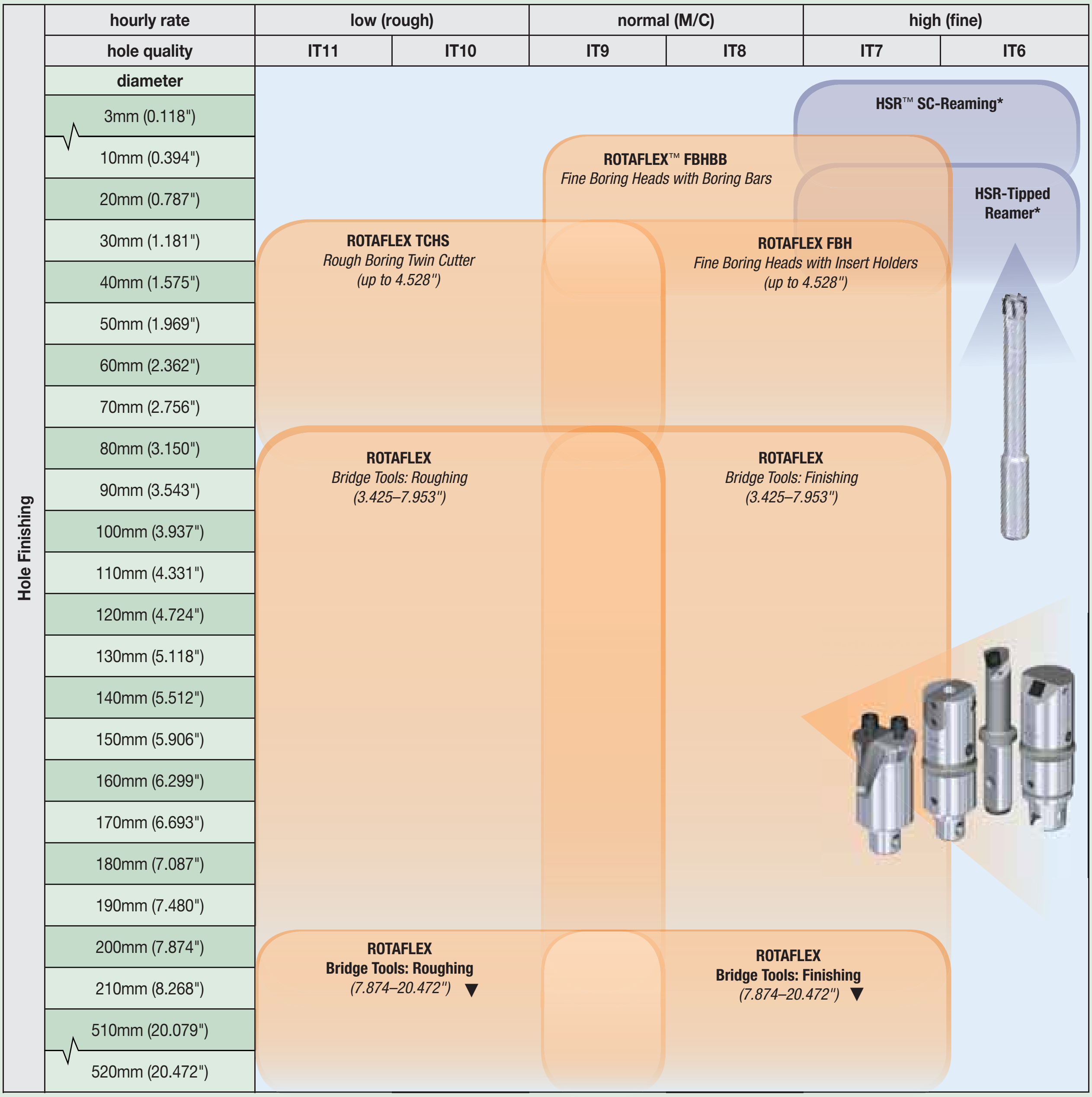
	hourly rate	low (rough)		normal (M/C)		high (fine)	
	hole quality	IT11	IT10	IT9	IT8	IT7	IT6
Solid Drilling	diameter						
	3mm (0.118")						
	6mm (0.236")						
	9mm (0.354")						
	12mm (0.472")						
	15mm (0.591")						
	18mm (0.709")						
	21mm (0.827")						
	24mm (0.945")						
	27mm (1.063")						
	30mm (1.181")						
	33mm (1.299")						
	36mm (1.417")						
	39mm (1.535")						
	42mm (1.654")						
	45mm (1.772")						
	58mm (2.283")						
	51mm (2.008")						
	54mm (2.126")						
	57mm (2.244")						
	60mm (2.362")						
	110mm (4.331")						



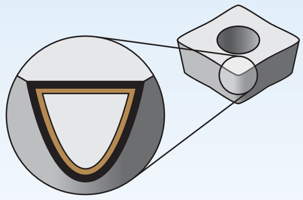
Determine the hole quality and diameter to show the available options and then decide the platform that will best fulfill your requirements.

- Solid Carbide Drills
- Modular Drills
- Indexable Drills
- Precision Hole Finishing
- Reaming

Select the Correct Holemaking Product Platform for Your Application



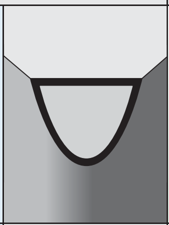
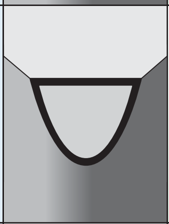
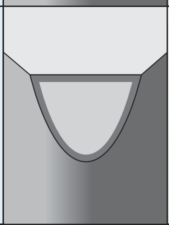
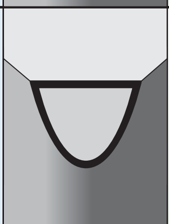
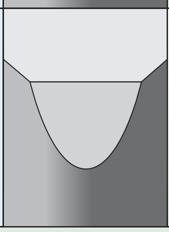
*IT6 is possible above 10mm (0.394") for both HSR SC-Reaming and HSR-Tipped Reamer in custom solutions.

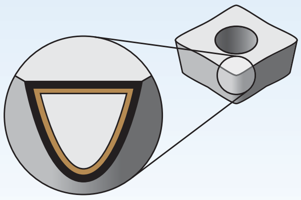


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

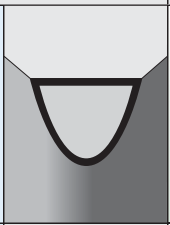
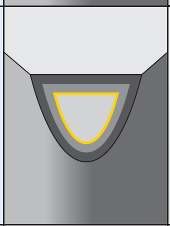
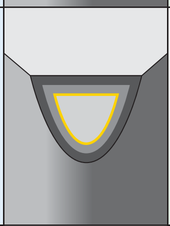
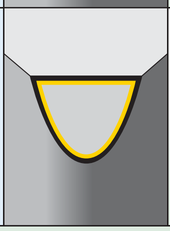
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WU25PD		**Composition:** With a multilayered PVD TiN-TiAlN coating and a high-quality submicron carbide substrate, this grade gives a high level of wear resistance at medium to high cutting speeds. **Application:** First choice for high reliability in all materials. This grade should be used at medium to high speeds and feeds. It is a general purpose grade that performs very well for alloyed and high-alloy steel and cast iron, but can also be used with excellent performance in all other material groups.	P			■	■	■	■			
			M			■	■	■	■			
			K			■	■	■	■			
			N		■	■	■					
			S			■	■	■				
			H		■	■	■					
WP20PD		**Composition:** With a multilayered PVD TiN-TiAlN coating, a high-quality submicron carbide substrate and a state-of-the-art surface condition, this grade gives the highest level of wear resistance at high cutting speeds. **Application:** A high productivity grade for high speeds and feeds. First choice for high productivity with excellent reliability in alloyed and high-alloyed steels and cast irons.	P		■	■	■					
			K			■	■	■				
WK15PD		**Composition:** With a newly developed unique multilayered PVD AlCrN coating and a high-quality submicron carbide substrate, this grade gives the highest level of wear resistance at high cutting speeds. **Application:** This grade offers extraordinary wear resistance in drilling of cast iron materials. With its high hot hardness it allows for high speed machining.										
			K	■	■	■	■					
WU20PD		**Composition:** With a multilayered PVD TiN-TiAlN coating, a high-quality submicron carbide substrate and a state-of-the-art surface condition, this grade gives the highest level of wear resistance at high cutting speeds. **Application:** First choice for alloyed and high-alloyed steels and cast irons. A state-of-the-art surface condition enables superior chip evacuation even when MQL is applied.	P		■	■	■					
			K			■	■	■				
WN10HD		**Composition:** This uncoated fine grain carbide with high hardness offers excellent abrasive wear resistance. **Application:** First choice for precision drilling of non-ferrous materials.										
			K	■	■							
			N	■	■							



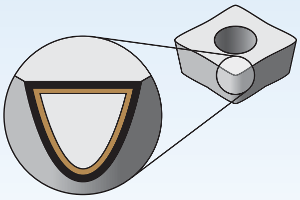
Coatings provide high-speed capability and are engineered for finishing to light roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟵⟶ toughness

Grade	Coating	Grade Description
WU25PD		**Composition:** With a multilayered PVD TiN-TiAlN coating and a high-quality submicron carbide substrate, this grade gives a high level of wear resistance at medium to high cutting speeds. **Application:** First choice for high reliability in most materials. This grade should be used at medium to high speeds and feeds. It is a general purpose grade that performs very well for alloyed and high-alloy steel and cast iron, but can also be used with excellent performance in stainless steels. NOTE: Previously named K20FTiAlN.
WPK10CH		**Composition:** With an advanced CVD TiCN-Al_2O_3 coating combined with a cobalt-enriched carbide substrate, this grade offers a balanced combination of deformation resistance and edge toughness. **Application:** Offers outstanding abrasion and crater wear resistance for high-speed machining of steels and cast irons. Use for very high cutting speeds with low to medium feed rates.
WU25CH		**Composition:** Advanced CVD TiCN-Al2O3 coating together with a newly engineered tough carbide substrate. Ensures adequate deformation resistance and excellent edge strength and offers very good wear resistance over a wide range of machining conditions. **Application:** A high productivity grade with high speeds and feeds. First choice for high productivity with excellent reliability in steels, stainless steels, and cast iron rates.
WU40PH		**Composition:** With a multilayered PVD TiN-TiAlN coating and a tough substrate, this grade withstands interruptions and provides high wear resistance for long tool life. **Application:** First choice for high reliability in most materials. This grade should be used at medium speeds and high feeds due to sharper edges and as a grade for high-toughness applications. It covers steel, stainless steel, cast iron, and high-temp alloys under certain conditions.

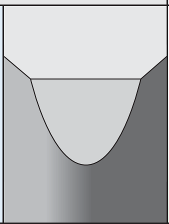
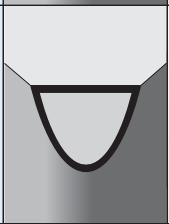
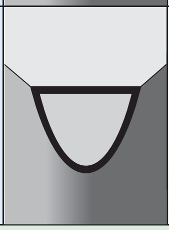
Grade		05	10	15	20	25	30	35	40	45
WU25PD	P			■	■	■	■			
	M			■	■	■	■			
	K			■	■	■	■			
WPK10CH	P	■	■	■	■					
	K	■	■	■	■					
WU25CH	P				■	■	■	■		
	M			■	■	■	■			
	K			■	■	■	■			
WU40PH	P						■	■	■	■
	M					■	■	■	■	
	K				■	■	■	■		



Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ←→ toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
K10F		**Composition:** This uncoated fine grain carbide with high hardness offers excellent abrasive wear resistance paired with excellent toughness for fine-finishing applications. **Application:** First choice for precision reaming of non-ferrous materials.	P					■	■	■	■	
			M									
			K									
			N		■	■	■	■				
			S			■	■					
			H									
K10F-DCFD		**Composition:** With a PVD TiAlN coating and a fine grain carbide substrate, this grade offers excellent wear resistance paired with good toughness for medium speed fine-finishing applications. **Application:** First choice for precision reaming of steels, stainless steel, and cast irons.	P		■	■	■	■				
			M		■	■	■	■				
			K	■	■	■						
			N									
			S									
			H									
CERMETDCFD		**Composition:** With a PVD TiAlN coating and a cermet substrate, this grade offers exceptional wear resistance for high speed fine finishing applications. **Application:** First choice for precision reaming of steels and cast irons.	P			■	■	■	■			
			M									
			K		■	■	■					
			N									
			S									
			H									

NOVO KNOWS CAD/CAM

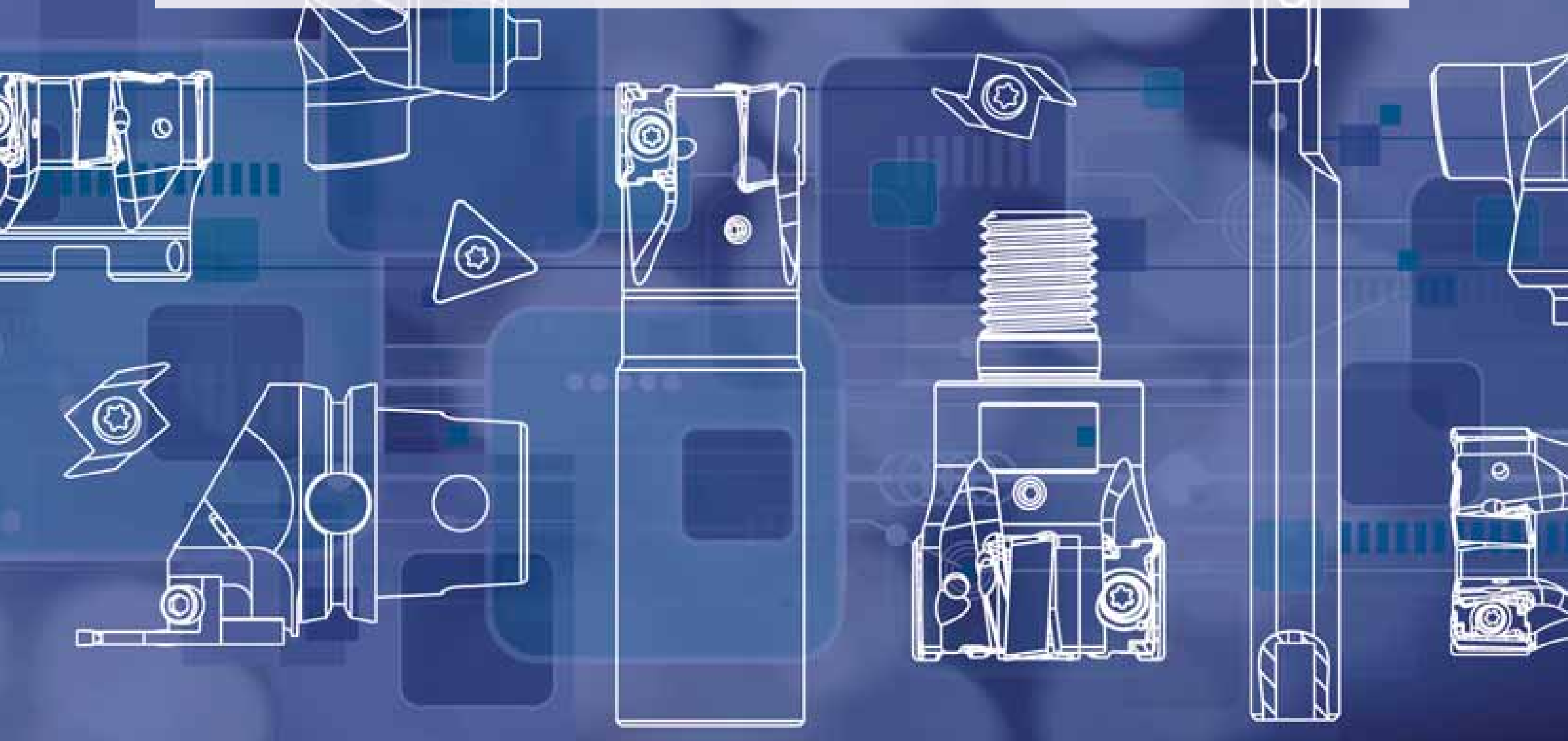
With the addition of NOVO™ to your team, your CAD/CAM capabilities become much more accurate, streamlined, and productive.

Before NOVO: The programmer would be in their CAD/CAM software, programming a part. Using the outdated method of finding a tool in a catalogue, and then manually inputting the tooling information from the catalogue into the CAD/CAM software.

The concern is that assumptions are made, and only partial tooling information is entered.

With NOVO: The powerful digital intelligence of NOVO not only helps the programmer find the right tool for the metalcutting job, but also automatically integrates all the tooling data into a complete CAD/CAM solution. The integration of all the tooling data increases the viability of the part being programmed, and is delivered quickly — saving you time.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. **widia.com/novo**



Holemaking • High-Performance Solid Carbide Drills

solid carbide drills for external coolant or dry machining		series	grade	standard ● first choice ○ alternate choice P	M	K	N	S	H	hole tolerance	standard range diameter range min–max	 min–max	 drilling depth L/D1
	VariDrill™ multiple-material drilling	VDS20	WU25PD	●	●	●	●	●		IT9–IT10	1,0–20,0	.0394–.7874	3 x–5 x
	TOP DRILL S™ for steel application-specific drilling	TDS202	WP20PD	●	○	○				IT9–IT10	3,0–20,0	.1181–.7874	5 x D
	TOP DRILL S for cast iron application-specific drilling	TDS212	WK15PD	○		●				IT9–IT10	3,0–20,0	.1181–.7874	5 x D
	TOP DRILL S+™ multiple-application drilling	TDS301	WU25PD	●	○	●	○	○		IT9–IT10	3,0–20,0	.1181–.7874	3 x D

solid carbide drills with internal coolant channel		series	grade	standard ● first choice ○ alternate choice P	M	K	N	S	H	hole tolerance	standard range diameter range min–max	 min–max	 drilling depth L/D1
	VariDrill multiple-material drilling	VDS40	WU25PD	●	●	●	●	●	○	IT9–IT10	1,0–20,0	.0394–.7874	3 x–8 x
	TOP DRILL S for steel application-specific drilling	TDS40	WP20PD	●	○	○				IT9–IT10	3,0–20,0	.1181–.7874	3 x–8 x
	TOP DRILL S for cast iron application-specific drilling	TDS41	WK15PD	○		●				IT9–IT10	3,0–20,0	.1181–.7874	3 x–8 x
	TOP DRILL S+ multiple-application drilling	TDS50	WU25PD	●	○	●	○	○		IT9–IT10	3,0–20,0	.1181–.7874	3 x–8 x
	TOP DRILL S+ 12 x D deep-hole drilling without piloting	TDS504	WU20PD	●	●	●		○		IT9–IT10	3,0–20,0	.1181–.7874	3 x–8 x
	TOP DRILL Deep superior deep-hole drilling	TDD10	WU20PD	●	○	●				IT9–IT10	3,0–20,0	.1181–.5118	15 x–30 x
	TOP DRILL G™ difficult drilling applications	TDG53	WN10HD				●			IT8–IT9	3,0–20,0	.1181–.7874	5 x–12 x
	TOP DRILL Flat-Bottom for flat-bottom applications	TDF51	WU20PD	●	○	●				IT9–IT10	–	–	–
			WN15HD				●			IT9–IT10	–	–	–

● standard
○ engineered solution capabilities

custom solution range: diameter range D1 mm min-max	D1 in min-max	drilling depth																			page(s)
1,0–20,0	.0394–1.00	1.5–8 x	●	●			●			●			○	○			○	●	●	○	T8–T21
3,0–25,0	.1181–1.00	1.5–8 x	●	●			●	●		●			○	○	●	○	○	●	○		T50–T75
3,0–25,0	.1181–1.00	1.5–8 x	●	●			●	●		●			○	○	○	●	●	●	○		T50–T75
3,0–25,0	.1181–1.00	1.5–5 x	●	●			●	●		●			○	○	○	●	○	●	●		T78–T96

● standard
○ engineered solution capabilities

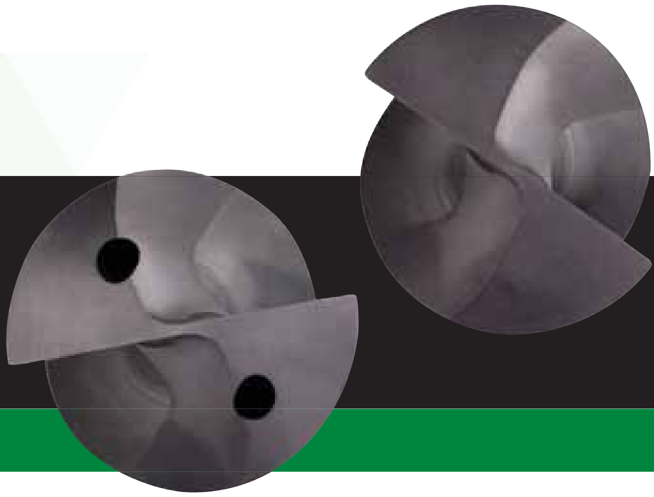
engineered solution range: diameter range D1 mm min-max	D1 in min-max	drilling depth																			page(s)
1,0–20,0	.0394–1.00	1.5–8 x			●	●	●			●			○	○			○	●	●	○	T8–T45
3,0–25,0	.1181–1.00	1.5–8 x			●	●	●			●			○	●	●	○	○	●	○		T50–T75
2,4–20,0	.1181–1.00	1.5–8 x			●	●	●	●		●			○	○		●	●	●	○		T50–T75
3,0–25,0	.1181–1.00	1.5–8 x			●	●	●	●		●			○	○	○	●	○	●	○		T78–T96
2,4–16,0	.1181–.7874	1.5–12 x			●	●	●	●		●			○	○	○	●	○	●	○		T100–T103
3,0–25,0	.0938–.6299	500mm			●	●	●	●		●					○	●	○	●	○		T106–T117
3,0–25,0	.1181–1.00	1.5–12 x			●	●	●	●	●	●	●		○	○	○		○	●	○		T120–T139
3,0–25,0	.1181–1.00	1.5–8 x			●	●	●	●	●		●	●	○	○	○	●	●	●	○		T46
3,0–25,0	.1181–1.00	1.5–8 x			●	●	●	●	●		●	●	○	○	○	●	●	●	○		T46

Solid Carbide Drills • Recommendation Chart

	Versatile				Application-Specific		
	General Purpose	General Purpose	Multipurpose	Multipurpose	High-Performance	High-Performance	Deep-Hole Drilling
	VariDrill™	VariDrill™	Top Drill S+™	Top Drill S+	Top Drill S/G	Top Drill S/G	WIDIA TDS+ WIDIA TDD
P Steel	**3 x D - VDS201A 3 x D - VDS201F 5 x D - VDS202A 5 x D - VDS202F**	**3 x D - VDS401A 3 x D - VDS401F 5 x D - VDS402A 5 x D - VDS402F 8 x D - VDS403A 8 x D - VDS403F**	**3 x D - TDS301A**	**3 x D - TDS501A 5 x D - TDS502A 8 x D - TDS503A**	**5 x D - TDS202A**	**3 x D - TDS401A 5 x D - TDS402A 8 x D - TDS403A**	**12 x D - TDS504A 15 x D - TDD105Z 20 x D - TDD106Z 25 x D - TDD107Z 30 x D - TDD108Z**
M Stainless Steel	**3 x D - VDS201A 3 x D - VDS201F 5 x D - VDS202A 5 x D - VDS202F**	**3 x D - VDS401A 3 x D - VDS401F 5 x D - VDS402A 5 x D - VDS402F 8 x D - VDS403A 8 x D - VDS403F**	**3 x D - TDS301A**	**3 x D - TDS501A 5 x D - TDS502A 8 x D - TDS503A**	–	WIDIA-Rübig™ Series Type WD	**12 x D - TDS504A 15 x D - TDD105Z 20 x D - TDD106Z 25 x D - TDD107Z 30 x D - TDD108Z**
K Cast Iron	**3 x D - VDS201A 3 x D - VDS201F 5 x D - VDS202A 5 x D - VDS202F**	**3 x D - VDS401A 3 x D - VDS401F 5 x D - VDS402A 5 x D - VDS402F 8 x D - VDS403A 8 x D - VDS403F**	**3 x D - TDS301A**	**3 x D - TDS501A 5 x D - TDS502A 8 x D - TDS503A**	**5 x D - TDS212A**	**3 x D - TDS411A 5 x D - TDS412A 8 x D - TDS413A**	**12 x D - TDS504A 15 x D - TDD105Z 20 x D - TDD106Z 25 x D - TDD107Z 30 x D - TDD108Z**
N Non-Ferrous	3 x D - VDS201A 3 x D - VDS201F 5 x D - VDS202A 5 x D - VDS202F	3 x D - VDS401A 3 x D - VDS401F 5 x D - VDS402A 5 x D - VDS402F 8 x D - VDS403A 8 x D - VDS403F	3 x D - TDS301A	3 x D - TDS501A 5 x D - TDS502A 8 x D - TDS503A		5 x D - TDG531A 8 x D - TDG532A 12 x D - TDG533A	TDD* uncoated, sharp
S Heat-Resistant Alloys, Titanium Alloys	**3 x D - VDS201A 3 x D - VDS201F 5 x D - VDS202A 5 x D - VDS202F**	**3 x D - VDS401A 3 x D - VDS401F 5 x D - VDS402A 5 x D - VDS402F 8 x D - VDS403A 8 x D - VDS403F**	**3 x D - TDS301A**	**3 x D - TDS501A 5 x D - TDS502A 8 x D - TDS503A**	–	WIDIA-Rübig Series Type WD	12 x D - TDS504A 15 x D - TDD105Z 20 x D - TDD106Z 25 x D - TDD107Z 30 x D - TDD108Z
H Hard Materials	VDS 3 x D - M155	VDS		TDS+			

standard first choice
alternate choice
simple special

VariDrill



The VariDrill advanced-point geometry design offers the ultimate solution for multipurpose drilling operations. It offers dependable tool life in all materials due to less chipping on the cutting edge.

- Reduced chipping on cutting edge means longer tool life.
- Geometry design offers strength and versatility.
- Delivers proper surface finish across multiple materials: steel, stainless steel, cast iron, aluminium, and high-temp alloys.

Innovative Technology

VariDrill™ is a technologically advanced holemaking solution. These high-performance solid carbide drills were designed in Germany to provide the transportation, aerospace, general engineering, and energy industries with a tool that performs on multiple materials.

Elegance, Strength, and Versatility

The engineers at WIDIA™ developed an innovative new design to deliver drilling performance. These solid carbide drills have a distinctive geometry and marginless design. The VariDrill point is versatile enough to work through steel, stainless steel, cast iron, aluminium, and a range of high-temp alloys.

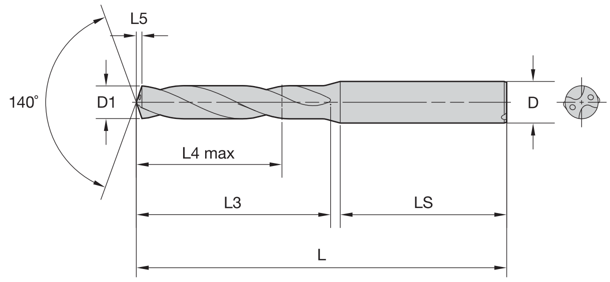
Optimum Hole Quality

The unique marginless design reduces chipping on the tool's edge and stabilises cutting forces. This unique tool geometry enables chips to roll smoothly and evacuate easily, resulting in noticeably less friction, heat, jamming, and scratching. By minimising these drilling issues, VariDrill delivers an optimum surface finish with every hole — no matter the material.

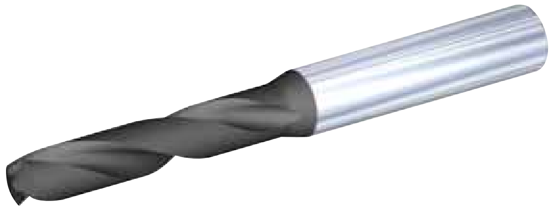
More Options and Longer Tool Life

Aside from its uniquely engineered design, VariDrill also offers a broad portfolio of drilling options. With more than 2,200 items, VariDrill offers more choices than any other drill for general engineering operations. And because most drills can be reconditioned, your tools will gain extended life.

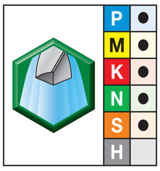
VariDrill — Innovatively designed and technologically advanced.
Make VariDrill your go-to drill for hole after hole...after hole.



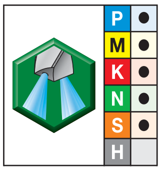
For information on L, L3, and L4 max, see page T143.



VDS201A • VDS401A • 3 x D



grade WU25PD
TiAlN



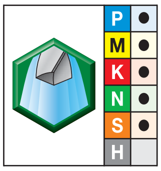
grade WU25PD
TiAlN

● first choice
○ alternate choice

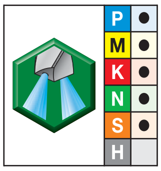
VDS201A order #	VDS201A catalogue #	VDS401A order #	VDS401A catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4144195	VDS201A01000		–	1,000	.0394	5	7	0,1	58	28	4
4144196	VDS201A01016		–	1,016	.0400	5	7	0,1	58	28	4
4144197	VDS201A01041		–	1,041	.0410	5	7	0,2	58	28	4
4144198	VDS201A01067		–	1,067	.0420	5	7	0,2	58	28	4
4144199	VDS201A01092		–	1,092	.0430	5	7	0,2	58	28	4
4144200	VDS201A01100		–	1,100	.0433	5	7	0,2	58	28	4
4144201	VDS201A01181		–	1,181	.0465	5	7	0,2	58	28	4
4144202	VDS201A01191		–	1,191	.0469	5	7	0,2	58	28	4
4144523	VDS201A01200		–	1,200	.0472	5	7	0,2	58	28	4
4144524	VDS201A01300		–	1,300	.0512	5	7	0,2	58	28	4
4144525	VDS201A01321		–	1,321	.0520	5	7	0,2	58	28	4
4144526	VDS201A01397		–	1,397	.0550	5	7	0,2	58	28	4
4144527	VDS201A01400		–	1,400	.0551	5	7	0,2	58	28	4
4144528	VDS201A01500	4140270	VDS401A01500	1,500	.0591	6	9	0,2	58	28	4
4144529	VDS201A01600	4140271	VDS401A01600	1,600	.0630	6	9	0,2	58	28	4
4144530	VDS201A01700	4140272	VDS401A01700	1,700	.0669	6	9	0,3	58	28	4
4144531	VDS201A01800	4140423	VDS401A01800	1,800	.0709	6	9	0,3	58	28	4
4144532	VDS201A01900	4140424	VDS401A01900	1,900	.0748	6	9	0,3	58	28	4
4144533	VDS201A01984	4140425	VDS401A01984	1,984	.0781	10	13	0,3	58	28	4
4144534	VDS201A02000	4140426	VDS401A02000	2,000	.0787	10	13	0,3	58	28	4
4144535	VDS201A02100	4140427	VDS401A02100	2,100	.0827	10	13	0,3	58	28	4
4144536	VDS201A02200	4140428	VDS401A02200	2,200	.0866	10	13	0,3	58	28	4
4144537	VDS201A02300	4140429	VDS401A02300	2,300	.0906	10	13	0,4	58	28	4
4144538	VDS201A02383	4140430	VDS401A02383	2,383	.0938	12	17	0,4	58	28	4

(continued)

(VDS201A • VDS401A • 3 x D — continued)



grade WU25PD
TiAlN



grade WU25PD
TiAlN

● first choice
○ alternate choice

order #	catalogue #	order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4144539	VDS201A02400	4140431	VDS401A02400	2,400	.0945	12	17	0,4	58	28	4
4144540	VDS201A02439	4140432	VDS401A02439	2,439	.0960	12	17	0,4	58	28	4
4144541	VDS201A02489	4140433	VDS401A02489	2,489	.0980	12	17	0,4	58	28	4
4144542	VDS201A02500	4140434	VDS401A02500	2,500	.0984	12	17	0,4	58	28	4
4144543	VDS201A02578	4140435	VDS401A02578	2,578	.1015	12	17	0,4	58	28	4
4144544	VDS201A02600	4140436	VDS401A02600	2,600	.1024	12	17	0,4	58	28	4
4144545	VDS201A02642	4140437	VDS401A02642	2,642	.1040	12	17	0,4	58	28	4
4144546	VDS201A02700	4140438	VDS401A02700	2,700	.1063	12	17	0,4	58	28	4
4144547	VDS201A02705	4140439	VDS401A02705	2,705	.1065	12	17	0,4	58	28	4
4144548	VDS201A02779	4140440	VDS401A02779	2,779	.1094	12	17	0,4	58	28	4
4144549	VDS201A02800	4140441	VDS401A02800	2,800	.1102	12	17	0,5	58	28	4
4144550	VDS201A02820	4140442	VDS401A02820	2,820	.1110	12	17	0,5	58	28	4
4144551	VDS201A02870	4140443	VDS401A02870	2,870	.1130	12	17	0,5	58	28	4
4144552	VDS201A02900	4140444	VDS401A02900	2,900	.1142	12	17	0,5	58	28	4
4144553	VDS201A02947	4140445	VDS401A02947	2,947	.1160	12	17	0,5	58	28	4
4143907	VDS201A03000	4140299	VDS401A03000	3,000	.1181	14	20	0,5	62	36	6
4143908	VDS201A03048	4140300	VDS401A03048	3,048	.1200	14	20	0,5	62	36	6
4143909	VDS201A03100	4140301	VDS401A03100	3,100	.1220	14	20	0,5	62	36	6
4143910	VDS201A03175	4140302	VDS401A03175	3,175	.1250	14	20	0,5	62	36	6
4143911	VDS201A03200	4140303	VDS401A03200	3,200	.1260	14	20	0,5	62	36	6
4143912	VDS201A03264	4140304	VDS401A03264	3,264	.1285	14	20	0,5	62	36	6
4143913	VDS201A03300	4140305	VDS401A03300	3,300	.1299	14	20	0,5	62	36	6
4143914	VDS201A03400	4140306	VDS401A03400	3,400	.1339	14	20	0,6	62	36	6
4143915	VDS201A03455	4140307	VDS401A03455	3,455	.1360	14	20	0,6	62	36	6
4143916	VDS201A03500	4140308	VDS401A03500	3,500	.1378	14	20	0,6	62	36	6
4143917	VDS201A03571	4140309	VDS401A03571	3,571	.1406	14	20	0,6	62	36	6
4143918	VDS201A03600	4140310	VDS401A03600	3,600	.1417	14	20	0,6	62	36	6
4143919	VDS201A03658	4140311	VDS401A03658	3,658	.1440	14	20	0,6	62	36	6
4143920	VDS201A03700	4140312	VDS401A03700	3,700	.1457	14	20	0,6	62	36	6
4143921	VDS201A03734	4140313	VDS401A03734	3,734	.1470	14	20	0,6	62	36	6
4143922	VDS201A03800	4140314	VDS401A03800	3,800	.1496	17	24	0,6	66	36	6
4143923	VDS201A03900	4140315	VDS401A03900	3,900	.1535	17	24	0,6	66	36	6
4143924	VDS201A03970	4140316	VDS401A03970	3,970	.1563	17	24	0,7	66	36	6
4143925	VDS201A04000	4140317	VDS401A04000	4,000	.1575	17	24	0,7	66	36	6
4143926	VDS201A04039	4140318	VDS401A04039	4,039	.1590	17	24	0,7	66	36	6
4143927	VDS201A04090	4140319	VDS401A04090	4,090	.1610	17	24	0,7	66	36	6
4143928	VDS201A04100	4140320	VDS401A04100	4,100	.1614	17	24	0,7	66	36	6
4143929	VDS201A04200	4140321	VDS401A04200	4,200	.1654	17	24	0,7	66	36	6
4143930	VDS201A04217	4140322	VDS401A04217	4,217	.1660	17	24	0,7	66	36	6
4143931	VDS201A04300	4140323	VDS401A04300	4,300	.1693	17	24	0,7	66	36	6

(continued)

(VDS201A • VDS401A • 3 x D — continued)

P	M	K	N	S	H
●	●	●	●	●	

● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4143932	VDS201A04366	4140324	VDS401A04366	4,366	.1719	17	24	0,7	66	36	6
4143933	VDS201A04400	4140325	VDS401A04400	4,400	.1732	17	24	0,7	66	36	6
4143934	VDS201A04500	4140326	VDS401A04500	4,500	.1772	17	24	0,7	66	36	6
4143935	VDS201A04600	4140328	VDS401A04600	4,600	.1811	17	24	0,8	66	36	6
4143936	VDS201A04623	4140329	VDS401A04623	4,623	.1820	17	24	0,8	66	36	6
4143937	VDS201A04700	4140330	VDS401A04700	4,700	.1850	17	24	0,8	66	36	6
4143938	VDS201A04763	4140331	VDS401A04763	4,763	.1875	20	28	0,8	66	36	6
4143939	VDS201A04800	4140332	VDS401A04800	4,800	.1890	20	28	0,8	66	36	6
4143940	VDS201A04852	4140333	VDS401A04852	4,852	.1910	20	28	0,8	66	36	6
4143941	VDS201A04900	4140334	VDS401A04900	4,900	.1929	20	28	0,8	66	36	6
4143942	VDS201A05000	4140335	VDS401A05000	5,000	.1969	20	28	0,8	66	36	6
4143943	VDS201A05100	4140336	VDS401A05100	5,100	.2008	20	28	0,8	66	36	6
4143944	VDS201A05106	4140337	VDS401A05106	5,106	.2010	20	28	0,8	66	36	6
4143945	VDS201A05159	4140338	VDS401A05159	5,159	.2031	20	28	0,9	66	36	6
4143946	VDS201A05200	4140339	VDS401A05200	5,200	.2047	20	28	0,9	66	36	6
4143947	VDS201A05300	4140340	VDS401A05300	5,300	.2087	20	28	0,9	66	36	6
4143948	VDS201A05400	4140341	VDS401A05400	5,400	.2126	20	28	0,9	66	36	6
4143949	VDS201A05410	4140342	VDS401A05410	5,410	.2130	20	28	0,9	66	36	6
4143950	VDS201A05500	4140343	VDS401A05500	5,500	.2165	20	28	0,9	66	36	6
4143951	VDS201A05558	4140344	VDS401A05558	5,558	.2188	20	28	0,9	66	36	6
4143952	VDS201A05600	4140345	VDS401A05600	5,600	.2205	20	28	0,9	66	36	6
4143953	VDS201A05616	4140346	VDS401A05616	5,616	.2211	20	28	0,9	66	36	6
4143954	VDS201A05700	4140347	VDS401A05700	5,700	.2244	20	28	1,0	66	36	6
4143955	VDS201A05800	4140348	VDS401A05800	5,800	.2283	20	28	1,0	66	36	6
4143956	VDS201A05900	4140349	VDS401A05900	5,900	.2323	20	28	1,0	66	36	6
4143957	VDS201A05954	4140350	VDS401A05954	5,954	.2344	20	28	1,0	66	36	6
4143958	VDS201A06000	4140351	VDS401A06000	6,000	.2362	20	28	1,0	66	36	6
4143959	VDS201A06100	4140352	VDS401A06100	6,100	.2402	24	34	1,0	79	36	8
4143960	VDS201A06200	4140353	VDS401A06200	6,200	.2441	24	34	1,0	79	36	8
4143961	VDS201A06300	4140354	VDS401A06300	6,300	.2480	24	34	1,1	79	36	8
4143962	VDS201A06350	4140355	VDS401A06350	6,350	.2500	24	34	1,1	79	36	8
4143963	VDS201A06400	4140356	VDS401A06400	6,400	.2520	24	34	1,1	79	36	8
4143964	VDS201A06500	4140357	VDS401A06500	6,500	.2559	24	34	1,1	79	36	8
4143965	VDS201A06528	4140358	VDS401A06528	6,528	.2570	24	34	1,1	79	36	8
4143966	VDS201A06600	4140359	VDS401A06600	6,600	.2598	24	34	1,1	79	36	8
4143967	VDS201A06630	4140360	VDS401A06630	6,630	.2610	24	34	1,1	79	36	8
4143968	VDS201A06700	4140361	VDS401A06700	6,700	.2638	24	34	1,1	79	36	8
4143969	VDS201A06746	4140362	VDS401A06746	6,746	.2656	24	34	1,1	79	36	8
4143970	VDS201A06800	4140363	VDS401A06800	6,800	.2677	24	34	1,1	79	36	8
4143971	VDS201A06900	4140364	VDS401A06900	6,900	.2717	24	34	1,2	79	36	8

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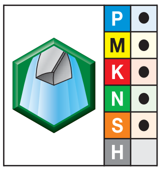
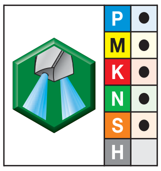
(VDS201A • VDS401A • 3 x D — continued)



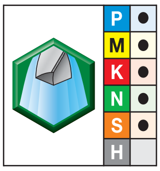


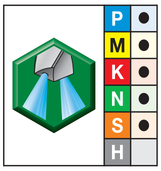
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	**catalogue #**	**order #**	**catalogue #**	**mm**	**in**	**L4 max**	**L3**	**L5**	**L**	**LS**	**D**
4143972	**VDS201A07000**	**4140365**	**VDS401A07000**	7,000	.2756	24	34	1,2	79	36	8
4143973	**VDS201A07100**	**4140366**	**VDS401A07100**	7,100	.2795	29	41	1,2	79	36	8
4143974	**VDS201A07145**	**4140367**	**VDS401A07145**	7,145	.2813	29	41	1,2	79	36	8
4143975	**VDS201A07200**	**4140368**	**VDS401A07200**	7,200	.2835	29	41	1,2	79	36	8
4143976	**VDS201A07300**	**4140369**	**VDS401A07300**	7,300	.2874	29	41	1,2	79	36	8
4143977	**VDS201A07400**	**4140370**	**VDS401A07400**	7,400	.2913	29	41	1,3	79	36	8
4143978	**VDS201A07500**	**4140371**	**VDS401A07500**	7,500	.2953	29	41	1,3	79	36	8
4143979	**VDS201A07541**	**4140372**	**VDS401A07541**	7,541	.2969	29	41	1,3	79	36	8
4143980	**VDS201A07600**	**4140373**	**VDS401A07600**	7,600	.2992	29	41	1,3	79	36	8
4143981	**VDS201A07700**	**4140374**	**VDS401A07700**	7,700	.3031	29	41	1,3	79	36	8
4143982	**VDS201A07800**	**4140375**	**VDS401A07800**	7,800	.3071	29	41	1,3	79	36	8
4143983	**VDS201A07900**	**4140376**	**VDS401A07900**	7,900	.3110	29	41	1,3	79	36	8
4143984	**VDS201A07938**	**4140377**	**VDS401A07938**	7,938	.3125	29	41	1,3	79	36	8
4143985	**VDS201A08000**	**4140378**	**VDS401A08000**	8,000	.3150	29	41	1,4	79	36	8
4143986	**VDS201A08100**	**4140379**	**VDS401A08100**	8,100	.3189	35	47	1,4	89	40	10
4143987	**VDS201A08200**	**4140380**	**VDS401A08200**	8,200	.3228	35	47	1,4	89	40	10
4143988	**VDS201A08300**	**4140381**	**VDS401A08300**	8,300	.3268	35	47	1,4	89	40	10
4143989	**VDS201A08334**	**4140382**	**VDS401A08334**	8,334	.3281	35	47	1,4	89	40	10
4143990	**VDS201A08400**	**4140383**	**VDS401A08400**	8,400	.3307	35	47	1,4	89	40	10
4143991	**VDS201A08433**	**4140384**	**VDS401A08433**	8,433	.3320	35	47	1,4	89	40	10
4143992	**VDS201A08500**	**4140385**	**VDS401A08500**	8,500	.3346	35	47	1,4	89	40	10
4143993	**VDS201A08600**	**4140386**	**VDS401A08600**	8,600	.3386	35	47	1,5	89	40	10
4143994	**VDS201A08700**	**4140387**	**VDS401A08700**	8,700	.3425	35	47	1,5	89	40	10
4143995	**VDS201A08733**	**4140388**	**VDS401A08733**	8,733	.3438	35	47	1,5	89	40	10
4143996	**VDS201A08800**	**4140389**	**VDS401A08800**	8,800	.3465	35	47	1,5	89	40	10
4143997	**VDS201A08900**	**4140390**	**VDS401A08900**	8,900	.3504	35	47	1,5	89	40	10
4143998	**VDS201A09000**	**4140391**	**VDS401A09000**	9,000	.3543	35	47	1,5	89	40	10
4143999	**VDS201A09100**	**4140392**	**VDS401A09100**	9,100	.3583	35	47	1,5	89	40	10
4144000	**VDS201A09129**	**4140393**	**VDS401A09129**	9,129	.3594	35	47	1,6	89	40	10
4144001	**VDS201A09200**	**4140394**	**VDS401A09200**	9,200	.3622	35	47	1,6	89	40	10
4144002	**VDS201A09300**	**4140395**	**VDS401A09300**	9,300	.3661	35	47	1,6	89	40	10
4144003	**VDS201A09347**	**4140396**	**VDS401A09347**	9,347	.3680	35	47	1,6	89	40	10
4144004	**VDS201A09400**	**4140397**	**VDS401A09400**	9,400	.3701	35	47	1,6	89	40	10
4144005	**VDS201A09500**	**4140398**	**VDS401A09500**	9,500	.3740	35	47	1,6	89	40	10
4144006	**VDS201A09525**	**4140399**	**VDS401A09525**	9,525	.3750	35	47	1,6	89	40	10
4144007	**VDS201A09600**	**4140400**	**VDS401A09600**	9,600	.3780	35	47	1,6	89	40	10
4144008	**VDS201A09700**	**4140401**	**VDS401A09700**	9,700	.3819	35	47	1,7	89	40	10
4144009	**VDS201A09800**	**4140402**	**VDS401A09800**	9,800	.3858	35	47	1,7	89	40	10
4144010	**VDS201A09900**	**4140403**	**VDS401A09900**	9,900	.3898	35	47	1,7	89	40	10
4144011	**VDS201A09921**	**4140404**	**VDS401A09921**	9,921	.3906	35	47	1,7	89	40	10

(continued)

(VDS201A • VDS401A • 3 x D — continued)





● first choice
○ alternate choice

grade WU25PD TiAIN		grade WU25PD TiAIN		D1 diameter							
order #	**catalogue #**	**order #**	**catalogue #**	**mm**	**in**	**L4 max**	**L3**	**L5**	**L**	**LS**	**D**
4144172	VDS201A10000	4140001	VDS401A10000	10,000	.3937	35	47	1,7	89	40	10
4144423	VDS201A10100	4140002	VDS401A10100	10,100	.3976	40	55	1,7	102	45	12
4144424	VDS201A10200	4140163	VDS401A10200	10,200	.4016	40	55	1,7	102	45	12
4144425	VDS201A10300	4140164	VDS401A10300	10,300	.4055	40	55	1,8	102	45	12
4144426	VDS201A10320	4140165	VDS401A10320	10,320	.4063	40	55	1,8	102	45	12
4144427	VDS201A10400	4140166	VDS401A10400	10,400	.4094	40	55	1,8	102	45	12
4144428	VDS201A10500	4140167	VDS401A10500	10,500	.4134	40	55	1,8	102	45	12
4144429	VDS201A10600	4140168	VDS401A10600	10,600	.4173	40	55	1,8	102	45	12
4144430	VDS201A10700	4140169	VDS401A10700	10,700	.4213	40	55	1,8	102	45	12
4144431	VDS201A10716	4140170	VDS401A10716	10,716	.4219	40	55	1,8	102	45	12
4144432	VDS201A10800	4140171	VDS401A10800	10,800	.4252	40	55	1,8	102	45	12
4144433	VDS201A10900	4140172	VDS401A10900	10,900	.4291	40	55	1,9	102	45	12
4144434	VDS201A11000	4140173	VDS401A11000	11,000	.4331	40	55	1,9	102	45	12
4144435	VDS201A11100	4140174	VDS401A11100	11,100	.4370	40	55	1,9	102	45	12
4144436	VDS201A11113	4140175	VDS401A11113	11,113	.4375	40	55	1,9	102	45	12
4144437	VDS201A11200	4140176	VDS401A11200	11,200	.4409	40	55	1,9	102	45	12
4144438	VDS201A11300	4140177	VDS401A11300	11,300	.4449	40	55	1,9	102	45	12
4144439	VDS201A11400	4140178	VDS401A11400	11,400	.4488	40	55	2,0	102	45	12
4144440	VDS201A11500	4140179	VDS401A11500	11,500	.4528	40	55	2,0	102	45	12
4144441	VDS201A11509	4140180	VDS401A11509	11,509	.4531	40	55	2,0	102	45	12
4144442	VDS201A11600	4140181	VDS401A11600	11,600	.4567	40	55	2,0	102	45	12
4144443	VDS201A11700	4140182	VDS401A11700	11,700	.4606	40	55	2,0	102	45	12
4144444	VDS201A11800	4140183	VDS401A11800	11,800	.4646	40	55	2,0	102	45	12
4144445	VDS201A11900	4140184	VDS401A11900	11,900	.4685	40	55	2,0	102	45	12
4144446	VDS201A11908	4140185	VDS401A11908	11,908	.4688	40	55	2,0	102	45	12
4144447	VDS201A12000	4140186	VDS401A12000	12,000	.4724	40	55	2,1	102	45	12
4144448	VDS201A12100	4140187	VDS401A12100	12,100	.4764	43	60	2,1	107	45	14
4144449	VDS201A12200	4140188	VDS401A12200	12,200	.4803	43	60	2,1	107	45	14
4144450	VDS201A12300	4140189	VDS401A12300	12,300	.4843	43	60	2,1	107	45	14
4144451	VDS201A12304	4140190	VDS401A12304	12,304	.4844	43	60	2,1	107	45	14
4144452	VDS201A12400	4140191	VDS401A12400	12,400	.4882	43	60	2,1	107	45	14
4144453	VDS201A12500	4140192	VDS401A12500	12,500	.4921	43	60	2,1	107	45	14
4144454	VDS201A12600	4140194	VDS401A12600	12,600	.4961	43	60	2,2	107	45	14
4144455	VDS201A12700	4140195	VDS401A12700	12,700	.5000	43	60	2,2	107	45	14
4144456	VDS201A12800	4140196	VDS401A12800	12,800	.5039	43	60	2,2	107	45	14
4144457	VDS201A12900	4140197	VDS401A12900	12,900	.5079	43	60	2,2	107	45	14
4144458	VDS201A13000	4140198	VDS401A13000	13,000	.5118	43	60	2,2	107	45	14
4144459	VDS201A13096	4140199	VDS401A13096	13,096	.5156	43	60	2,3	107	45	14
4144460	VDS201A13100	4140200	VDS401A13100	13,100	.5157	43	60	2,3	107	45	14
4144461	VDS201A13200	4140201	VDS401A13200	13,200	.5197	43	60	2,3	107	45	14

(continued)

(VDS201A • VDS401A • 3 x D — continued)

P ● M ● K ● N ● S ● H

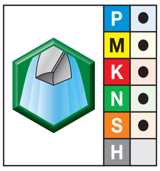
P ● M ● K ● N ● S ● H

● first choice
○ alternate choice

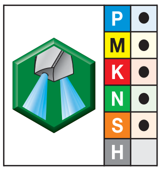
grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144462	VDS201A13300	4140202	VDS401A13300	13,300	.5236	43	60	2,3	107	45	14
4144463	VDS201A13400	4140203	VDS401A13400	13,400	.5276	43	60	2,3	107	45	14
4144464	VDS201A13500	4140204	VDS401A13500	13,500	.5315	43	60	2,3	107	45	14
4144465	VDS201A13600	4140205	VDS401A13600	13,600	.5354	43	60	2,3	107	45	14
4144466	VDS201A13700	4140206	VDS401A13700	13,700	.5394	43	60	2,4	107	45	14
4144467	VDS201A13800	4140207	VDS401A13800	13,800	.5433	43	60	2,4	107	45	14
4144468	VDS201A13891	4140208	VDS401A13891	13,891	.5469	43	60	2,4	107	45	14
4144469	VDS201A13900	4140209	VDS401A13900	13,900	.5472	43	60	2,4	107	45	14
4144470	VDS201A14000	4140210	VDS401A14000	14,000	.5512	43	60	2,4	107	45	14
4144471	VDS201A14100	4140211	VDS401A14100	14,100	.5551	45	65	2,4	115	48	16
4144472	VDS201A14200	4140212	VDS401A14200	14,200	.5591	45	65	2,5	115	48	16
4144473	VDS201A14288	4140213	VDS401A14288	14,288	.5625	45	65	2,5	115	48	16
4144474	VDS201A14300	4140214	VDS401A14300	14,300	.5630	45	65	2,5	115	48	16
4144475	VDS201A14400	4140215	VDS401A14400	14,400	.5669	45	65	2,5	115	48	16
4144476	VDS201A14500	4140216	VDS401A14500	14,500	.5709	45	65	2,5	115	48	16
4144477	VDS201A14600	4140217	VDS401A14600	14,600	.5748	45	65	2,5	115	48	16
4144478	VDS201A14684	4140218	VDS401A14684	14,684	.5781	45	65	2,5	115	48	16
4144479	VDS201A14700	4140219	VDS401A14700	14,700	.5787	45	65	2,5	115	48	16
4144480	VDS201A14800	4140220	VDS401A14800	14,800	.5827	45	65	2,6	115	48	16
4144481	VDS201A14900	4140221	VDS401A14900	14,900	.5866	45	65	2,6	115	48	16
4144482	VDS201A15000	4140222	VDS401A15000	15,000	.5906	45	65	2,6	115	48	16
4144483	VDS201A15083	4140223	VDS401A15083	15,083	.5938	45	65	2,6	115	48	16
4144484	VDS201A15100	4140224	VDS401A15100	15,100	.5945	45	65	2,6	115	48	16
4144485	VDS201A15200	4140225	VDS401A15200	15,200	.5984	45	65	2,6	115	48	16
4144486	VDS201A15300	4140226	VDS401A15300	15,300	.6024	45	65	2,6	115	48	16
4144487	VDS201A15400	4140227	VDS401A15400	15,400	.6063	45	65	2,7	115	48	16
4144488	VDS201A15479	4140228	VDS401A15479	15,479	.6094	45	65	2,7	115	48	16
4144489	VDS201A15500	4140229	VDS401A15500	15,500	.6102	45	65	2,7	115	48	16
4144490	VDS201A15600	4140230	VDS401A15600	15,600	.6142	45	65	2,7	115	48	16
4144491	VDS201A15700	4140231	VDS401A15700	15,700	.6181	45	65	2,7	115	48	16
4144492	VDS201A15800	4140232	VDS401A15800	15,800	.6220	45	65	2,7	115	48	16
4144493	VDS201A15875	4140233	VDS401A15875	15,875	.6250	45	65	2,7	115	48	16
4144494	VDS201A15900	4140234	VDS401A15900	15,900	.6260	45	65	2,8	115	48	16
4144495	VDS201A16000	4140235	VDS401A16000	16,000	.6299	45	65	2,8	115	48	16
4144496	VDS201A16100	4140236	VDS401A16100	16,100	.6339	51	73	2,8	123	48	18
4144497	VDS201A16200	4140237	VDS401A16200	16,200	.6378	51	73	2,8	123	48	18
4144498	VDS201A16271	4140238	VDS401A16271	16,271	.6406	51	73	2,8	123	48	18
4144499	VDS201A16300	4140239	VDS401A16300	16,300	.6417	51	73	2,8	123	48	18
4144500	VDS201A16400	4140241	VDS401A16400	16,400	.6457	51	73	2,8	123	48	18
4144501	VDS201A16500	4140242	VDS401A16500	16,500	.6496	51	73	2,9	123	48	18

(continued)

(VDS201A • VDS401A • 3 x D — continued)



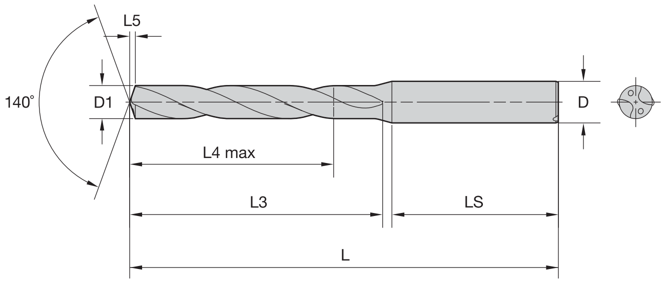
grade WU25PD
TiAlN

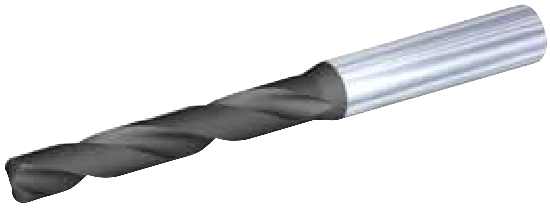


grade WU25PD
TiAlN

● first choice
○ alternate choice

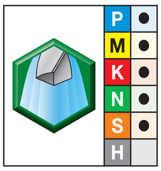
grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144503	VDS201A16600	4140243	VDS401A16600	16,600	.6535	51	73	2,9	123	48	18
4144504	VDS201A16670	4140244	VDS401A16670	16,670	.6563	51	73	2,9	123	48	18
4144505	VDS201A16700	4140245	VDS401A16700	16,700	.6575	51	73	2,9	123	48	18
4144506	VDS201A16800	4140246	VDS401A16800	16,800	.6614	51	73	2,9	123	48	18
4144507	VDS201A16900	4140247	VDS401A16900	16,900	.6654	51	73	2,9	123	48	18
4144508	VDS201A17000	4140248	VDS401A17000	17,000	.6693	51	73	2,9	123	48	18
4144509	VDS201A17100	4140249	VDS401A17100	17,100	.6732	51	73	3,0	123	48	18
4144510	VDS201A17200	4140250	VDS401A17200	17,200	.6772	51	73	3,0	123	48	18
4144511	VDS201A17300	4140251	VDS401A17300	17,300	.6811	51	73	3,0	123	48	18
4144512	VDS201A17400	4140252	VDS401A17400	17,400	.6850	51	73	3,0	123	48	18
4144513	VDS201A17463	4140253	VDS401A17463	17,463	.6875	51	73	3,0	123	48	18
4144514	VDS201A17500	4140254	VDS401A17500	17,500	.6890	51	73	3,0	123	48	18
4144515	VDS201A17600	4140255	VDS401A17600	17,600	.6929	51	73	3,1	123	48	18
4144516	VDS201A17700	4140256	VDS401A17700	17,700	.6969	51	73	3,1	123	48	18
4144517	VDS201A17800	4140257	VDS401A17800	17,800	.7008	51	73	3,1	123	48	18
4144518	VDS201A17859	4140258	VDS401A17859	17,859	.7031	51	73	3,1	123	48	18
4144519	VDS201A17900	4140259	VDS401A17900	17,900	.7047	51	73	3,1	123	48	18
4144590	VDS201A18000	4140449	VDS401A18000	18,000	.7087	51	73	3,1	123	48	18
4144591	VDS201A18100	4140450	VDS401A18100	18,100	.7126	55	79	3,1	131	50	20
4144592	VDS201A18200	4140451	VDS401A18200	18,200	.7165	55	79	3,2	131	50	20
4144593	VDS201A18258	4140452	VDS401A18258	18,258	.7188	55	79	3,2	131	50	20
4144594	VDS201A18300	4140463	VDS401A18300	18,300	.7205	55	79	3,2	131	50	20
4144595	VDS201A18400	4140464	VDS401A18400	18,400	.7244	55	79	3,2	131	50	20
4144596	VDS201A18500	4140465	VDS401A18500	18,500	.7283	55	79	3,2	131	50	20
4144597	VDS201A18600	4140466	VDS401A18600	18,600	.7323	55	79	3,2	131	50	20
4144598	VDS201A18654	4140467	VDS401A18654	18,654	.7344	55	79	3,2	131	50	20
4144599	VDS201A18700	4140468	VDS401A18700	18,700	.7362	55	79	3,2	131	50	20
4144600	VDS201A18800	4140469	VDS401A18800	18,800	.7402	55	79	3,3	131	50	20
4144601	VDS201A18900	4140470	VDS401A18900	18,900	.7441	55	79	3,3	131	50	20
4144602	VDS201A19000	4140471	VDS401A19000	19,000	.7480	55	79	3,3	131	50	20
4144603	VDS201A19050	4140472	VDS401A19050	19,050	.7500	55	79	3,3	131	50	20
4144604	VDS201A19100	4140473	VDS401A19100	19,100	.7520	55	79	3,3	131	50	20
4144605	VDS201A19200	4140474	VDS401A19200	19,200	.7559	55	79	3,3	131	50	20
4144606	VDS201A19300	4140475	VDS401A19300	19,300	.7598	55	79	3,4	131	50	20
4144607	VDS201A19400	4140476	VDS401A19400	19,400	.7638	55	79	3,4	131	50	20
4144608	VDS201A19500	4140477	VDS401A19500	19,500	.7677	55	79	3,4	131	50	20
4144609	VDS201A19600	4140478	VDS401A19600	19,600	.7717	55	79	3,4	131	50	20
4144610	VDS201A19700	4140479	VDS401A19700	19,700	.7756	55	79	3,4	131	50	20
4144611	VDS201A19800	4140480	VDS401A19800	19,800	.7795	55	79	3,4	131	50	20
4144612	VDS201A19900	4140481	VDS401A19900	19,900	.7835	55	79	3,5	131	50	20
4144613	VDS201A20000	4140482	VDS401A20000	20,000	.7874	55	79	3,5	131	50	20

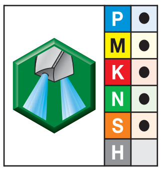




For information on L, L3, and L4 max, see page T143.

■ VDS202A • VDS402A • 5 x D



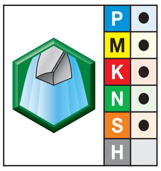


● first choice
○ alternate choice

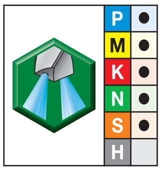
grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148000	VDS202A01000		–	1,000	.0394	6	9	0,1	58	28	4
4148001	VDS202A01016		–	1,016	.0400	6	9	0,1	58	28	4
4148002	VDS202A01041		–	1,041	.0410	6	9	0,2	58	28	4
4148003	VDS202A01067		–	1,067	.0420	6	9	0,2	58	28	4
4148004	VDS202A01092		–	1,092	.0430	6	9	0,2	58	28	4
4148005	VDS202A01100		–	1,100	.0433	6	9	0,2	58	28	4
4148006	VDS202A01181		–	1,181	.0465	6	9	0,2	58	28	4
4148007	VDS202A01191		–	1,191	.0469	6	9	0,2	58	28	4
4148008	VDS202A01200		–	1,200	.0472	6	9	0,2	58	28	4
4148009	VDS202A01300		–	1,300	.0512	6	9	0,2	58	28	4
4148010	VDS202A01321		–	1,321	.0520	6	9	0,2	58	28	4
4148011	VDS202A01397		–	1,397	.0550	6	9	0,2	58	28	4
4148012	VDS202A01400		–	1,400	.0551	6	9	0,2	58	28	4
4148013	VDS202A01500	4142871	VDS402A01500	1,500	.0591	9	12	0,2	58	40	4
4148014	VDS202A01600	4142884	VDS402A01600	1,600	.0630	9	12	0,2	58	28	4
4148015	VDS202A01700	4142887	VDS402A01700	1,700	.0669	9	12	0,3	58	28	4
4148016	VDS202A01800	4142890	VDS402A01800	1,800	.0709	9	12	0,3	58	28	4
4148017	VDS202A01900	4142893	VDS402A01900	1,900	.0748	9	12	0,3	58	28	4
4148018	VDS202A01984	4142896	VDS402A01984	1,984	.0781	14	18	0,3	58	28	4
4148019	VDS202A02000	4142899	VDS402A02000	2,000	.0787	14	18	0,3	58	28	4
4148020	VDS202A02100	4142902	VDS402A02100	2,100	.0827	14	18	0,3	58	28	4
4148021	VDS202A02200	4142905	VDS402A02200	2,200	.0866	14	18	0,3	58	28	4
4148022	VDS202A02300	4142908	VDS402A02300	2,300	.0906	14	18	0,4	58	28	4
4148023	VDS202A02383	4142911	VDS402A02383	2,383	.0938	17	22	0,4	58	28	4

(continued)

(VDS202A • VDS402A • 5 x D — continued)



grade WU25PD
TiAlN



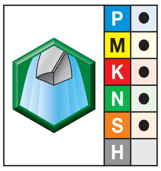
grade WU25PD
TiAlN

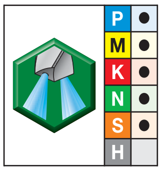
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148024	VDS202A02400	4142924	VDS402A02400	2,400	.0945	17	22	0,4	58	28	4
4148025	VDS202A02439	4142927	VDS402A02439	2,439	.0960	17	22	0,4	58	28	4
4148026	VDS202A02489	4142930	VDS402A02489	2,489	.0980	17	22	0,4	58	28	4
4148027	VDS202A02500	4142933	VDS402A02500	2,500	.0984	17	22	0,4	58	28	4
4148028	VDS202A02578	4142936	VDS402A02578	2,578	.1015	17	22	0,4	58	28	4
4148029	VDS202A02600	4142939	VDS402A02600	2,600	.1024	17	22	0,4	58	28	4
4148030	VDS202A02642	4142942	VDS402A02642	2,642	.1040	17	22	0,4	58	28	4
4148031	VDS202A02700	4142945	VDS402A02700	2,700	.1063	17	22	0,4	58	28	4
4148032	VDS202A02705	4142948	VDS402A02705	2,705	.1065	17	22	0,4	58	28	4
4148033	VDS202A02779	4142951	VDS402A02779	2,779	.1094	17	22	0,4	58	28	4
4148034	VDS202A02800	4142964	VDS402A02800	2,800	.1102	17	22	0,5	58	28	4
4148035	VDS202A02820	4142967	VDS402A02820	2,820	.1110	17	22	0,5	58	28	4
4148036	VDS202A02870	4142970	VDS402A02870	2,870	.1130	17	22	0,5	58	28	4
4148037	VDS202A02900	4142973	VDS402A02900	2,900	.1142	17	22	0,5	58	28	4
4148038	VDS202A02947	4142976	VDS402A02947	2,947	.1160	17	22	0,5	58	28	4
4148142	VDS202A03000	4142844	VDS402A03000	3,000	.1181	23	28	0,5	66	36	6
4148143	VDS202A03048	4142846	VDS402A03048	3,048	.1200	23	28	0,5	66	36	6
4148144	VDS202A03100	4142847	VDS402A03100	3,100	.1220	23	28	0,5	66	36	6
4148145	VDS202A03175	4142849	VDS402A03175	3,175	.1250	23	28	0,5	66	36	6
4148146	VDS202A03200	4142851	VDS402A03200	3,200	.1260	23	28	0,5	66	36	6
4148147	VDS202A03264	4142864	VDS402A03264	3,264	.1285	23	28	0,5	66	36	6
4148148	VDS202A03300	4142865	VDS402A03300	3,300	.1299	23	28	0,5	66	36	6
4148149	VDS202A03400	4142867	VDS402A03400	3,400	.1339	23	28	0,6	66	36	6
4148150	VDS202A03455	4142869	VDS402A03455	3,455	.1360	23	28	0,6	66	36	6
4148151	VDS202A03500	4142872	VDS402A03500	3,500	.1378	23	28	0,6	66	36	6
4148152	VDS202A03571	4142885	VDS402A03571	3,571	.1406	23	28	0,6	66	36	6
4148153	VDS202A03600	4142888	VDS402A03600	3,600	.1417	23	28	0,6	66	36	6
4148154	VDS202A03658	4142891	VDS402A03658	3,658	.1440	23	28	0,6	66	36	6
4148155	VDS202A03700	4142894	VDS402A03700	3,700	.1457	23	28	0,6	66	36	6
4148156	VDS202A03734	4142897	VDS402A03734	3,734	.1470	23	28	0,6	66	36	6
4148157	VDS202A03800	4142900	VDS402A03800	3,800	.1496	29	36	0,6	74	36	6
4148158	VDS202A03900	4142903	VDS402A03900	3,900	.1535	29	36	0,6	74	36	6
4148159	VDS202A03970	4142906	VDS402A03970	3,970	.1563	29	36	0,7	74	36	6
4148160	VDS202A04000	4142909	VDS402A04000	4,000	.1575	29	36	0,7	74	36	6
4148161	VDS202A04039	4142912	VDS402A04039	4,039	.1590	29	36	0,7	74	36	6
4148162	VDS202A04090	4142925	VDS402A04090	4,090	.1610	29	36	0,7	74	36	6
4148163	VDS202A04100	4142928	VDS402A04100	4,100	.1614	29	36	0,7	74	36	6
4148164	VDS202A04200	4142931	VDS402A04200	4,200	.1654	29	36	0,7	74	36	6
4148165	VDS202A04217	4142934	VDS402A04217	4,217	.1660	29	36	0,7	74	36	6
4148166	VDS202A04300	4142937	VDS402A04300	4,300	.1693	29	36	0,7	74	36	6

(continued)

(VDS202A • VDS402A • 5 x D — continued)





● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148167	VDS202A04366	4142940	VDS402A04366	4,366	.1719	29	36	0,7	74	36	6
4148168	VDS202A04400	4142943	VDS402A04400	4,400	.1732	29	36	0,7	74	36	6
4148169	VDS202A04500	4142946	VDS402A04500	4,500	.1772	29	36	0,7	74	36	6
4148170	VDS202A04600	4142949	VDS402A04600	4,600	.1811	29	36	0,8	74	36	6
4148171	VDS202A04623	4142952	VDS402A04623	4,623	.1820	29	36	0,8	74	36	6
4148172	VDS202A04700	4142965	VDS402A04700	4,700	.1850	29	36	0,8	74	36	6
4148173	VDS202A04763	4142968	VDS402A04763	4,763	.1875	35	44	0,8	82	36	6
4148174	VDS202A04800	4142971	VDS402A04800	4,800	.1890	35	44	0,8	82	36	6
4148175	VDS202A04852	4142974	VDS402A04852	4,852	.1910	35	44	0,8	82	36	6
4148176	VDS202A04900	4142977	VDS402A04900	4,900	.1929	35	44	0,8	82	36	6
4148177	VDS202A05000	4142979	VDS402A05000	5,000	.1969	35	44	0,8	82	36	6
4148178	VDS202A05100	4142981	VDS402A05100	5,100	.2008	35	44	0,8	82	36	6
4148179	VDS202A05106	4142994	VDS402A05106	5,106	.2010	35	44	0,8	82	36	6
4148180	VDS202A05159	4142996	VDS402A05159	5,159	.2031	35	44	0,9	82	36	6
4148181	VDS202A05200	4142997	VDS402A05200	5,200	.2047	35	44	0,9	82	36	6
4148182	VDS202A05300	4142999	VDS402A05300	5,300	.2087	35	44	0,9	82	36	6
4148183	VDS202A05400	4143000	VDS402A05400	5,400	.2126	35	44	0,9	82	36	6
4148184	VDS202A05410	4143001	VDS402A05410	5,410	.2130	35	44	0,9	82	36	6
4148185	VDS202A05500	4143002	VDS402A05500	5,500	.2165	35	44	0,9	82	36	6
4148186	VDS202A05558	4143003	VDS402A05558	5,558	.2188	35	44	0,9	82	36	6
4148187	VDS202A05600	4143004	VDS402A05600	5,600	.2205	35	44	0,9	82	36	6
4148188	VDS202A05616	4143005	VDS402A05616	5,616	.2211	35	44	0,9	82	36	6
4148189	VDS202A05700	4143006	VDS402A05700	5,700	.2244	35	44	1,0	82	36	6
4148190	VDS202A05800	4143007	VDS402A05800	5,800	.2283	35	44	1,0	82	36	6
4148191	VDS202A05900	4143008	VDS402A05900	5,900	.2323	35	44	1,0	82	36	6
4148192	VDS202A05954	4143009	VDS402A05954	5,954	.2344	35	44	1,0	82	36	6
4148193	VDS202A06000	4143010	VDS402A06000	6,000	.2362	35	44	1,0	82	36	6
4148194	VDS202A06100	4143011	VDS402A06100	6,100	.2402	43	53	1,0	91	36	8
4148195	VDS202A06200	4143012	VDS402A06200	6,200	.2441	43	53	1,0	91	36	8
4148196	VDS202A06300	4143023	VDS402A06300	6,300	.2480	43	53	1,1	91	36	8
4148197	VDS202A06350	4143024	VDS402A06350	6,350	.2500	43	53	1,1	91	36	8
4148198	VDS202A06400	4143025	VDS402A06400	6,400	.2520	43	53	1,1	91	36	8
4148199	VDS202A06500	4143026	VDS402A06500	6,500	.2559	43	53	1,1	91	36	8
4148200	VDS202A06528	4143027	VDS402A06528	6,528	.2570	43	53	1,1	91	36	8
4148201	VDS202A06600	4143028	VDS402A06600	6,600	.2598	43	53	1,1	91	36	8
4148202	VDS202A06630	4143029	VDS402A06630	6,630	.2610	43	53	1,1	91	36	8
4148203	VDS202A06700	4143030	VDS402A06700	6,700	.2638	43	53	1,1	91	36	8
4148204	VDS202A06746	4143031	VDS402A06746	6,746	.2656	43	53	1,1	91	36	8
4148205	VDS202A06800	4143032	VDS402A06800	6,800	.2677	43	53	1,1	91	36	8
4148206	VDS202A06900	4143043	VDS402A06900	6,900	.2717	43	53	1,2	91	36	8

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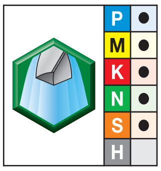
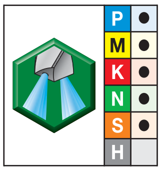
Solid Carbide Drills

(VDS202A • VDS402A • 5 x D — continued)





● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	**catalogue #**	**order #**	**catalogue #**	**mm**	**in**	**L4 max**	**L3**	**L5**	**L**	**LS**	**D**
4148207	**VDS202A07000**	**4143044**	**VDS402A07000**	7,000	.2756	43	53	1,2	91	36	8
4148208	**VDS202A07100**	**4143045**	**VDS402A07100**	7,100	.2795	43	53	1,2	91	36	8
4148209	**VDS202A07145**	**4143046**	**VDS402A07145**	7,145	.2813	43	53	1,2	91	36	8
4148210	**VDS202A07200**	**4143047**	**VDS402A07200**	7,200	.2835	43	53	1,2	91	36	8
4148211	**VDS202A07300**	**4143048**	**VDS402A07300**	7,300	.2874	43	53	1,2	91	36	8
4148212	**VDS202A07400**	**4143049**	**VDS402A07400**	7,400	.2913	43	53	1,3	91	36	8
4148213	**VDS202A07500**	**4143050**	**VDS402A07500**	7,500	.2953	43	53	1,3	91	36	8
4148214	**VDS202A07541**	**4143051**	**VDS402A07541**	7,541	.2969	43	53	1,3	91	36	8
4148215	**VDS202A07600**	**4143052**	**VDS402A07600**	7,600	.2992	43	53	1,3	91	36	8
4148216	**VDS202A07700**	**4143063**	**VDS402A07700**	7,700	.3031	43	53	1,3	91	36	8
4148217	**VDS202A07800**	**4143064**	**VDS402A07800**	7,800	.3071	43	53	1,3	91	36	8
4148218	**VDS202A07900**	**4143065**	**VDS402A07900**	7,900	.3110	43	53	1,3	91	36	8
4148219	**VDS202A07938**	**4143066**	**VDS402A07938**	7,938	.3125	43	53	1,3	91	36	8
4148220	**VDS202A08000**	**4143067**	**VDS402A08000**	8,000	.3150	43	53	1,4	91	36	8
4148221	**VDS202A08100**	**4143068**	**VDS402A08100**	8,100	.3189	49	61	1,4	103	40	10
4148222	**VDS202A08200**	**4143069**	**VDS402A08200**	8,200	.3228	49	61	1,4	103	40	10
4148223	**VDS202A08300**	**4143070**	**VDS402A08300**	8,300	.3268	49	61	1,4	103	40	10
4148224	**VDS202A08334**	**4143071**	**VDS402A08334**	8,334	.3281	49	61	1,4	103	40	10
4148225	**VDS202A08400**	**4143072**	**VDS402A08400**	8,400	.3307	49	61	1,4	103	40	10
4148226	**VDS202A08433**	**4143083**	**VDS402A08433**	8,433	.3320	49	61	1,4	103	40	10
4148227	**VDS202A08500**	**4143084**	**VDS402A08500**	8,500	.3346	49	61	1,4	103	40	10
4148228	**VDS202A08600**	**4143085**	**VDS402A08600**	8,600	.3386	49	61	1,5	103	40	10
4148229	**VDS202A08700**	**4143086**	**VDS402A08700**	8,700	.3425	49	61	1,5	103	40	10
4148230	**VDS202A08733**	**4143087**	**VDS402A08733**	8,733	.3438	49	61	1,5	103	40	10
4148231	**VDS202A08800**	**4143088**	**VDS402A08800**	8,800	.3465	49	61	1,5	103	40	10
4148232	**VDS202A08900**	**4143089**	**VDS402A08900**	8,900	.3504	49	61	1,5	103	40	10
4148233	**VDS202A09000**	**4143090**	**VDS402A09000**	9,000	.3543	49	61	1,5	103	40	10
4148234	**VDS202A09100**	**4143091**	**VDS402A09100**	9,100	.3583	49	61	1,5	103	40	10
4148235	**VDS202A09129**	**4143092**	**VDS402A09129**	9,129	.3594	49	61	1,6	103	40	10
4148236	**VDS202A09200**	**4143103**	**VDS402A09200**	9,200	.3622	49	61	1,6	103	40	10
4148237	**VDS202A09300**	**4143104**	**VDS402A09300**	9,300	.3661	49	61	1,6	103	40	10
4148238	**VDS202A09347**	**4143105**	**VDS402A09347**	9,347	.3680	49	61	1,6	103	40	10
4148239	**VDS202A09400**	**4143106**	**VDS402A09400**	9,400	.3701	49	61	1,6	103	40	10
4148240	**VDS202A09500**	**4143107**	**VDS402A09500**	9,500	.3740	49	61	1,6	103	40	10
4148241	**VDS202A09525**	**4143108**	**VDS402A09525**	9,525	.3750	49	61	1,6	103	40	10
4148242	**VDS202A09600**	**4143109**	**VDS402A09600**	9,600	.3780	49	61	1,6	103	40	10
4148243	**VDS202A09700**	**4143110**	**VDS402A09700**	9,700	.3819	49	61	1,7	103	40	10
4148244	**VDS202A09800**	**4143111**	**VDS402A09800**	9,800	.3858	49	61	1,7	103	40	10
4148245	**VDS202A09900**	**4143112**	**VDS402A09900**	9,900	.3898	49	61	1,7	103	40	10
4148246	**VDS202A09921**	**4143113**	**VDS402A09921**	9,921	.3906	49	61	1,7	103	40	10

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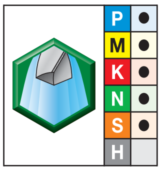
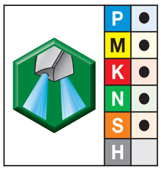
(VDS202A • VDS402A • 5 x D — continued)





● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148258	VDS202A10000	4142823	VDS402A10000	10,000	.3937	49	61	1,7	103	40	10
4148259	VDS202A10100	4142825	VDS402A10100	10,100	.3976	56	71	1,7	118	45	12
4148260	VDS202A10200	4142827	VDS402A10200	10,200	.4016	56	71	1,7	118	45	12
4148261	VDS202A10300	4142829	VDS402A10300	10,300	.4055	56	71	1,8	118	45	12
4148262	VDS202A10320	4142831	VDS402A10320	10,320	.4063	56	71	1,8	118	45	12
4148283	VDS202A10400	4142832	VDS402A10400	10,400	.4094	56	71	1,8	118	45	12
4148284	VDS202A10500	4142834	VDS402A10500	10,500	.4134	56	71	1,8	118	45	12
4148285	VDS202A10600	4142836	VDS402A10600	10,600	.4173	56	71	1,8	118	45	12
4148286	VDS202A10700	4142838	VDS402A10700	10,700	.4213	56	71	1,8	118	45	12
4148287	VDS202A10716	4142840	VDS402A10716	10,716	.4219	56	71	1,8	118	45	12
4148288	VDS202A10800	4142842	VDS402A10800	10,800	.4252	56	71	1,8	118	45	12
4148289	VDS202A10900	4142855	VDS402A10900	10,900	.4291	56	71	1,9	118	45	12
4148290	VDS202A11000	4142857	VDS402A11000	11,000	.4331	56	71	1,9	118	45	12
4148291	VDS202A11100	4142858	VDS402A11100	11,100	.4370	56	71	1,9	118	45	12
4148292	VDS202A11113	4142861	VDS402A11113	11,113	.4375	56	71	1,9	118	45	12
4148293	VDS202A11200	4142862	VDS402A11200	11,200	.4409	56	71	1,9	118	45	12
4148294	VDS202A11300	4142873	VDS402A11300	11,300	.4449	56	71	1,9	118	45	12
4148295	VDS202A11400	4142874	VDS402A11400	11,400	.4488	56	71	2,0	118	45	12
4148296	VDS202A11500	4142875	VDS402A11500	11,500	.4528	56	71	2,0	118	45	12
4148297	VDS202A11509	4142876	VDS402A11509	11,509	.4531	56	71	2,0	118	45	12
4148298	VDS202A11600	4142877	VDS402A11600	11,600	.4567	56	71	2,0	118	45	12
4148299	VDS202A11700	4142878	VDS402A11700	11,700	.4606	56	71	2,0	118	45	12
4148300	VDS202A11800	4142879	VDS402A11800	11,800	.4646	56	71	2,0	118	45	12
4148301	VDS202A11900	4142880	VDS402A11900	11,900	.4685	56	71	2,0	118	45	12
4148302	VDS202A11908	4142881	VDS402A11908	11,908	.4688	56	71	2,0	118	45	12
4148313	VDS202A12000	4142882	VDS402A12000	12,000	.4724	56	71	2,1	118	45	12
4148314	VDS202A12100	4142913	VDS402A12100	12,100	.4764	60	77	2,1	124	45	14
4148315	VDS202A12200	4142914	VDS402A12200	12,200	.4803	60	77	2,1	124	45	14
4148316	VDS202A12300	4142915	VDS402A12300	12,300	.4843	60	77	2,1	124	45	14
4148317	VDS202A12304	4142916	VDS402A12304	12,304	.4844	60	77	2,1	124	45	14
4148318	VDS202A12400	4142917	VDS402A12400	12,400	.4882	60	77	2,1	124	45	14
4148319	VDS202A12500	4142918	VDS402A12500	12,500	.4921	60	77	2,1	124	45	14
4148320	VDS202A12600	4142919	VDS402A12600	12,600	.4961	60	77	2,2	124	45	14
4148321	VDS202A12700	4142920	VDS402A12700	12,700	.5000	60	77	2,2	124	45	14
4148322	VDS202A12800	4142921	VDS402A12800	12,800	.5039	60	77	2,2	124	45	14
4148343	VDS202A12900	4142922	VDS402A12900	12,900	.5079	60	77	2,2	124	45	14
4148344	VDS202A13000	4142953	VDS402A13000	13,000	.5118	60	77	2,2	124	45	14
4148345	VDS202A13096	4142954	VDS402A13096	13,096	.5156	60	77	2,3	124	45	14
4148346	VDS202A13100	4142955	VDS402A13100	13,100	.5157	60	77	2,3	124	45	14
4148347	VDS202A13200	4142956	VDS402A13200	13,200	.5197	60	77	2,3	124	45	14

(continued)

(VDS202A • VDS402A • 5 x D — continued)

P ● M ● K ● N ● S ● H

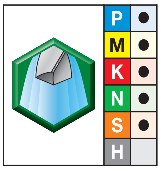
P ● M ● K ● N ● S ● H

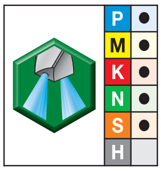
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148348	VDS202A13300	4142957	VDS402A13300	13,300	.5236	60	77	2,3	124	45	14
4148349	VDS202A13400	4142958	VDS402A13400	13,400	.5276	60	77	2,3	124	45	14
4148350	VDS202A13500	4142959	VDS402A13500	13,500	.5315	60	77	2,3	124	45	14
4148351	VDS202A13600	4142960	VDS402A13600	13,600	.5354	60	77	2,3	124	45	14
4148352	VDS202A13700	4142961	VDS402A13700	13,700	.5394	60	77	2,4	124	45	14
4148353	VDS202A13800	4142962	VDS402A13800	13,800	.5433	60	77	2,4	124	45	14
4148354	VDS202A13891	4142983	VDS402A13891	13,891	.5469	60	77	2,4	124	45	14
4148355	VDS202A13900	4142984	VDS402A13900	13,900	.5472	60	77	2,4	124	45	14
4148356	VDS202A14000	4142985	VDS402A14000	14,000	.5512	60	77	2,4	124	45	14
4148357	VDS202A14100	4142986	VDS402A14100	14,100	.5551	63	83	2,4	133	48	16
4148358	VDS202A14200	4142987	VDS402A14200	14,200	.5591	63	83	2,5	133	48	16
4148359	VDS202A14288	4142988	VDS402A14288	14,288	.5625	63	83	2,5	133	48	16
4148360	VDS202A14300	4142989	VDS402A14300	14,300	.5630	63	83	2,5	133	48	16
4148361	VDS202A14400	4142990	VDS402A14400	14,400	.5669	63	83	2,5	133	48	16
4148362	VDS202A14500	4142991	VDS402A14500	14,500	.5709	63	83	2,5	133	48	16
4148363	VDS202A14600	4142992	VDS402A14600	14,600	.5748	63	83	2,5	133	48	16
4148364	VDS202A14684	4143013	VDS402A14684	14,684	.5781	63	83	2,5	133	48	16
4148365	VDS202A14700	4143014	VDS402A14700	14,700	.5787	63	83	2,5	133	48	16
4148366	VDS202A14800	4143015	VDS402A14800	14,800	.5827	63	83	2,6	133	48	16
4148367	VDS202A14900	4143016	VDS402A14900	14,900	.5866	63	83	2,6	133	48	16
4148368	VDS202A15000	4143017	VDS402A15000	15,000	.5906	63	83	2,6	133	48	16
4148369	VDS202A15083	4143018	VDS402A15083	15,083	.5938	63	83	2,6	133	48	16
4148370	VDS202A15100	4143019	VDS402A15100	15,100	.5945	63	83	2,6	133	48	16
4148371	VDS202A15200	4143020	VDS402A15200	15,200	.5984	63	83	2,6	133	48	16
4148372	VDS202A15300	4143021	VDS402A15300	15,300	.6024	63	83	2,6	133	48	16
4148373	VDS202A15400	4143022	VDS402A15400	15,400	.6063	63	83	2,7	133	48	16
4148374	VDS202A15479	4143033	VDS402A15479	15,479	.6094	63	83	2,7	133	48	16
4148375	VDS202A15500	4143034	VDS402A15500	15,500	.6102	63	83	2,7	133	48	16
4148376	VDS202A15600	4143035	VDS402A15600	15,600	.6142	63	83	2,7	133	48	16
4148377	VDS202A15700	4143036	VDS402A15700	15,700	.6181	63	83	2,7	133	48	16
4148378	VDS202A15800	4143037	VDS402A15800	15,800	.6220	63	83	2,7	133	48	16
4148379	VDS202A15875	4143038	VDS402A15875	15,875	.6250	63	83	2,7	133	48	16
4148380	VDS202A15900	4143039	VDS402A15900	15,900	.6260	63	83	2,8	133	48	16
4148381	VDS202A16000	4143040	VDS402A16000	16,000	.6299	63	83	2,8	133	48	16
4148382	VDS202A16100	4143041	VDS402A16100	16,100	.6339	71	93	2,8	143	48	18
4148383	VDS202A16200	4143042	VDS402A16200	16,200	.6378	71	93	2,8	143	48	18
4148384	VDS202A16271	4143053	VDS402A16271	16,271	.6406	71	93	2,8	143	48	18
4148385	VDS202A16300	4143054	VDS402A16300	16,300	.6417	71	93	2,8	143	48	18
4148386	VDS202A16400	4143055	VDS402A16400	16,400	.6457	71	93	2,8	143	48	18
4148387	VDS202A16500	4143056	VDS402A16500	16,500	.6496	71	93	2,9	143	48	18

(continued)

(VDS202A • VDS402A • 5 x D — continued)





● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148388	VDS202A16600	4143057	VDS402A16600	16,600	.6535	71	93	2,9	143	48	18
4148389	VDS202A16670	4143058	VDS402A16670	16,670	.6563	71	93	2,9	143	48	18
4148390	VDS202A16700	4143059	VDS402A16700	16,700	.6575	71	93	2,9	143	48	18
4148391	VDS202A16800	4143060	VDS402A16800	16,800	.6614	71	93	2,9	143	48	18
4148392	VDS202A16900	4143061	VDS402A16900	16,900	.6654	71	93	2,9	143	48	18
4148393	VDS202A17000	4143062	VDS402A17000	17,000	.6693	71	93	2,9	143	48	18
4148394	VDS202A17100	4143073	VDS402A17100	17,100	.6732	71	93	3,0	143	48	18
4148395	VDS202A17200	4143074	VDS402A17200	17,200	.6772	71	93	3,0	143	48	18
4148396	VDS202A17300	4143075	VDS402A17300	17,300	.6811	71	93	3,0	143	48	18
4148397	VDS202A17400	4143076	VDS402A17400	17,400	.6850	71	93	3,0	143	48	18
4148398	VDS202A17463	4143077	VDS402A17463	17,463	.6875	71	93	3,0	143	48	18
4148399	VDS202A17500	4143078	VDS402A17500	17,500	.6890	71	93	3,0	143	48	18
4148400	VDS202A17600	4143079	VDS402A17600	17,600	.6929	71	93	3,1	143	48	18
4148401	VDS202A17700	4143080	VDS402A17700	17,700	.6969	71	93	3,1	143	48	18
4148402	VDS202A17800	4143081	VDS402A17800	17,800	.7008	71	93	3,1	143	48	18
4148403	VDS202A17859	4143082	VDS402A17859	17,859	.7031	71	93	3,1	143	48	18
4148404	VDS202A17900	4143093	VDS402A17900	17,900	.7047	71	93	3,1	143	48	18
4147921	VDS202A18000	4142803	VDS402A18000	18,000	.7087	71	93	3,1	143	48	18
4147922	VDS202A18100	4142804	VDS402A18100	18,100	.7126	77	101	3,1	153	50	20
4148303	VDS202A18200	4142805	VDS402A18200	18,200	.7165	77	101	3,2	153	50	20
4148304	VDS202A18258	4142806	VDS402A18258	18,258	.7188	77	101	3,2	153	50	20
4148305	VDS202A18300	4142807	VDS402A18300	18,300	.7205	77	101	3,2	153	50	20
4148306	VDS202A18400	4142808	VDS402A18400	18,400	.7244	77	101	3,2	153	50	20
4148307	VDS202A18500	4142809	VDS402A18500	18,500	.7283	77	101	3,2	153	50	20
4148308	VDS202A18600	4142810	VDS402A18600	18,600	.7323	77	101	3,2	153	50	20
4148309	VDS202A18654	4142811	VDS402A18654	18,654	.7344	77	101	3,2	153	50	20
4148310	VDS202A18700	4142812	VDS402A18700	18,700	.7362	77	101	3,2	153	50	20
4148311	VDS202A18800	4142824	VDS402A18800	18,800	.7402	77	101	3,3	153	50	20
4148312	VDS202A18900	4142826	VDS402A18900	18,900	.7441	77	101	3,3	153	50	20
4148323	VDS202A19000	4142828	VDS402A19000	19,000	.7480	77	101	3,3	153	50	20
4148324	VDS202A19050	4142830	VDS402A19050	19,050	.7500	77	101	3,3	153	50	20
4148325	VDS202A19100	4142833	VDS402A19100	19,100	.7520	77	101	3,3	153	50	20
4148326	VDS202A19200	4142835	VDS402A19200	19,200	.7559	77	101	3,3	153	50	20
4148327	VDS202A19300	4142837	VDS402A19300	19,300	.7598	77	101	3,4	153	50	20
4148328	VDS202A19400	4142839	VDS402A19400	19,400	.7638	77	101	3,4	153	50	20
4148329	VDS202A19500	4142841	VDS402A19500	19,500	.7677	77	101	3,4	153	50	20
4148330	VDS202A19600	4142853	VDS402A19600	19,600	.7717	77	101	3,4	153	50	20
4148331	VDS202A19700	4142854	VDS402A19700	19,700	.7756	77	101	3,4	153	50	20
4148332	VDS202A19800	4142856	VDS402A19800	19,800	.7795	77	101	3,4	153	50	20
4148333	VDS202A19900	4142859	VDS402A19900	19,900	.7835	77	101	3,5	153	50	20
4148334	VDS202A20000	4142860	VDS402A20000	20,000	.7874	77	101	3,5	153	50	20

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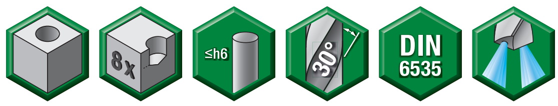

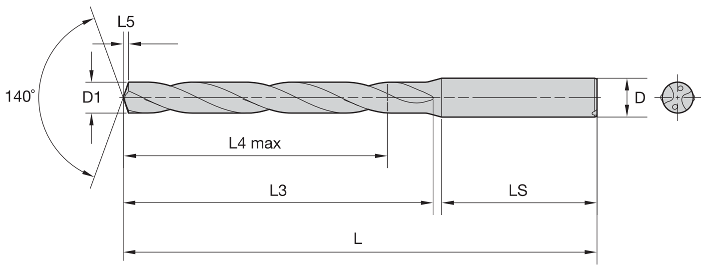

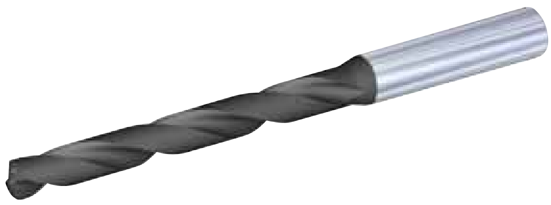

For information on L, L3, and L4 max, see page T143.

■ VDS403A • 8 x D

P	●
M	●
K	●
N	●
S	●
H	

grade WU25PD
TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
6023126	VDS403A01000	1,000	.0394	10	12	0,1	58	28	4
6023127	VDS403A01016	1,016	.0400	10	12	0,1	58	28	4
6023128	VDS403A01067	1,067	.0420	10	12	0,2	58	28	4
6023129	VDS403A01100	1,100	.0433	10	12	0,2	58	28	4
6023130	VDS403A01181	1,181	.0465	10	12	0,2	58	28	4
6023131	VDS403A01191	1,191	.0469	10	12	0,2	58	28	4
6023132	VDS403A01200	1,200	.0472	10	12	0,2	58	28	4
6023133	VDS403A01300	1,300	.0512	10	12	0,2	58	28	4
6023134	VDS403A01321	1,321	.0520	10	12	0,2	58	28	4
6023135	VDS403A01397	1,397	.0550	10	12	0,2	58	28	4
6023136	VDS403A01400	1,400	.0551	10	12	0,2	58	28	4
4143700	VDS403A01500	1,500	.0591	15	18	0,2	58	28	4
4143701	VDS403A01600	1,600	.0630	15	18	0,2	58	28	4
4143702	VDS403A01700	1,700	.0669	15	18	0,3	58	28	4
4143723	VDS403A01800	1,800	.0709	15	18	0,3	58	28	4
4143724	VDS403A01900	1,900	.0748	15	18	0,3	58	28	4
4143725	VDS403A01984	1,984	.0781	22	26	0,3	66	28	4
4143726	VDS403A02000	2,000	.0787	22	26	0,3	66	28	4
4143727	VDS403A02100	2,100	.0827	22	26	0,3	66	28	4
4143728	VDS403A02200	2,200	.0866	22	26	0,3	66	28	4
4143729	VDS403A02300	2,300	.0906	22	26	0,4	66	28	4
4143730	VDS403A02383	2,383	.0938	25	30	0,4	66	28	4
4143731	VDS403A02400	2,400	.0945	25	30	0,4	66	28	4
4143732	VDS403A02439	2,439	.0960	25	30	0,4	66	28	4
4143733	VDS403A02489	2,489	.0980	25	30	0,4	66	28	4
4143734	VDS403A02500	2,500	.0984	25	30	0,4	66	28	4
4143735	VDS403A02578	2,578	.1015	25	30	0,4	66	28	4
4143736	VDS403A02600	2,600	.1024	25	30	0,4	66	28	4

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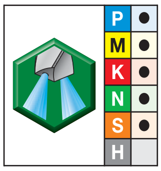
(VDS403A • 8 x D — continued)



grade WU25PD
TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4143737	VDS403A02642	2,642	.1040	25	30	0,4	66	28	4
4143738	VDS403A02700	2,700	.1063	25	30	0,4	66	28	4
4143739	VDS403A02705	2,705	.1065	25	30	0,4	66	28	4
4143740	VDS403A02779	2,779	.1094	25	30	0,4	66	28	4
4143741	VDS403A02800	2,800	.1102	25	30	0,5	66	28	4
4143742	VDS403A02820	2,820	.1110	25	30	0,5	66	28	4
4143743	VDS403A02870	2,870	.1130	25	30	0,5	66	28	4
4143744	VDS403A02900	2,900	.1142	25	30	0,5	66	28	4
4143745	VDS403A02947	2,947	.1160	25	30	0,5	66	28	4
4143746	VDS403A03000	3,000	.1181	33	40	0,5	78	36	6
4143747	VDS403A03048	3,048	.1200	33	40	0,5	78	36	6
4143748	VDS403A03100	3,100	.1220	33	40	0,5	78	36	6
4143749	VDS403A03175	3,175	.1250	33	40	0,5	78	36	6
4143750	VDS403A03200	3,200	.1260	33	40	0,5	78	36	6
4143751	VDS403A03264	3,264	.1285	33	40	0,5	78	36	6
4143752	VDS403A03300	3,300	.1299	33	40	0,5	78	36	6
4143753	VDS403A03400	3,400	.1339	33	40	0,6	78	36	6
4143754	VDS403A03455	3,455	.1360	33	49	0,6	78	36	6
4143755	VDS403A03500	3,500	.1378	33	49	0,6	78	36	6
4143756	VDS403A03571	3,571	.1406	33	49	0,6	78	36	6
4143757	VDS403A03600	3,600	.1417	33	40	0,6	78	36	6
4143758	VDS403A03658	3,658	.1440	33	49	0,6	78	36	6
4143759	VDS403A03700	3,700	.1457	33	40	0,6	78	36	6
4143760	VDS403A03734	3,734	.1470	33	40	0,6	78	36	6
4143761	VDS403A03800	3,800	.1496	41	49	0,6	87	36	6
4143762	VDS403A03900	3,900	.1535	41	40	0,6	87	36	6
4143763	VDS403A03970	3,970	.1563	41	49	0,7	87	36	6
4143764	VDS403A04000	4,000	.1575	41	40	0,7	87	36	6
4143765	VDS403A04039	4,039	.1590	41	40	0,7	87	36	6
4143766	VDS403A04090	4,090	.1610	41	40	0,7	87	36	6
4143767	VDS403A04100	4,100	.1614	41	49	0,7	87	36	6
4143768	VDS403A04200	4,200	.1654	41	49	0,7	87	36	6
4143769	VDS403A04217	4,217	.1660	41	49	0,7	87	36	6
4143770	VDS403A04300	4,300	.1693	41	49	0,7	87	36	6
4143771	VDS403A04366	4,366	.1719	41	49	0,7	87	36	6
4143772	VDS403A04400	4,400	.1732	41	49	0,7	87	36	6
4143773	VDS403A04500	4,500	.1772	41	49	0,7	87	36	6
4143774	VDS403A04600	4,600	.1811	41	49	0,8	87	36	6
4143775	VDS403A04623	4,623	.1820	41	49	0,8	87	36	6
4143776	VDS403A04700	4,700	.1850	41	56	0,8	87	36	6

(continued)

Solid Carbide Drills

(VDS403A • 8 x D — continued)

P ● M ● K ● N ● S ● H

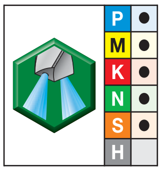
● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4143777	**VDS403A04763**	4,763	.1875	48	49	0,8	94	36	6
4143778	**VDS403A04800**	4,800	.1890	48	56	0,8	94	36	6
4143779	**VDS403A04852**	4,852	.1910	48	56	0,8	94	36	6
4143780	**VDS403A04900**	4,900	.1929	48	56	0,8	94	36	6
4143781	**VDS403A05000**	5,000	.1969	48	56	0,8	94	36	6
4143782	**VDS403A05100**	5,100	.2008	48	56	0,8	94	36	6
4143783	**VDS403A05106**	5,106	.2010	48	56	0,8	94	36	6
4143784	**VDS403A05159**	5,159	.2031	48	56	0,9	94	36	6
4143785	**VDS403A05200**	5,200	.2047	48	56	0,9	94	36	6
4143786	**VDS403A05300**	5,300	.2087	48	56	0,9	94	36	6
4143787	**VDS403A05400**	5,400	.2126	48	56	0,9	94	36	6
4143788	**VDS403A05410**	5,410	.2130	48	56	0,9	94	36	6
4143789	**VDS403A05500**	5,500	.2165	48	56	0,9	94	36	6
4143790	**VDS403A05558**	5,558	.2188	48	56	0,9	94	36	6
4143791	**VDS403A05600**	5,600	.2205	48	56	0,9	94	36	6
4143792	**VDS403A05616**	5,616	.2211	48	56	0,9	94	36	6
4143793	**VDS403A05700**	5,700	.2244	48	56	1,0	94	36	6
4143794	**VDS403A05800**	5,800	.2283	48	67	1,0	94	36	6
4143795	**VDS403A05900**	5,900	.2323	48	67	1,0	94	36	6
4143796	**VDS403A05954**	5,954	.2344	48	56	1,0	94	36	6
4143797	**VDS403A06000**	6,000	.2362	48	67	1,0	94	36	6
4143798	**VDS403A06100**	6,100	.2402	57	67	1,0	105	36	8
4143799	**VDS403A06200**	6,200	.2441	57	67	1,0	105	36	8
4143800	**VDS403A06300**	6,300	.2480	57	56	1,1	105	36	8
4143801	**VDS403A06350**	6,350	.2500	57	67	1,1	105	36	8
4143802	**VDS403A06400**	6,400	.2520	57	67	1,1	105	36	8
4143803	**VDS403A06500**	6,500	.2559	57	67	1,1	105	36	8
4143804	**VDS403A06528**	6,528	.2570	57	67	1,1	105	36	8
4143805	**VDS403A06600**	6,600	.2598	57	67	1,1	105	36	8
4143806	**VDS403A06630**	6,630	.2610	57	56	1,1	105	36	8
4143807	**VDS403A06700**	6,700	.2638	57	67	1,1	105	36	8
4143808	**VDS403A06746**	6,746	.2656	57	56	1,1	105	36	8
4143809	**VDS403A06800**	6,800	.2677	57	67	1,1	105	36	8
4143810	**VDS403A06900**	6,900	.2717	57	67	1,2	105	36	8
4143811	**VDS403A07000**	7,000	.2756	57	72	1,2	105	36	8
4143812	**VDS403A07100**	7,100	.2795	61	72	1,2	110	36	8
4143813	**VDS403A07145**	7,145	.2813	61	67	1,2	110	36	8
4143814	**VDS403A07200**	7,200	.2835	61	72	1,2	110	36	8
4143815	**VDS403A07300**	7,300	.2874	61	72	1,2	110	36	8
4143816	**VDS403A07400**	7,400	.2913	61	72	1,3	110	36	8

(continued)

(VDS403A • 8 x D — continued)



● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4143817	VDS403A07500	7,500	.2953	61	72	1,3	110	36	8
4143818	VDS403A07541	7,541	.2969	61	72	1,3	110	36	8
4143819	VDS403A07600	7,600	.2992	61	80	1,3	110	36	8
4143820	VDS403A07700	7,700	.3031	61	80	1,3	110	36	8
4143821	VDS403A07800	7,800	.3071	61	80	1,3	110	36	8
4143822	VDS403A07900	7,900	.3110	61	80	1,3	110	36	8
4143823	VDS403A07938	7,938	.3125	61	80	1,3	110	36	8
4143824	VDS403A08000	8,000	.3150	61	80	1,4	110	36	8
4143825	VDS403A08100	8,100	.3189	68	80	1,4	122	40	10
4143826	VDS403A08200	8,200	.3228	68	80	1,4	122	40	10
4143827	VDS403A08300	8,300	.3268	68	80	1,4	122	40	10
4143828	VDS403A08334	8,334	.3281	68	80	1,4	122	40	10
4143829	VDS403A08400	8,400	.3307	68	72	1,4	122	40	10
4143830	VDS403A08433	8,433	.3320	68	80	1,4	122	40	10
4143831	VDS403A08500	8,500	.3346	68	80	1,4	122	40	10
4143832	VDS403A08600	8,600	.3386	68	80	1,5	122	40	10
4143833	VDS403A08700	8,700	.3425	68	72	1,5	122	40	10
4143834	VDS403A08733	8,733	.3438	68	72	1,5	122	40	10
4143835	VDS403A08800	8,800	.3465	68	72	1,5	122	40	10
4143836	VDS403A08900	8,900	.3504	68	72	1,5	122	40	10
4143837	VDS403A09000	9,000	.3543	68	72	1,5	122	40	10
4143838	VDS403A09100	9,100	.3583	68	80	1,5	122	40	10
4143839	VDS403A09129	9,129	.3594	68	80	1,6	122	40	10
4143840	VDS403A09200	9,200	.3622	68	80	1,6	122	40	10
4143841	VDS403A09300	9,300	.3661	68	80	1,6	122	40	10
4143842	VDS403A09347	9,347	.3680	68	80	1,6	122	40	10
4143843	VDS403A09400	9,400	.3701	68	80	1,6	122	40	10
4143844	VDS403A09500	9,500	.3740	68	80	1,6	122	40	10
4143845	VDS403A09525	9,525	.3750	68	80	1,6	122	40	10
4143846	VDS403A09600	9,600	.3780	68	80	1,6	122	40	10
4143847	VDS403A09700	9,700	.3819	68	80	1,7	122	40	10
4143848	VDS403A09800	9,800	.3858	68	80	1,7	122	40	10
4143849	VDS403A09900	9,900	.3898	68	80	1,7	122	40	10
4143850	VDS403A09921	9,921	.3906	68	80	1,7	122	40	10
4143421	VDS403A10000	10,000	.3937	68	80	1,7	122	40	10
4143422	VDS403A10100	10,100	.3976	79	94	1,7	141	45	12
4143473	VDS403A10200	10,200	.4016	79	94	1,7	141	45	12
4143474	VDS403A10300	10,300	.4055	79	94	1,8	141	45	12
4143475	VDS403A10320	10,320	.4063	79	94	1,8	141	45	12
4143476	VDS403A10400	10,400	.4094	79	94	1,8	141	45	12

(continued)

Solid Carbide Drills

(VDS403A • 8 x D — continued)

P	●
M	●
K	●
N	●
S	●
H	

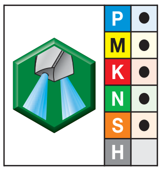
grade WU25PD
TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4143477	VDS403A10500	10,500	.4134	79	94	1,8	141	45	12
4143478	VDS403A10600	10,600	.4173	79	94	1,8	141	45	12
4143479	VDS403A10700	10,700	.4213	79	94	1,8	141	45	12
4143480	VDS403A10716	10,716	.4219	79	94	1,8	141	45	12
4143481	VDS403A10800	10,800	.4252	79	94	1,8	141	45	12
4143482	VDS403A10900	10,900	.4291	79	94	1,9	141	45	12
4143483	VDS403A11000	11,000	.4331	79	94	1,9	141	45	12
4143484	VDS403A11100	11,100	.4370	79	94	1,9	141	45	12
4143485	VDS403A11113	11,113	.4375	79	94	1,9	141	45	12
4143486	VDS403A11200	11,200	.4409	79	94	1,9	141	45	12
4143487	VDS403A11300	11,300	.4449	79	94	1,9	141	45	12
4143488	VDS403A11400	11,400	.4488	79	94	2,0	141	45	12
4143489	VDS403A11500	11,500	.4528	79	94	2,0	141	45	12
4143490	VDS403A11509	11,509	.4531	79	94	2,0	141	45	12
4143491	VDS403A11600	11,600	.4567	79	94	2,0	141	45	12
4143492	VDS403A11700	11,700	.4606	79	94	2,0	141	45	12
4143493	VDS403A11800	11,800	.4646	79	94	2,0	141	45	12
4143494	VDS403A11900	11,900	.4685	79	94	2,0	141	45	12
4143495	VDS403A11908	11,908	.4688	79	94	2,0	141	45	12
4143496	VDS403A12000	12,000	.4724	79	94	2,1	141	45	12
4143497	VDS403A12100	12,100	.4764	91	108	2,1	155	45	14
4143498	VDS403A12200	12,200	.4803	91	108	2,1	155	45	14
4143499	VDS403A12300	12,300	.4843	91	108	2,1	155	45	14
4143500	VDS403A12304	12,304	.4844	91	108	2,1	155	45	14
4143501	VDS403A12400	12,400	.4882	91	108	2,1	155	45	14
4143502	VDS403A12500	12,500	.4921	91	108	2,1	155	45	14
4143503	VDS403A12600	12,600	.4961	91	108	2,2	155	45	14
4143504	VDS403A12700	12,700	.5000	91	108	2,2	155	45	14
4143505	VDS403A12800	12,800	.5039	91	108	2,2	155	45	14
4143506	VDS403A12900	12,900	.5079	91	108	2,2	155	45	14
4143507	VDS403A13000	13,000	.5118	91	108	2,2	155	45	14
4143508	VDS403A13096	13,096	.5156	91	108	2,3	155	45	14
4143509	VDS403A13100	13,100	.5157	91	108	2,3	155	45	14
4143510	VDS403A13200	13,200	.5197	91	108	2,3	155	45	14
4143511	VDS403A13300	13,300	.5236	91	108	2,3	155	45	14
4143512	VDS403A13400	13,400	.5276	91	108	2,3	155	45	14
4143513	VDS403A13500	13,500	.5315	91	108	2,3	155	45	14
4143514	VDS403A13600	13,600	.5354	91	108	2,3	155	45	14
4143515	VDS403A13700	13,700	.5394	91	108	2,4	155	45	14
4143516	VDS403A13800	13,800	.5433	91	108	2,4	155	45	14

(continued)

(VDS403A • 8 x D — continued)

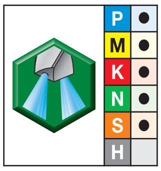


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4143517	VDS403A13891	13,891	.5469	91	108	2,4	155	45	14
4143518	VDS403A13900	13,900	.5472	91	108	2,4	155	45	14
4143519	VDS403A14000	14,000	.5512	91	108	2,4	155	45	14
4143520	VDS403A14100	14,100	.5551	101	121	2,4	171	48	16
4143521	VDS403A14200	14,200	.5591	101	121	2,5	171	48	16
4143522	VDS403A14288	14,288	.5625	101	121	2,5	171	48	16
4143523	VDS403A14300	14,300	.5630	101	121	2,5	171	48	16
4143524	VDS403A14400	14,400	.5669	101	121	2,5	171	48	16
4143525	VDS403A14500	14,500	.5709	101	121	2,5	171	48	16
4143526	VDS403A14600	14,600	.5748	101	121	2,5	171	48	16
4143527	VDS403A14684	14,684	.5781	101	121	2,5	171	48	16
4143528	VDS403A14700	14,700	.5787	101	121	2,5	171	48	16
4143529	VDS403A14800	14,800	.5827	101	121	2,6	171	48	16
4143530	VDS403A14900	14,900	.5866	101	121	2,6	171	48	16
4143531	VDS403A15000	15,000	.5906	101	121	2,6	171	48	16
4143532	VDS403A15083	15,083	.5938	101	121	2,6	171	48	16
4143533	VDS403A15100	15,100	.5945	101	121	2,6	171	48	16
4143534	VDS403A15200	15,200	.5984	101	121	2,6	171	48	16
4143535	VDS403A15300	15,300	.6024	101	121	2,6	171	48	16
4143536	VDS403A15400	15,400	.6063	101	121	2,7	171	48	16
4143537	VDS403A15479	15,479	.6094	101	121	2,7	171	48	16
4143538	VDS403A15500	15,500	.6102	101	121	2,7	171	48	16
4143539	VDS403A15600	15,600	.6142	101	121	2,7	171	48	16
4143540	VDS403A15700	15,700	.6181	101	121	2,7	171	48	16
4143541	VDS403A15800	15,800	.6220	101	121	2,7	171	48	16
4143542	VDS403A15875	15,875	.6250	101	121	2,7	171	48	16
4143543	VDS403A15900	15,900	.6260	101	121	2,8	171	48	16
4143544	VDS403A16000	16,000	.6299	101	121	2,8	171	48	16
4143545	VDS403A16100	16,100	.6339	113	135	2,8	185	48	18
4143546	VDS403A16200	16,200	.6378	113	135	2,8	185	48	18
4143547	VDS403A16271	16,271	.6406	113	135	2,8	185	48	18
4143548	VDS403A16300	16,300	.6417	113	135	2,8	185	48	18
4143549	VDS403A16400	16,400	.6457	113	135	2,8	185	48	18
4143550	VDS403A16500	16,500	.6496	113	135	2,9	185	48	18
4143551	VDS403A16600	16,600	.6535	113	135	2,9	185	48	18
4143552	VDS403A16670	16,670	.6563	113	135	2,9	185	48	18
4143553	VDS403A16700	16,700	.6575	113	135	2,9	185	48	18
4143554	VDS403A16800	16,800	.6614	113	135	2,9	185	48	18
4143555	VDS403A16900	16,900	.6654	113	135	2,9	185	48	18
4143556	VDS403A17000	17,000	.6693	113	135	2,9	185	48	18

(continued)

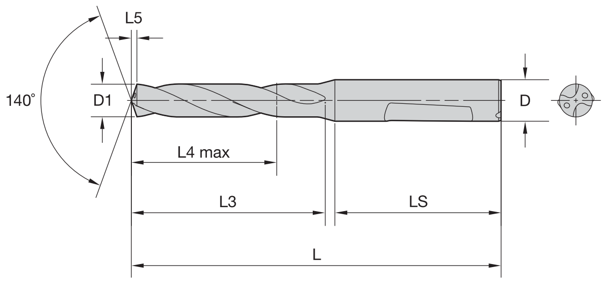
(VDS403A • 8 x D — continued)

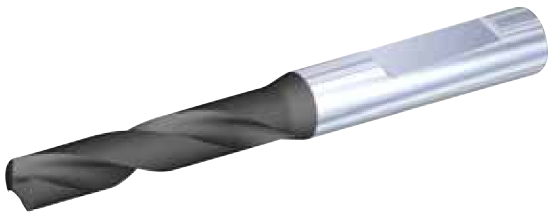


● first choice
○ alternate choice

grade WU25PD
TiAlN

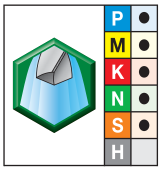
order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4143557	VDS403A17100	17,100	.6732	113	135	3,0	185	48	18
4143558	VDS403A17200	17,200	.6772	113	135	3,0	185	48	18
4143559	VDS403A17300	17,300	.6811	113	135	3,0	185	48	18
4143560	VDS403A17400	17,400	.6850	113	135	3,0	185	48	18
4143561	VDS403A17463	17,463	.6875	113	135	3,0	185	48	18
4143562	VDS403A17500	17,500	.6890	113	135	3,0	185	48	18
4143563	VDS403A17600	17,600	.6929	113	135	3,1	185	48	18
4143564	VDS403A17700	17,700	.6969	113	135	3,1	185	48	18
4143565	VDS403A17800	17,800	.7008	113	135	3,1	185	48	18
4143566	VDS403A17859	17,859	.7031	113	135	3,1	185	48	18
4143567	VDS403A17900	17,900	.7047	113	135	3,1	185	48	18
4144209	VDS403A18000	18,000	.7087	113	135	3,1	185	48	18
4144211	VDS403A18100	18,100	.7126	124	148	3,1	200	50	20
4144212	VDS403A18200	18,200	.7165	124	148	3,2	200	50	20
4144244	VDS403A18258	18,258	.7188	124	148	3,2	200	50	20
4144246	VDS403A18300	18,300	.7205	124	148	3,2	200	50	20
4144248	VDS403A18400	18,400	.7244	124	148	3,2	200	50	20
4144250	VDS403A18500	18,500	.7283	124	148	3,2	200	50	20
4144252	VDS403A18600	18,600	.7323	124	148	3,2	200	50	20
4144254	VDS403A18654	18,654	.7344	124	148	3,2	200	50	20
4144256	VDS403A18700	18,700	.7362	124	148	3,2	200	50	20
4144258	VDS403A18800	18,800	.7402	124	148	3,3	200	50	20
4144260	VDS403A18900	18,900	.7441	124	148	3,3	200	50	20
4144262	VDS403A19000	19,000	.7480	124	148	3,3	200	50	20
4144275	VDS403A19050	19,050	.7500	124	148	3,3	200	50	20
4144277	VDS403A19100	19,100	.7520	124	148	3,3	200	50	20
4144279	VDS403A19200	19,200	.7559	124	148	3,3	200	50	20
4144281	VDS403A19300	19,300	.7598	124	148	3,4	200	50	20
4144283	VDS403A19400	19,400	.7638	124	148	3,4	200	50	20
4144285	VDS403A19500	19,500	.7677	124	148	3,4	200	50	20
4144287	VDS403A19600	19,600	.7717	124	148	3,4	200	50	20
4144289	VDS403A19700	19,700	.7756	124	148	3,4	200	50	20
4144291	VDS403A19800	19,800	.7795	124	148	3,4	200	50	20
4144303	VDS403A19900	19,900	.7835	124	148	3,5	200	50	20
4144305	VDS403A20000	20,000	.7874	124	148	3,5	200	50	20

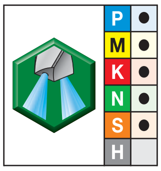




For information on L, L3, and L4 max, see page T143.

VDS201F • VDS401F • 3 x D





● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4147927	VDS201F03000	4140012	VDS401F03000	3,000	.1181	14	20	0,5	62	36	6
4147928	VDS201F03100	4140023	VDS401F03100	3,100	.1220	14	20	0,5	62	36	6
4147929	VDS201F03200	4140024	VDS401F03200	3,200	.1260	14	20	0,5	62	36	6
4147930	VDS201F03300	4140025	VDS401F03300	3,300	.1299	14	20	0,5	62	36	6
4147931	VDS201F03400	4140026	VDS401F03400	3,400	.1339	14	20	0,6	62	36	6
4147932	VDS201F03500	4140027	VDS401F03500	3,500	.1378	14	20	0,6	62	36	6
4147933	VDS201F03600	4140028	VDS401F03600	3,600	.1417	14	20	0,6	62	36	6
4147934	VDS201F03700	4140029	VDS401F03700	3,700	.1457	14	20	0,6	62	36	6
4147935	VDS201F03800	4140030	VDS401F03800	3,800	.1496	17	24	0,6	66	36	6
4147936	VDS201F03900	4140031	VDS401F03900	3,900	.1535	17	24	0,6	66	36	6
4147937	VDS201F04000	4140032	VDS401F04000	4,000	.1575	17	24	0,7	66	36	6
4147938	VDS201F04100	4140033	VDS401F04100	4,100	.1614	17	24	0,7	66	36	6
4147939	VDS201F04200	4140034	VDS401F04200	4,200	.1654	17	24	0,7	66	36	6
4147940	VDS201F04300	4140035	VDS401F04300	4,300	.1693	17	24	0,7	66	36	6
4147941	VDS201F04400	4140036	VDS401F04400	4,400	.1732	17	24	0,7	66	36	6
4147942	VDS201F04500	4140037	VDS401F04500	4,500	.1772	17	24	0,7	66	36	6
4147943	VDS201F04600	4140038	VDS401F04600	4,600	.1811	17	24	0,8	66	36	6
4147944	VDS201F04700	4140039	VDS401F04700	4,700	.1850	17	24	0,8	66	36	6
4147945	VDS201F04800	4140040	VDS401F04800	4,800	.1890	20	28	0,8	66	36	6
4147946	VDS201F04900	4140041	VDS401F04900	4,900	.1929	20	28	0,8	66	36	6
4147947	VDS201F05000	4140042	VDS401F05000	5,000	.1969	20	28	0,8	66	36	6
4147948	VDS201F05100	4140043	VDS401F05100	5,100	.2008	20	28	0,8	66	36	6
4147949	VDS201F05200	4140044	VDS401F05200	5,200	.2047	20	28	0,9	66	36	6
4147950	VDS201F05300	4140045	VDS401F05300	5,300	.2087	20	28	0,9	66	36	6

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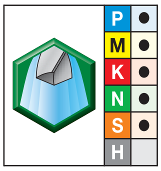
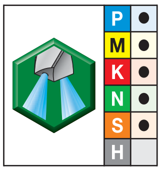
(VDS201F • VDS401F • 3 x D — continued)



grade WU25PD
TiAlN



grade WU25PD
TiAlN

● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4147951	VDS201F05400	4140046	VDS401F05400	5,400	.2126	20	28	0,9	66	36	6
4147952	VDS201F05500	4140047	VDS401F05500	5,500	.2165	20	28	0,9	66	36	6
4147953	VDS201F05600	4140048	VDS401F05600	5,600	.2205	20	28	0,9	66	36	6
4147954	VDS201F05700	4140049	VDS401F05700	5,700	.2244	20	28	1,0	66	36	6
4147955	VDS201F05800	4140050	VDS401F05800	5,800	.2283	20	28	1,0	66	36	6
4147956	VDS201F05900	4140051	VDS401F05900	5,900	.2323	20	28	1,0	66	36	6
4147957	VDS201F06000	4140052	VDS401F06000	6,000	.2362	20	28	1,0	66	36	6
4147958	VDS201F06100	4140053	VDS401F06100	6,100	.2402	24	34	1,0	79	36	8
4147959	VDS201F06200	4140054	VDS401F06200	6,200	.2441	24	34	1,0	79	36	8
4147960	VDS201F06300	4140055	VDS401F06300	6,300	.2480	24	34	1,1	79	36	8
4147961	VDS201F06400	4140056	VDS401F06400	6,400	.2520	24	34	1,1	79	36	8
4147962	VDS201F06500	4140057	VDS401F06500	6,500	.2559	24	34	1,1	79	36	8
4147963	VDS201F06600	4140058	VDS401F06600	6,600	.2598	24	34	1,1	79	36	8
4147964	VDS201F06700	4140059	VDS401F06700	6,700	.2638	24	34	1,1	79	36	8
4147965	VDS201F06800	4140060	VDS401F06800	6,800	.2677	24	34	1,1	79	36	8
4147966	VDS201F06900	4140061	VDS401F06900	6,900	.2717	24	34	1,2	79	36	8
4147967	VDS201F07000	4140062	VDS401F07000	7,000	.2756	24	34	1,2	79	36	8
4147968	VDS201F07100	4140063	VDS401F07100	7,100	.2795	29	41	1,2	79	36	8
4147969	VDS201F07200	4140064	VDS401F07200	7,200	.2835	29	41	1,2	79	36	8
4147970	VDS201F07300	4140065	VDS401F07300	7,300	.2874	29	41	1,2	79	36	8
4147971	VDS201F07400	4140066	VDS401F07400	7,400	.2913	29	41	1,3	79	36	8
4147972	VDS201F07500	4140067	VDS401F07500	7,500	.2953	29	41	1,3	79	36	8
4147973	VDS201F07600	4140068	VDS401F07600	7,600	.2992	29	41	1,3	79	36	8
4147974	VDS201F07700	4140069	VDS401F07700	7,700	.3031	29	41	1,3	79	36	8
4147975	VDS201F07800	4140070	VDS401F07800	7,800	.3071	29	41	1,3	79	36	8
4147976	VDS201F07900	4140071	VDS401F07900	7,900	.3110	29	41	1,3	79	36	8
4147977	VDS201F08000	4140072	VDS401F08000	8,000	.3150	29	41	1,4	79	36	8
4147978	VDS201F08100	4140073	VDS401F08100	8,100	.3189	35	47	1,4	89	40	10
4147979	VDS201F08200	4140074	VDS401F08200	8,200	.3228	35	47	1,4	89	40	10
4147980	VDS201F08300	4140075	VDS401F08300	8,300	.3268	35	47	1,4	89	40	10
4147981	VDS201F08400	4140076	VDS401F08400	8,400	.3307	35	47	1,4	89	40	10
4147982	VDS201F08500	4140077	VDS401F08500	8,500	.3346	35	47	1,4	89	40	10
4147983	VDS201F08600	4140078	VDS401F08600	8,600	.3386	35	47	1,5	89	40	10
4147984	VDS201F08700	4140079	VDS401F08700	8,700	.3425	35	47	1,5	89	40	10
4147985	VDS201F08800	4140080	VDS401F08800	8,800	.3465	35	47	1,5	89	40	10
4147986	VDS201F08900	4140081	VDS401F08900	8,900	.3504	35	47	1,5	89	40	10
4147987	VDS201F09000	4140082	VDS401F09000	9,000	.3543	35	47	1,5	89	40	10
4147988	VDS201F09100	4140083	VDS401F09100	9,100	.3583	35	47	1,5	89	40	10
4147989	VDS201F09200	4140084	VDS401F09200	9,200	.3622	35	47	1,6	89	40	10
4147990	VDS201F09300	4140085	VDS401F09300	9,300	.3661	35	47	1,6	89	40	10

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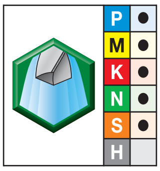
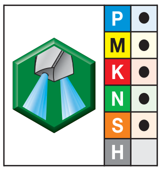
(VDS201F • VDS401F • 3 x D — continued)



grade WU25PD
TiAlN



grade WU25PD
TiAlN

● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4147991	VDS201F09400	4140086	VDS401F09400	9,400	.3701	35	47	1,6	89	40	10
4147992	VDS201F09500	4140087	VDS401F09500	9,500	.3740	35	47	1,6	89	40	10
4147993	VDS201F09600	4140088	VDS401F09600	9,600	.3780	35	47	1,6	89	40	10
4147994	VDS201F09700	4140089	VDS401F09700	9,700	.3819	35	47	1,7	89	40	10
4147995	VDS201F09800	4140090	VDS401F09800	9,800	.3858	35	47	1,7	89	40	10
4147996	VDS201F09900	4140091	VDS401F09900	9,900	.3898	35	47	1,7	89	40	10
4148039	VDS201F10000	4140410	VDS401F10000	10,000	.3937	35	47	1,7	89	40	10
4148040	VDS201F10100	4140411	VDS401F10100	10,100	.3976	40	55	1,7	102	45	12
4148041	VDS201F10200	4140412	VDS401F10200	10,200	.4016	40	55	1,7	102	45	12
4148042	VDS201F10300	4140503	VDS401F10300	10,300	.4055	40	55	1,8	102	45	12
4148043	VDS201F10400	4140504	VDS401F10400	10,400	.4094	40	55	1,8	102	45	12
4148044	VDS201F10500	4140505	VDS401F10500	10,500	.4134	40	55	1,8	102	45	12
4148045	VDS201F10600	4140506	VDS401F10600	10,600	.4173	40	55	1,8	102	45	12
4148046	VDS201F10700	4140507	VDS401F10700	10,700	.4213	40	55	1,8	102	45	12
4148047	VDS201F10800	4140508	VDS401F10800	10,800	.4252	40	55	1,8	102	45	12
4148048	VDS201F10900	4140509	VDS401F10900	10,900	.4291	40	55	1,9	102	45	12
4148049	VDS201F11000	4140510	VDS401F11000	11,000	.4331	40	55	1,9	102	45	12
4148050	VDS201F11100	4140511	VDS401F11100	11,100	.4370	40	55	1,9	102	45	12
4148051	VDS201F11200	4140512	VDS401F11200	11,200	.4409	40	55	1,9	102	45	12
4148052	VDS201F11300	4140513	VDS401F11300	11,300	.4449	40	55	1,9	102	45	12
4148053	VDS201F11400	4140514	VDS401F11400	11,400	.4488	40	55	2,0	102	45	12
4148054	VDS201F11500	4140515	VDS401F11500	11,500	.4528	40	55	2,0	102	45	12
4148055	VDS201F11600	4140516	VDS401F11600	11,600	.4567	40	55	2,0	102	45	12
4148056	VDS201F11700	4140517	VDS401F11700	11,700	.4606	40	55	2,0	102	45	12
4148057	VDS201F11800	4140518	VDS401F11800	11,800	.4646	40	55	2,0	102	45	12
4148058	VDS201F11900	4140519	VDS401F11900	11,900	.4685	40	55	2,0	102	45	12
4148059	VDS201F12000	4140520	VDS401F12000	12,000	.4724	40	55	2,1	102	45	12
4148060	VDS201F12100	4140521	VDS401F12100	12,100	.4764	43	60	2,1	107	45	14
4148061	VDS201F12200	4140522	VDS401F12200	12,200	.4803	43	60	2,1	107	45	14
4148062	VDS201F12300	4140523	VDS401F12300	12,300	.4843	43	60	2,1	107	45	14
4148063	VDS201F12400	4140524	VDS401F12400	12,400	.4882	43	60	2,1	107	45	14
4148064	VDS201F12500	4140525	VDS401F12500	12,500	.4921	43	60	2,1	107	45	14
4148065	VDS201F12600	4140526	VDS401F12600	12,600	.4961	43	60	2,2	107	45	14
4148066	VDS201F12700	4140527	VDS401F12700	12,700	.5000	43	60	2,2	107	45	14
4148067	VDS201F12800	4140528	VDS401F12800	12,800	.5039	43	60	2,2	107	45	14
4148068	VDS201F12900	4140529	VDS401F12900	12,900	.5079	43	60	2,2	107	45	14
4148069	VDS201F13000	4140530	VDS401F13000	13,000	.5118	43	60	2,2	107	45	14
4148070	VDS201F13100	4140531	VDS401F13100	13,100	.5157	43	60	2,3	107	45	14
4148071	VDS201F13200	4140532	VDS401F13200	13,200	.5197	43	60	2,3	107	45	14
4148072	VDS201F13300	4140533	VDS401F13300	13,300	.5236	43	60	2,3	107	45	14

(continued)

(VDS201F • VDS401F • 3 x D — continued)

● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148073	VDS201F13400	4140534	VDS401F13400	13,400	.5276	43	60	2,3	107	45	14
4148074	VDS201F13500	4140535	VDS401F13500	13,500	.5315	43	60	2,3	107	45	14
4148075	VDS201F13600	4140536	VDS401F13600	13,600	.5354	43	60	2,3	107	45	14
4148076	VDS201F13700	4140537	VDS401F13700	13,700	.5394	43	60	2,4	107	45	14
4148077	VDS201F13800	4140538	VDS401F13800	13,800	.5433	43	60	2,4	107	45	14
4148078	VDS201F13900	4140539	VDS401F13900	13,900	.5472	43	60	2,4	107	45	14
4148079	VDS201F14000	4140540	VDS401F14000	14,000	.5512	43	60	2,4	107	45	14
4148080	VDS201F14100	4140541	VDS401F14100	14,100	.5551	45	65	2,4	115	48	16
4148081	VDS201F14200	4140542	VDS401F14200	14,200	.5591	45	65	2,5	115	48	16
4148082	VDS201F14300	4140543	VDS401F14300	14,300	.5630	45	65	2,5	115	48	16
4148083	VDS201F14400	4140544	VDS401F14400	14,400	.5669	45	65	2,5	115	48	16
4148084	VDS201F14500	4140545	VDS401F14500	14,500	.5709	45	65	2,5	115	48	16
4148085	VDS201F14600	4140546	VDS401F14600	14,600	.5748	45	65	2,5	115	48	16
4148086	VDS201F14700	4140547	VDS401F14700	14,700	.5787	45	65	2,5	115	48	16
4148087	VDS201F14800	4140548	VDS401F14800	14,800	.5827	45	65	2,6	115	48	16
4148088	VDS201F14900	4140549	VDS401F14900	14,900	.5866	45	65	2,6	115	48	16
4148089	VDS201F15000	4140550	VDS401F15000	15,000	.5906	45	65	2,6	115	48	16
4148090	VDS201F15100	4140551	VDS401F15100	15,100	.5945	45	65	2,6	115	48	16
4148091	VDS201F15200	4140552	VDS401F15200	15,200	.5984	45	65	2,6	115	48	16
4148092	VDS201F15300	4140553	VDS401F15300	15,300	.6024	45	65	2,6	115	48	16
4148093	VDS201F15400	4140554	VDS401F15400	15,400	.6063	45	65	2,7	115	48	16
4148094	VDS201F15500	4140555	VDS401F15500	15,500	.6102	45	65	2,7	115	48	16
4148095	VDS201F15600	4140556	VDS401F15600	15,600	.6142	45	65	2,7	115	48	16
4148096	VDS201F15700	4140557	VDS401F15700	15,700	.6181	45	65	2,7	115	48	16
4148097	VDS201F15800	4140558	VDS401F15800	15,800	.6220	45	65	2,7	115	48	16
4148098	VDS201F15900	4140559	VDS401F15900	15,900	.6260	45	65	2,8	115	48	16
4148099	VDS201F16000	4140560	VDS401F16000	16,000	.6299	45	65	2,8	115	48	16
4148100	VDS201F16100	4140561	VDS401F16100	16,100	.6339	51	73	2,8	123	48	18
4148101	VDS201F16200	4140562	VDS401F16200	16,200	.6378	51	73	2,8	123	48	18
4148102	VDS201F16300	4140563	VDS401F16300	16,300	.6417	51	73	2,8	123	48	18
4148103	VDS201F16400	4140564	VDS401F16400	16,400	.6457	51	73	2,8	123	48	18
4148104	VDS201F16500	4140565	VDS401F16500	16,500	.6496	51	73	2,9	123	48	18
4148105	VDS201F16600	4140566	VDS401F16600	16,600	.6535	51	73	2,9	123	48	18
4148106	VDS201F16700	4140567	VDS401F16700	16,700	.6575	51	73	2,9	123	48	18
4148107	VDS201F16800	4140568	VDS401F16800	16,800	.6614	51	73	2,9	123	48	18
4148108	VDS201F16900	4140569	VDS401F16900	16,900	.6654	51	73	2,9	123	48	18
4148109	VDS201F17000	4140570	VDS401F17000	17,000	.6693	51	73	2,9	123	48	18
4148110	VDS201F17100	4140571	VDS401F17100	17,100	.6732	51	73	3,0	123	48	18
4148111	VDS201F17200	4140572	VDS401F17200	17,200	.6772	51	73	3,0	123	48	18
4148112	VDS201F17300	4140573	VDS401F17300	17,300	.6811	51	73	3,0	123	48	18

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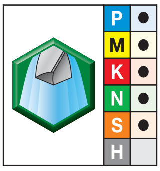
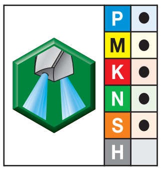
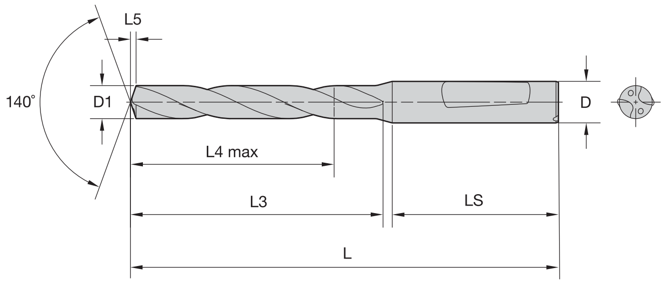
(VDS201F • VDS401F • 3 x D — continued)





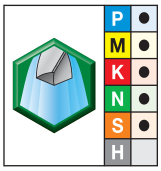
● first choice
○ alternate choice

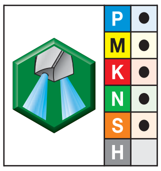
grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148113	VDS201F17400	4140574	VDS401F17400	17,400	.6850	51	73	3,0	123	48	18
4148114	VDS201F17500	4140575	VDS401F17500	17,500	.6890	51	73	3,0	123	48	18
4148115	VDS201F17600	4140576	VDS401F17600	17,600	.6929	51	73	3,1	123	48	18
4148116	VDS201F17700	4140577	VDS401F17700	17,700	.6969	51	73	3,1	123	48	18
4148117	VDS201F17800	4140578	VDS401F17800	17,800	.7008	51	73	3,1	123	48	18
4148118	VDS201F17900	4140579	VDS401F17900	17,900	.7047	51	73	3,1	123	48	18
4148119	VDS201F18000	4140580	VDS401F18000	18,000	.7087	51	73	3,1	123	48	18
4148120	VDS201F18100	4140581	VDS401F18100	18,100	.7126	55	79	3,1	131	50	20
4148121	VDS201F18200	4140582	VDS401F18200	18,200	.7165	55	79	3,2	131	50	20
4148122	VDS201F18300	4140583	VDS401F18300	18,300	.7205	55	79	3,2	131	50	20
4148123	VDS201F18400	4140584	VDS401F18400	18,400	.7244	55	79	3,2	131	50	20
4148124	VDS201F18500	4140585	VDS401F18500	18,500	.7283	55	79	3,2	131	50	20
4148125	VDS201F18600	4140586	VDS401F18600	18,600	.7323	55	79	3,2	131	50	20
4148126	VDS201F18700	4140587	VDS401F18700	18,700	.7362	55	79	3,2	131	50	20
4148127	VDS201F18800	4140588	VDS401F18800	18,800	.7402	55	79	3,3	131	50	20
4148128	VDS201F18900	4140589	VDS401F18900	18,900	.7441	55	79	3,3	131	50	20
4148129	VDS201F19000	4140590	VDS401F19000	19,000	.7480	55	79	3,3	131	50	20
4148130	VDS201F19100	4140591	VDS401F19100	19,100	.7520	55	79	3,3	131	50	20
4148131	VDS201F19200	4140592	VDS401F19200	19,200	.7559	55	79	3,3	131	50	20
4148132	VDS201F19300	4140593	VDS401F19300	19,300	.7598	55	79	3,4	131	50	20
4148133	VDS201F19400	4140594	VDS401F19400	19,400	.7638	55	79	3,4	131	50	20
4148134	VDS201F19500	4140595	VDS401F19500	19,500	.7677	55	79	3,4	131	50	20
4148135	VDS201F19600	4140596	VDS401F19600	19,600	.7717	55	79	3,4	131	50	20
4148136	VDS201F19700	4140597	VDS401F19700	19,700	.7756	55	79	3,4	131	50	20
4148137	VDS201F19800	4140598	VDS401F19800	19,800	.7795	55	79	3,4	131	50	20
4148138	VDS201F19900	4140599	VDS401F19900	19,900	.7835	55	79	3,5	131	50	20
4148139	VDS201F20000	4140600	VDS401F20000	20,000	.7874	55	79	3,5	131	50	20



For information on L, L3, and L4 max, see page T143.

VDS202F • VDS402F • 5 x D



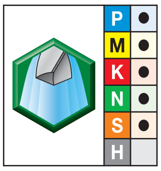


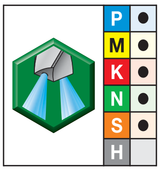
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148335	VDS202F03000	4142783	VDS402F03000	3,000	.1181	23	28	0,5	66	36	6
4148336	VDS202F03100	4142784	VDS402F03100	3,100	.1220	23	28	0,5	66	36	6
4148337	VDS202F03200	4142785	VDS402F03200	3,200	.1260	23	28	0,5	66	36	6
4148338	VDS202F03300	4142786	VDS402F03300	3,300	.1299	23	28	0,5	66	36	6
4148339	VDS202F03400	4142787	VDS402F03400	3,400	.1339	23	28	0,6	66	36	6
4148340	VDS202F03500	4142788	VDS402F03500	3,500	.1378	23	28	0,6	66	36	6
4148341	VDS202F03600	4142789	VDS402F03600	3,600	.1417	23	28	0,6	66	36	6
4148342	VDS202F03700	4142790	VDS402F03700	3,700	.1457	23	28	0,6	66	36	6
4148413	VDS202F03800	4142791	VDS402F03800	3,800	.1496	29	36	0,6	74	36	6
4148414	VDS202F03900	4142792	VDS402F03900	3,900	.1535	29	36	0,6	74	36	6
4148415	VDS202F04000	4142793	VDS402F04000	4,000	.1575	29	36	0,7	74	36	6
4148416	VDS202F04100	4142794	VDS402F04100	4,100	.1614	29	36	0,7	74	36	6
4148417	VDS202F04200	4142795	VDS402F04200	4,200	.1654	29	36	0,7	74	36	6
4148418	VDS202F04300	4142796	VDS402F04300	4,300	.1693	29	36	0,7	74	36	6
4148419	VDS202F04400	4142797	VDS402F04400	4,400	.1732	29	36	0,7	74	36	6
4148420	VDS202F04500	4142798	VDS402F04500	4,500	.1772	29	36	0,7	74	36	6
4148421	VDS202F04600	4142799	VDS402F04600	4,600	.1811	29	36	0,8	74	36	6
4148422	VDS202F04700	4142800	VDS402F04700	4,700	.1850	29	36	0,8	74	36	6
4148423	VDS202F04800	4142801	VDS402F04800	4,800	.1890	35	44	0,8	82	36	6
4148424	VDS202F04900	4142802	VDS402F04900	4,900	.1929	35	44	0,8	82	36	6
4148425	VDS202F05000	4142813	VDS402F05000	5,000	.1969	35	44	0,8	82	36	6
4148426	VDS202F05100	4142814	VDS402F05100	5,100	.2008	35	44	0,8	82	36	6
4148427	VDS202F05200	4142815	VDS402F05200	5,200	.2047	35	44	0,9	82	36	6
4148428	VDS202F05300	4142816	VDS402F05300	5,300	.2087	35	44	0,9	82	36	6

(continued)

(VDS202F • VDS402F • 5 x D — continued)





● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148429	VDS202F05400	4142817	VDS402F05400	5,400	.2126	35	44	0,9	82	36	6
4148430	VDS202F05500	4142818	VDS402F05500	5,500	.2165	35	44	0,9	82	36	6
4148431	VDS202F05600	4142819	VDS402F05600	5,600	.2205	35	44	0,9	82	36	6
4148432	VDS202F05700	4142820	VDS402F05700	5,700	.2244	35	44	1,0	82	36	6
4148433	VDS202F05800	4142821	VDS402F05800	5,800	.2283	35	44	1,0	82	36	6
4148434	VDS202F05900	4142822	VDS402F05900	5,900	.2323	35	44	1,0	82	36	6
4148435	VDS202F06000	4142843	VDS402F06000	6,000	.2362	35	44	1,0	82	36	6
4148436	VDS202F06100	4142845	VDS402F06100	6,100	.2402	43	53	1,0	91	36	8
4148437	VDS202F06200	4142848	VDS402F06200	6,200	.2441	43	53	1,0	91	36	8
4148438	VDS202F06300	4142850	VDS402F06300	6,300	.2480	43	53	1,1	91	36	8
4148439	VDS202F06400	4142852	VDS402F06400	6,400	.2520	43	53	1,1	91	36	8
4148440	VDS202F06500	4142863	VDS402F06500	6,500	.2559	43	53	1,1	91	36	8
4148441	VDS202F06600	4142866	VDS402F06600	6,600	.2598	43	53	1,1	91	36	8
4148442	VDS202F06700	4142868	VDS402F06700	6,700	.2638	43	53	1,1	91	36	8
4148443	VDS202F06800	4142870	VDS402F06800	6,800	.2677	43	53	1,1	91	36	8
4148444	VDS202F06900	4142883	VDS402F06900	6,900	.2717	43	53	1,2	91	36	8
4148445	VDS202F07000	4142886	VDS402F07000	7,000	.2756	43	53	1,2	91	36	8
4148446	VDS202F07100	4142889	VDS402F07100	7,100	.2795	43	53	1,2	91	36	8
4148447	VDS202F07200	4142892	VDS402F07200	7,200	.2835	43	53	1,2	91	36	8
4148448	VDS202F07300	4142895	VDS402F07300	7,300	.2874	43	53	1,2	91	36	8
4148449	VDS202F07400	4142898	VDS402F07400	7,400	.2913	43	53	1,3	91	36	8
4148450	VDS202F07500	4142901	VDS402F07500	7,500	.2953	43	53	1,3	91	36	8
4148451	VDS202F07600	4142904	VDS402F07600	7,600	.2992	43	53	1,3	91	36	8
4148452	VDS202F07700	4142907	VDS402F07700	7,700	.3031	43	53	1,3	91	36	8
4148453	VDS202F07800	4142910	VDS402F07800	7,800	.3071	43	53	1,3	91	36	8
4148454	VDS202F07900	4142923	VDS402F07900	7,900	.3110	43	53	1,3	91	36	8
4148455	VDS202F08000	4142926	VDS402F08000	8,000	.3150	43	53	1,4	91	36	8
4148456	VDS202F08100	4142929	VDS402F08100	8,100	.3189	49	61	1,4	103	40	10
4148457	VDS202F08200	4142932	VDS402F08200	8,200	.3228	49	61	1,4	103	40	10
4148458	VDS202F08300	4142935	VDS402F08300	8,300	.3268	49	61	1,4	103	40	10
4148459	VDS202F08400	4142938	VDS402F08400	8,400	.3307	49	61	1,4	103	40	10
4148460	VDS202F08500	4142941	VDS402F08500	8,500	.3346	49	61	1,4	103	40	10
4148461	VDS202F08600	4142944	VDS402F08600	8,600	.3386	49	61	1,5	103	40	10
4148462	VDS202F08700	4142947	VDS402F08700	8,700	.3425	49	61	1,5	103	40	10
4148463	VDS202F08800	4142950	VDS402F08800	8,800	.3465	49	61	1,5	103	40	10
4148464	VDS202F08900	4142963	VDS402F08900	8,900	.3504	49	61	1,5	103	40	10
4148465	VDS202F09000	4142966	VDS402F09000	9,000	.3543	49	61	1,5	103	40	10
4148466	VDS202F09100	4142969	VDS402F09100	9,100	.3583	49	61	1,5	103	40	10
4148467	VDS202F09200	4142972	VDS402F09200	9,200	.3622	49	61	1,6	103	40	10
4148468	VDS202F09300	4142975	VDS402F09300	9,300	.3661	49	61	1,6	103	40	10

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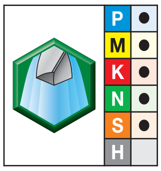
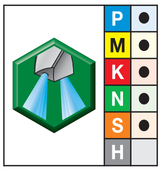
(VDS202F • VDS402F • 5 x D — continued)



grade WU25PD
TiAlN



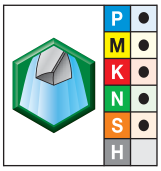
grade WU25PD
TiAlN

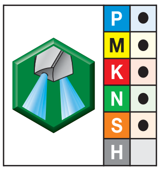
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148469	VDS202F09400	4142978	VDS402F09400	9,400	.3701	49	61	1,6	103	40	10
4148470	VDS202F09500	4142980	VDS402F09500	9,500	.3740	49	61	1,6	103	40	10
4148471	VDS202F09600	4142982	VDS402F09600	9,600	.3780	49	61	1,6	103	40	10
4148472	VDS202F09700	4142993	VDS402F09700	9,700	.3819	49	61	1,7	103	40	10
4148473	VDS202F09800	4142995	VDS402F09800	9,800	.3858	49	61	1,7	103	40	10
4148474	VDS202F09900	4142998	VDS402F09900	9,900	.3898	49	61	1,7	103	40	10
4148405	VDS202F10000	4143569	VDS402F10000	10,000	.3937	49	61	1,7	103	40	10
4148406	VDS202F10100	4143570	VDS402F10100	10,100	.3976	56	71	1,7	118	45	12
4148407	VDS202F10200	4143571	VDS402F10200	10,200	.4016	56	71	1,7	118	45	12
4148408	VDS202F10300	4143572	VDS402F10300	10,300	.4055	56	71	1,8	118	45	12
4148409	VDS202F10400	4143583	VDS402F10400	10,400	.4094	56	71	1,8	118	45	12
4148410	VDS202F10500	4143584	VDS402F10500	10,500	.4134	56	71	1,8	118	45	12
4148411	VDS202F10600	4143585	VDS402F10600	10,600	.4173	56	71	1,8	118	45	12
4148412	VDS202F10700	4143586	VDS402F10700	10,700	.4213	56	71	1,8	118	45	12
4148483	VDS202F10800	4143587	VDS402F10800	10,800	.4252	56	71	1,8	118	45	12
4148484	VDS202F10900	4143588	VDS402F10900	10,900	.4291	56	71	1,9	118	45	12
4148485	VDS202F11000	4143589	VDS402F11000	11,000	.4331	56	71	1,9	118	45	12
4148486	VDS202F11100	4143590	VDS402F11100	11,100	.4370	56	71	1,9	118	45	12
4148487	VDS202F11200	4143591	VDS402F11200	11,200	.4409	56	71	1,9	118	45	12
4148488	VDS202F11300	4143592	VDS402F11300	11,300	.4449	56	71	1,9	118	45	12
4148489	VDS202F11400	4143593	VDS402F11400	11,400	.4488	56	71	2,0	118	45	12
4148490	VDS202F11500	4143594	VDS402F11500	11,500	.4528	56	71	2,0	118	45	12
4148491	VDS202F11600	4143595	VDS402F11600	11,600	.4567	56	71	2,0	118	45	12
4148492	VDS202F11700	4143596	VDS402F11700	11,700	.4606	56	71	2,0	118	45	12
4148493	VDS202F11800	4143597	VDS402F11800	11,800	.4646	56	71	2,0	118	45	12
4148494	VDS202F11900	4143598	VDS402F11900	11,900	.4685	56	71	2,0	118	45	12
4148495	VDS202F12000	4143599	VDS402F12000	12,000	.4724	56	71	2,1	118	45	12
4148496	VDS202F12100	4143600	VDS402F12100	12,100	.4764	60	77	2,1	124	45	14
4148497	VDS202F12200	4143601	VDS402F12200	12,200	.4803	60	77	2,1	124	45	14
4148498	VDS202F12300	4143602	VDS402F12300	12,300	.4843	60	77	2,1	124	45	14
4148499	VDS202F12400	4143603	VDS402F12400	12,400	.4882	60	77	2,1	124	45	14
4148500	VDS202F12500	4143604	VDS402F12500	12,500	.4921	60	77	2,1	124	45	14
4148501	VDS202F12600	4143605	VDS402F12600	12,600	.4961	60	77	2,2	124	45	14
4148502	VDS202F12700	4143606	VDS402F12700	12,700	.5000	60	77	2,2	124	45	14
4148503	VDS202F12800	4143607	VDS402F12800	12,800	.5039	60	77	2,2	124	45	14
4148504	VDS202F12900	4143608	VDS402F12900	12,900	.5079	60	77	2,2	124	45	14
4148505	VDS202F13000	4143609	VDS402F13000	13,000	.5118	60	77	2,2	124	45	14
4148506	VDS202F13100	4143610	VDS402F13100	13,100	.5157	60	77	2,3	124	45	14
4148507	VDS202F13200	4143611	VDS402F13200	13,200	.5197	60	77	2,3	124	45	14
4148508	VDS202F13300	4143612	VDS402F13300	13,300	.5236	60	77	2,3	124	45	14

(continued)

(VDS202F • VDS402F • 5 x D — continued)



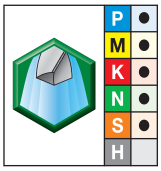


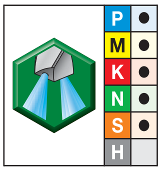
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148509	VDS202F13400	4143613	VDS402F13400	13,400	.5276	60	77	2,3	124	45	14
4148510	VDS202F13500	4143614	VDS402F13500	13,500	.5315	60	77	2,3	124	45	14
4148511	VDS202F13600	4143615	VDS402F13600	13,600	.5354	60	77	2,3	124	45	14
4148512	VDS202F13700	4143616	VDS402F13700	13,700	.5394	60	77	2,4	124	45	14
4148513	VDS202F13800	4143617	VDS402F13800	13,800	.5433	60	77	2,4	124	45	14
4148514	VDS202F13900	4143618	VDS402F13900	13,900	.5472	60	77	2,4	124	45	14
4148515	VDS202F14000	4143619	VDS402F14000	14,000	.5512	60	77	2,4	124	45	14
4148516	VDS202F14100	4143620	VDS402F14100	14,100	.5551	63	83	2,4	133	48	16
4148517	VDS202F14200	4143621	VDS402F14200	14,200	.5591	63	83	2,5	133	48	16
4148518	VDS202F14300	4143622	VDS402F14300	14,300	.5630	63	83	2,5	133	48	16
4148519	VDS202F14400	4143623	VDS402F14400	14,400	.5669	63	83	2,5	133	48	16
4148520	VDS202F14500	4143624	VDS402F14500	14,500	.5709	63	83	2,5	133	48	16
4148521	VDS202F14600	4143625	VDS402F14600	14,600	.5748	63	83	2,5	133	48	16
4148522	VDS202F14700	4143626	VDS402F14700	14,700	.5787	63	83	2,5	133	48	16
4148523	VDS202F14800	4143627	VDS402F14800	14,800	.5827	63	83	2,6	133	48	16
4148524	VDS202F14900	4143628	VDS402F14900	14,900	.5866	63	83	2,6	133	48	16
4148525	VDS202F15000	4143629	VDS402F15000	15,000	.5906	63	83	2,6	133	48	16
4148526	VDS202F15100	4143630	VDS402F15100	15,100	.5945	63	83	2,6	133	48	16
4148527	VDS202F15200	4143631	VDS402F15200	15,200	.5984	63	83	2,6	133	48	16
4148528	VDS202F15300	4143632	VDS402F15300	15,300	.6024	63	83	2,6	133	48	16
4148529	VDS202F15400	4143633	VDS402F15400	15,400	.6063	63	83	2,7	133	48	16
4148530	VDS202F15500	4143634	VDS402F15500	15,500	.6102	63	83	2,7	133	48	16
4148531	VDS202F15600	4143635	VDS402F15600	15,600	.6142	63	83	2,7	133	48	16
4148532	VDS202F15700	4143636	VDS402F15700	15,700	.6181	63	83	2,7	133	48	16
4148533	VDS202F15800	4143637	VDS402F15800	15,800	.6220	63	83	2,7	133	48	16
4148534	VDS202F15900	4143638	VDS402F15900	15,900	.6260	63	83	2,8	133	48	16
4148535	VDS202F16000	4143639	VDS402F16000	16,000	.6299	63	83	2,8	133	48	16
4148536	VDS202F16100	4143640	VDS402F16100	16,100	.6339	71	93	2,8	143	48	18
4148537	VDS202F16200	4143641	VDS402F16200	16,200	.6378	71	93	2,8	143	48	18
4148538	VDS202F16300	4143642	VDS402F16300	16,300	.6417	71	93	2,8	143	48	18
4148539	VDS202F16400	4143643	VDS402F16400	16,400	.6457	71	93	2,8	143	48	18
4148540	VDS202F16500	4143644	VDS402F16500	16,500	.6496	71	93	2,9	143	48	18
4148541	VDS202F16600	4143645	VDS402F16600	16,600	.6535	71	93	2,9	143	48	18
4148542	VDS202F16700	4143646	VDS402F16700	16,700	.6575	71	93	2,9	143	48	18
4148543	VDS202F16800	4143647	VDS402F16800	16,800	.6614	71	93	2,9	143	48	18
4148544	VDS202F16900	4143648	VDS402F16900	16,900	.6654	71	93	2,9	143	48	18
4148545	VDS202F17000	4143649	VDS402F17000	17,000	.6693	71	93	2,9	143	48	18
4148546	VDS202F17100	4143650	VDS402F17100	17,100	.6732	71	93	3,0	143	48	18
4148547	VDS202F17200	4143651	VDS402F17200	17,200	.6772	71	93	3,0	143	48	18
4148548	VDS202F17300	4143652	VDS402F17300	17,300	.6811	71	93	3,0	143	48	18

(continued)

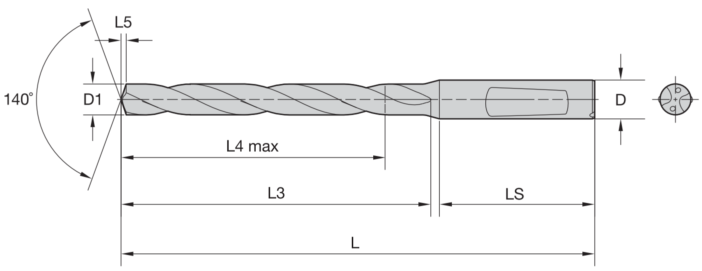
(VDS202F • VDS402F • 5 x D — continued)

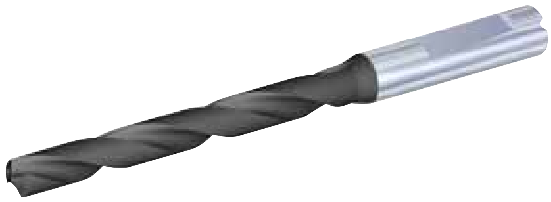




● first choice
○ alternate choice

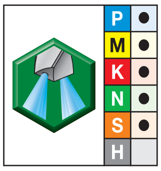
grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	**catalogue #**	**order #**	**catalogue #**	**mm**	**in**	**L4 max**	**L3**	**L5**	**L**	**LS**	**D**
4148549	**VDS202F17400**	**4143653**	**VDS402F17400**	17,400	.6850	71	93	3,0	143	48	18
4148550	**VDS202F17500**	**4143654**	**VDS402F17500**	17,500	.6890	71	93	3,0	143	48	18
4148551	**VDS202F17600**	**4143655**	**VDS402F17600**	17,600	.6929	71	93	3,1	143	48	18
4148552	**VDS202F17700**	**4143656**	**VDS402F17700**	17,700	.6969	71	93	3,1	143	48	18
4148553	**VDS202F17800**	**4143657**	**VDS402F17800**	17,800	.7008	71	93	3,1	143	48	18
4148554	**VDS202F17900**	**4143658**	**VDS402F17900**	17,900	.7047	71	93	3,1	143	48	18
4148555	**VDS202F18000**	**4143659**	**VDS402F18000**	18,000	.7087	71	93	3,1	143	48	18
4148556	**VDS202F18100**	**4143660**	**VDS402F18100**	18,100	.7126	77	101	3,1	153	50	20
4148557	**VDS202F18200**	**4143661**	**VDS402F18200**	18,200	.7165	77	101	3,2	153	50	20
4148558	**VDS202F18300**	**4143662**	**VDS402F18300**	18,300	.7205	77	101	3,2	153	50	20
4148559	**VDS202F18400**	**4143663**	**VDS402F18400**	18,400	.7244	77	101	3,2	153	50	20
4148560	**VDS202F18500**	**4143664**	**VDS402F18500**	18,500	.7283	77	101	3,2	153	50	20
4148561	**VDS202F18600**	**4143665**	**VDS402F18600**	18,600	.7323	77	101	3,2	153	50	20
4148562	**VDS202F18700**	**4143666**	**VDS402F18700**	18,700	.7362	77	101	3,2	153	50	20
4148563	**VDS202F18800**	**4143667**	**VDS402F18800**	18,800	.7402	77	101	3,3	153	50	20
4148564	**VDS202F18900**	**4143668**	**VDS402F18900**	18,900	.7441	77	101	3,3	153	50	20
4148565	**VDS202F19000**	**4143669**	**VDS402F19000**	19,000	.7480	77	101	3,3	153	50	20
4148566	**VDS202F19100**	**4143670**	**VDS402F19100**	19,100	.7520	77	101	3,3	153	50	20
4148567	**VDS202F19200**	**4143671**	**VDS402F19200**	19,200	.7559	77	101	3,3	153	50	20
4148568	**VDS202F19300**	**4143672**	**VDS402F19300**	19,300	.7598	77	101	3,4	153	50	20
4148569	**VDS202F19400**	**4143673**	**VDS402F19400**	19,400	.7638	77	101	3,4	153	50	20
4148570	**VDS202F19500**	**4143674**	**VDS402F19500**	19,500	.7677	77	101	3,4	153	50	20
4148571	**VDS202F19600**	**4143675**	**VDS402F19600**	19,600	.7717	77	101	3,4	153	50	20
4148572	**VDS202F19700**	**4143676**	**VDS402F19700**	19,700	.7756	77	101	3,4	153	50	20
4148573	**VDS202F19800**	**4143677**	**VDS402F19800**	19,800	.7795	77	101	3,4	153	50	20
4148574	**VDS202F19900**	**4143678**	**VDS402F19900**	19,900	.7835	77	101	3,5	153	50	20
4148575	**VDS202F20000**	**4143679**	**VDS402F20000**	20,000	.7874	77	101	3,5	153	50	20





For information on L, L3, and L4 max, see page T143.

VDS403F • 8 x D

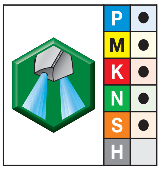


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144208	VDS403F03000	3,000	.1181	33	40	0,5	78	36	6
4144210	VDS403F03100	3,100	.1220	33	40	0,5	78	36	6
4144243	VDS403F03200	3,200	.1260	33	40	0,5	78	36	6
4144245	VDS403F03300	3,300	.1299	33	40	0,5	78	36	6
4144247	VDS403F03400	3,400	.1339	33	40	0,6	78	36	6
4144249	VDS403F03500	3,500	.1378	33	40	0,6	78	36	6
4144251	VDS403F03600	3,600	.1417	33	40	0,6	78	36	6
4144253	VDS403F03700	3,700	.1457	33	40	0,6	78	36	6
4144255	VDS403F03800	3,800	.1496	41	49	0,6	87	36	6
4144257	VDS403F03900	3,900	.1535	41	49	0,6	87	36	6
4144259	VDS403F04000	4,000	.1575	41	49	0,7	87	36	6
4144261	VDS403F04100	4,100	.1614	41	49	0,7	87	36	6
4144273	VDS403F04200	4,200	.1654	41	49	0,7	87	36	6
4144274	VDS403F04300	4,300	.1693	41	49	0,7	87	36	6
4144276	VDS403F04400	4,400	.1732	41	49	0,7	87	36	6
4144278	VDS403F04500	4,500	.1772	41	49	0,7	87	36	6
4144280	VDS403F04600	4,600	.1811	41	49	0,8	87	36	6
4144282	VDS403F04700	4,700	.1850	41	49	0,8	87	36	6
4144284	VDS403F04800	4,800	.1890	48	56	0,8	94	36	6
4144286	VDS403F04900	4,900	.1929	48	56	0,8	94	36	6
4144288	VDS403F05000	5,000	.1969	48	56	0,8	94	36	6
4144290	VDS403F05100	5,100	.2008	48	56	0,8	94	36	6
4144292	VDS403F05200	5,200	.2047	48	56	0,9	94	36	6
4144304	VDS403F05300	5,300	.2087	48	56	0,9	94	36	6

(continued)

(VDS403F • 8 x D — continued)



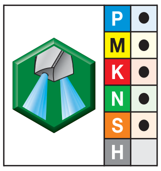
● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4144306	VDS403F05400	5,400	.2126	48	56	0,9	94	36	6
4144307	VDS403F05500	5,500	.2165	48	56	0,9	94	36	6
4144308	VDS403F05600	5,600	.2205	48	56	0,9	94	36	6
4144309	VDS403F05700	5,700	.2244	48	56	1,0	94	36	6
4144310	VDS403F05800	5,800	.2283	48	56	1,0	94	36	6
4144311	VDS403F05900	5,900	.2323	48	56	1,0	94	36	6
4144312	VDS403F06000	6,000	.2362	48	56	1,0	94	36	6
4144313	VDS403F06100	6,100	.2402	57	67	1,0	105	36	8
4144314	VDS403F06200	6,200	.2441	57	67	1,0	105	36	8
4144315	VDS403F06300	6,300	.2480	57	67	1,1	105	36	8
4144316	VDS403F06400	6,400	.2520	57	67	1,1	105	36	8
4144317	VDS403F06500	6,500	.2559	57	67	1,1	105	36	8
4144318	VDS403F06600	6,600	.2598	57	67	1,1	105	36	8
4144319	VDS403F06700	6,700	.2638	57	67	1,1	105	36	8
4144320	VDS403F06800	6,800	.2677	57	67	1,1	105	36	8
4144321	VDS403F06900	6,900	.2717	57	67	1,2	105	36	8
4144322	VDS403F07000	7,000	.2756	57	67	1,2	105	36	8
4144343	VDS403F07100	7,100	.2795	61	72	1,2	110	36	8
4144344	VDS403F07200	7,200	.2835	61	72	1,2	110	36	8
4144345	VDS403F07300	7,300	.2874	61	72	1,2	110	36	8
4144346	VDS403F07400	7,400	.2913	61	72	1,3	110	36	8
4144347	VDS403F07500	7,500	.2953	61	72	1,3	110	36	8
4144348	VDS403F07600	7,600	.2992	61	72	1,3	110	36	8
4144349	VDS403F07700	7,700	.3031	61	72	1,3	110	36	8
4144350	VDS403F07800	7,800	.3071	61	72	1,3	110	36	8
4144351	VDS403F07900	7,900	.3110	61	72	1,3	110	36	8
4144352	VDS403F08000	8,000	.3150	61	72	1,4	110	36	8
4144363	VDS403F08100	8,100	.3189	68	80	1,4	122	40	10
4144364	VDS403F08200	8,200	.3228	68	80	1,4	122	40	10
4144365	VDS403F08300	8,300	.3268	68	80	1,4	122	40	10
4144366	VDS403F08400	8,400	.3307	68	80	1,4	122	40	10
4144367	VDS403F08500	8,500	.3346	68	80	1,4	122	40	10
4144368	VDS403F08600	8,600	.3386	68	80	1,5	122	40	10
4144369	VDS403F08700	8,700	.3425	68	80	1,5	122	40	10
4144370	VDS403F08800	8,800	.3465	68	80	1,5	122	40	10
4144371	VDS403F08900	8,900	.3504	68	80	1,5	122	40	10
4144372	VDS403F09000	9,000	.3543	68	80	1,5	122	40	10
4144373	VDS403F09100	9,100	.3583	68	80	1,5	122	40	10
4144374	VDS403F09200	9,200	.3622	68	80	1,6	122	40	10
4144375	VDS403F09300	9,300	.3661	68	80	1,6	122	40	10

(continued)

(VDS403F • 8 x D — continued)



● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4144376	VDS403F09400	9,400	.3701	68	80	1,6	122	40	10
4144377	VDS403F09500	9,500	.3740	68	80	1,6	122	40	10
4144378	VDS403F09600	9,600	.3780	68	80	1,6	122	40	10
4144379	VDS403F09700	9,700	.3819	68	80	1,7	122	40	10
4144380	VDS403F09800	9,800	.3858	68	80	1,7	122	40	10
4144381	VDS403F09900	9,900	.3898	68	80	1,7	122	40	10
4144207	VDS403F10000	10,000	.3937	68	80	1,7	122	40	10
4143888	VDS403F10100	10,100	.3976	79	94	1,7	141	45	12
4143889	VDS403F10200	10,200	.4016	79	94	1,7	141	45	12
4143890	VDS403F10300	10,300	.4055	79	94	1,8	141	45	12
4143891	VDS403F10400	10,400	.4094	79	94	1,8	141	45	12
4143892	VDS403F10500	10,500	.4134	79	94	1,8	141	45	12
4144223	VDS403F10600	10,600	.4173	79	94	1,8	141	45	12
4144224	VDS403F10700	10,700	.4213	79	94	1,8	141	45	12
4144225	VDS403F10800	10,800	.4252	79	94	1,8	141	45	12
4144226	VDS403F10900	10,900	.4291	79	94	1,9	141	45	12
4144227	VDS403F11000	11,000	.4331	79	94	1,9	141	45	12
4144228	VDS403F11100	11,100	.4370	79	94	1,9	141	45	12
4144229	VDS403F11200	11,200	.4409	79	94	1,9	141	45	12
4144230	VDS403F11300	11,300	.4449	79	94	1,9	141	45	12
4144231	VDS403F11400	11,400	.4488	79	94	2,0	141	45	12
4144232	VDS403F11500	11,500	.4528	79	94	2,0	141	45	12
4144233	VDS403F11600	11,600	.4567	79	94	2,0	141	45	12
4144234	VDS403F11700	11,700	.4606	79	94	2,0	141	45	12
4144235	VDS403F11800	11,800	.4646	79	94	2,0	141	45	12
4144236	VDS403F11900	11,900	.4685	79	94	2,0	141	45	12
4144237	VDS403F12000	12,000	.4724	79	94	2,1	141	45	12
4144238	VDS403F12100	12,100	.4764	91	108	2,1	155	45	14
4144239	VDS403F12200	12,200	.4803	91	108	2,1	155	45	14
4144240	VDS403F12300	12,300	.4843	91	108	2,1	155	45	14
4144241	VDS403F12400	12,400	.4882	91	108	2,1	155	45	14
4144242	VDS403F12500	12,500	.4921	91	108	2,1	155	45	14
4144263	VDS403F12600	12,600	.4961	91	108	2,2	155	45	14
4144264	VDS403F12700	12,700	.5000	91	108	2,2	155	45	14
4144265	VDS403F12800	12,800	.5039	91	108	2,2	155	45	14
4144266	VDS403F12900	12,900	.5079	91	108	2,2	155	45	14
4144267	VDS403F13000	13,000	.5118	91	108	2,2	155	45	14
4144268	VDS403F13100	13,100	.5157	91	108	2,3	155	45	14
4144269	VDS403F13200	13,200	.5197	91	108	2,3	155	45	14
4144270	VDS403F13300	13,300	.5236	91	108	2,3	155	45	14

(continued)

(VDS403F • 8 x D — continued)

P	●
M	●
K	●
N	●
S	●
H	

● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4144271	VDS403F13400	13,400	.5276	91	108	2,3	155	45	14
4144272	VDS403F13500	13,500	.5315	91	108	2,3	155	45	14
4144293	VDS403F13600	13,600	.5354	91	108	2,3	155	45	14
4144294	VDS403F13700	13,700	.5394	91	108	2,4	155	45	14
4144295	VDS403F13800	13,800	.5433	91	108	2,4	155	45	14
4144296	VDS403F13900	13,900	.5472	91	108	2,4	155	45	14
4144297	VDS403F14000	14,000	.5512	91	108	2,4	155	45	14
4144298	VDS403F14100	14,100	.5551	101	121	2,4	171	48	16
4144299	VDS403F14200	14,200	.5591	101	121	2,5	171	48	16
4144300	VDS403F14300	14,300	.5630	101	121	2,5	171	48	16
4144301	VDS403F14400	14,400	.5669	101	121	2,5	171	48	16
4144302	VDS403F14500	14,500	.5709	101	121	2,5	171	48	16
4144323	VDS403F14600	14,600	.5748	101	121	2,5	171	48	16
4144324	VDS403F14700	14,700	.5787	101	121	2,5	171	48	16
4144325	VDS403F14800	14,800	.5827	101	121	2,6	171	48	16
4144326	VDS403F14900	14,900	.5866	101	121	2,6	171	48	16
4144327	VDS403F15000	15,000	.5906	101	121	2,6	171	48	16
4144328	VDS403F15100	15,100	.5945	101	121	2,6	171	48	16
4144329	VDS403F15200	15,200	.5984	101	121	2,6	171	48	16
4144330	VDS403F15300	15,300	.6024	101	121	2,6	171	48	16
4144331	VDS403F15400	15,400	.6063	101	121	2,7	171	48	16
4144332	VDS403F15500	15,500	.6102	101	121	2,7	171	48	16
4144333	VDS403F15600	15,600	.6142	101	121	2,7	171	48	16
4144334	VDS403F15700	15,700	.6181	101	121	2,7	171	48	16
4144335	VDS403F15800	15,800	.6220	101	121	2,7	171	48	16
4144336	VDS403F15900	15,900	.6260	101	121	2,8	171	48	16
4144337	VDS403F16000	16,000	.6299	101	121	2,8	171	48	16
4144338	VDS403F16100	16,100	.6339	113	135	2,8	185	48	18
4144339	VDS403F16200	16,200	.6378	113	135	2,8	185	48	18
4144340	VDS403F16300	16,300	.6417	113	135	2,8	185	48	18
4144341	VDS403F16400	16,400	.6457	113	135	2,8	185	48	18
4144342	VDS403F16500	16,500	.6496	113	135	2,9	185	48	18
4144353	VDS403F16600	16,600	.6535	113	135	2,9	185	48	18
4144354	VDS403F16700	16,700	.6575	113	135	2,9	185	48	18
4144355	VDS403F16800	16,800	.6614	113	135	2,9	185	48	18
4144356	VDS403F16900	16,900	.6654	113	135	2,9	185	48	18
4144357	VDS403F17000	17,000	.6693	113	135	2,9	185	48	18
4144358	VDS403F17100	17,100	.6732	113	135	3,0	185	48	18
4144359	VDS403F17200	17,200	.6772	113	135	3,0	185	48	18
4144360	VDS403F17300	17,300	.6811	113	135	3,0	185	48	18

(continued)

(VDS403F • 8 x D — continued)

P	●
M	●
K	●
N	●
S	●
H	

● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
4144361	**VDS403F17400**	17,400	.6850	113	135	3,0	185	48	18
4144362	**VDS403F17500**	17,500	.6890	113	135	3,0	185	48	18
4144383	**VDS403F17600**	17,600	.6929	113	135	3,1	185	48	18
4144384	**VDS403F17700**	17,700	.6969	113	135	3,1	185	48	18
4144385	**VDS403F17800**	17,800	.7008	113	135	3,1	185	48	18
4144386	**VDS403F17900**	17,900	.7047	113	135	3,1	185	48	18
4144387	**VDS403F18000**	18,000	.7087	113	135	3,1	185	48	18
4144388	**VDS403F18100**	18,100	.7126	124	148	3,1	200	50	20
4144389	**VDS403F18200**	18,200	.7165	124	148	3,2	200	50	20
4144390	**VDS403F18300**	18,300	.7205	124	148	3,2	200	50	20
4144391	**VDS403F18400**	18,400	.7244	124	148	3,2	200	50	20
4144392	**VDS403F18500**	18,500	.7283	124	148	3,2	200	50	20
4144393	**VDS403F18600**	18,600	.7323	124	148	3,2	200	50	20
4144394	**VDS403F18700**	18,700	.7362	124	148	3,2	200	50	20
4144395	**VDS403F18800**	18,800	.7402	124	148	3,3	200	50	20
4144396	**VDS403F18900**	18,900	.7441	124	148	3,3	200	50	20
4144397	**VDS403F19000**	19,000	.7480	124	148	3,3	200	50	20
4144398	**VDS403F19100**	19,100	.7520	124	148	3,3	200	50	20
4144399	**VDS403F19200**	19,200	.7559	124	148	3,3	200	50	20
4144400	**VDS403F19300**	19,300	.7598	124	148	3,4	200	50	20
4144401	**VDS403F19400**	19,400	.7638	124	148	3,4	200	50	20
4144402	**VDS403F19500**	19,500	.7677	124	148	3,4	200	50	20
4144403	**VDS403F19600**	19,600	.7717	124	148	3,4	200	50	20
4144404	**VDS403F19700**	19,700	.7756	124	148	3,4	200	50	20
4144405	**VDS403F19800**	19,800	.7795	124	148	3,4	200	50	20
4144406	**VDS403F19900**	19,900	.7835	124	148	3,5	200	50	20
4144407	**VDS403F20000**	20,000	.7874	124	148	3,5	200	50	20

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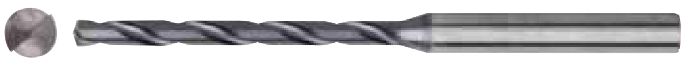

Material Group		Cutting Speed — vc Range — m/min min		max	Tool Diameter (mm)	1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	60	–	100	mm/r	0,04–0,09	0,05–0,12	0,07–0,14	0,08–0,16	0,11–0,22	0,13–0,26	0,15–0,31	0,18–0,35	0,22–0,42	0,28–0,54
P	2, 3, 4, 6, 7	50	–	90	mm/r	0,05–0,10	0,06–0,13	0,08–0,15	0,09–0,17	0,13–0,23	0,15–0,28	0,19–0,33	0,22–0,38	0,26–0,47	0,34–0,59
P	5, 9, 10, 11	50	–	100	mm/r	0,05–0,10	0,06–0,13	0,07–0,15	0,08–0,17	0,12–0,23	0,14–0,28	0,17–0,33	0,19–0,38	0,23–0,47	0,29–0,59
P	12, 13	30	–	60	mm/r	0,03–0,05	0,04–0,06	0,05–0,08	0,06–0,10	0,08–0,14	0,10–0,18	0,13–0,22	0,14–0,24	0,18–0,32	0,23–0,41
M	14.1	30	–	50	mm/r	0,02–0,05	0,03–0,06	0,04–0,07	0,05–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
M	14.3	40	–	60	mm/r	0,02–0,06	0,03–0,07	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,14	0,10–0,16	0,12–0,18	0,14–0,20	0,16–0,22
M	14.2, 14.4	30	–	50	mm/r	0,02–0,05	0,03–0,06	0,04–0,07	0,06–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
K	15, 16	70	–	150	mm/r	0,06–0,13	0,07–0,14	0,09–0,18	0,10–0,19	0,13–0,25	0,16–0,30	0,18–0,35	0,20–0,39	0,25–0,48	0,30–0,59
K	17, 18, 19	90	–	120	mm/r	0,08–0,11	0,09–0,12	0,10–0,13	0,10–0,15	0,13–0,20	0,16–0,25	0,18–0,29	0,20–0,32	0,25–0,38	0,30–0,48
K	20	80	–	120	mm/r	0,04–0,10	0,06–0,12	0,06–0,14	0,07–0,15	0,10–0,20	0,11–0,24	0,14–0,28	0,15–0,32	0,19–0,38	0,24–0,48
N	21	90	–	270	mm/r	0,05–0,12	0,06–0,13	0,08–0,14	0,10–0,16	0,12–0,20	0,16–0,24	0,20–0,28	0,24–0,32	0,28–0,40	0,32–0,48
N	22, 23, 24	90	–	270	mm/r	0,04–0,08	0,06–0,12	0,08–0,16	0,10–0,20	0,12–0,24	0,16–0,28	0,20–0,32	0,24–0,36	0,28–0,44	0,32–0,52
N	25	90	–	225	mm/r	0,10–0,13	0,11–0,14	0,12–0,14	0,13–0,16	0,14–0,20	0,16–0,24	0,20–0,28	0,24–0,32	0,28–0,40	0,32–0,44
N	26, 27, 28	90	–	270	mm/r	0,04–0,08	0,06–0,12	0,08–0,16	0,10–0,20	0,12–0,24	0,16–0,28	0,20–0,32	0,24–0,36	0,28–0,40	0,32–0,48
S	31, 32	20	–	30	mm/r	0,01–0,04	0,02–0,05	0,03–0,06	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,13	0,10–0,14	0,12–0,16	0,14–0,18
S	33, 34, 35	10	–	30	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16
S	36	20	–	40	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,02–0,05	0,04–0,07	0,06–0,09	0,07–0,10	0,08–0,11	0,09–0,13	0,10–0,15
S	37	20	–	50	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16

Recommended Feed Rate (f) by Diameter

Metric tolerance

nominal size range	D1 tolerance	D tolerance h6
1–3	0,000/-0,014 (h8)	0,000/-0,006
>3–6	0,000/-0,012 (h7)	0,000/-0,008
>6–10	0,000/-0,015 (h7)	0,000/-0,009
>10–18	0,000/-0,018 (h7)	0,000/-0,011
>18–20	0,000/-0,021 (h7)	0,000/-0,013

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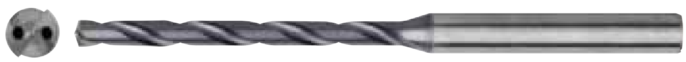

Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter										
		min	–	max	Tool Diameter (mm)	1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	70	–	140	mm/r	0,04–0,09	0,05–0,12	0,07–0,14	0,08–0,16	0,11–0,22	0,13–0,26	0,15–0,31	0,18–0,35	0,22–0,42	0,28–0,54
	2, 3, 4, 6, 7	60	–	100	mm/r	0,05–0,10	0,06–0,13	0,08–0,15	0,09–0,17	0,13–0,23	0,15–0,28	0,19–0,33	0,22–0,38	0,26–0,47	0,34–0,59
	5, 9, 10, 11	50	–	100	mm/r	0,05–0,10	0,06–0,13	0,07–0,15	0,08–0,17	0,12–0,23	0,14–0,28	0,17–0,33	0,19–0,38	0,23–0,47	0,29–0,59
	12, 13	40	–	70	mm/r	0,03–0,05	0,04–0,06	0,05–0,08	0,06–0,10	0,08–0,14	0,10–0,18	0,13–0,22	0,14–0,24	0,18–0,32	0,23–0,41
M	14.1	30	–	50	mm/r	0,02–0,05	0,03–0,06	0,04–0,07	0,05–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
	14.3	40	–	60	mm/r	0,02–0,06	0,03–0,07	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,14	0,10–0,16	0,12–0,18	0,14–0,20	0,16–0,22
	14.2, 14.4	30	–	50	mm/r	0,02–0,05	0,03–0,06	0,04–0,07	0,06–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
K	15, 16	80	–	160	mm/r	0,07–0,14	0,08–0,15	0,10–0,20	0,11–0,22	0,14–0,28	0,18–0,34	0,21–0,40	0,23–0,44	0,28–0,54	0,34–0,67
	17, 18, 19	90	–	140	mm/r	0,09–0,13	0,10–0,14	0,11–0,14	0,12–0,17	0,14–0,23	0,18–0,28	0,21–0,32	0,23–0,36	0,28–0,43	0,34–0,54
	20	80	–	130	mm/r	0,05–0,12	0,06–0,14	0,07–0,15	0,08–0,17	0,11–0,23	0,13–0,27	0,15–0,32	0,17–0,36	0,22–0,43	0,27–0,54
N	21	90	–	315	mm/r	0,05–0,12	0,06–0,13	0,08–0,14	0,10–0,16	0,12–0,20	0,16–0,24	0,20–0,28	0,24–0,32	0,28–0,40	0,32–0,48
	22, 23, 24	90	–	270	mm/r	0,04–0,08	0,06–0,12	0,08–0,16	0,10–0,20	0,12–0,24	0,16–0,28	0,20–0,32	0,24–0,36	0,28–0,44	0,32–0,52
	25	90	–	270	mm/r	0,10–0,13	0,11–0,14	0,12–0,14	0,13–0,16	0,14–0,20	0,16–0,24	0,20–0,28	0,24–0,32	0,28–0,40	0,32–0,44
	26, 27, 28	90	–	270	mm/r	0,04–0,08	0,06–0,12	0,08–0,16	0,10–0,20	0,12–0,24	0,16–0,28	0,20–0,32	0,24–0,36	0,28–0,40	0,32–0,48
S	31, 32	20	–	30	mm/r	0,01–0,04	0,02–0,05	0,03–0,06	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,13	0,10–0,14	0,12–0,16	0,14–0,18
	33, 34, 35	10	–	30	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16
	36	10	–	40	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,02–0,05	0,04–0,07	0,06–0,09	0,07–0,10	0,08–0,11	0,09–0,13	0,10–0,15
	37	10	–	40	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16

	Metric tolerance	
nominal size range	D1 tolerance	D tolerance h6
1–3	0,000/-0,014 (h8)	0,000/-0,006
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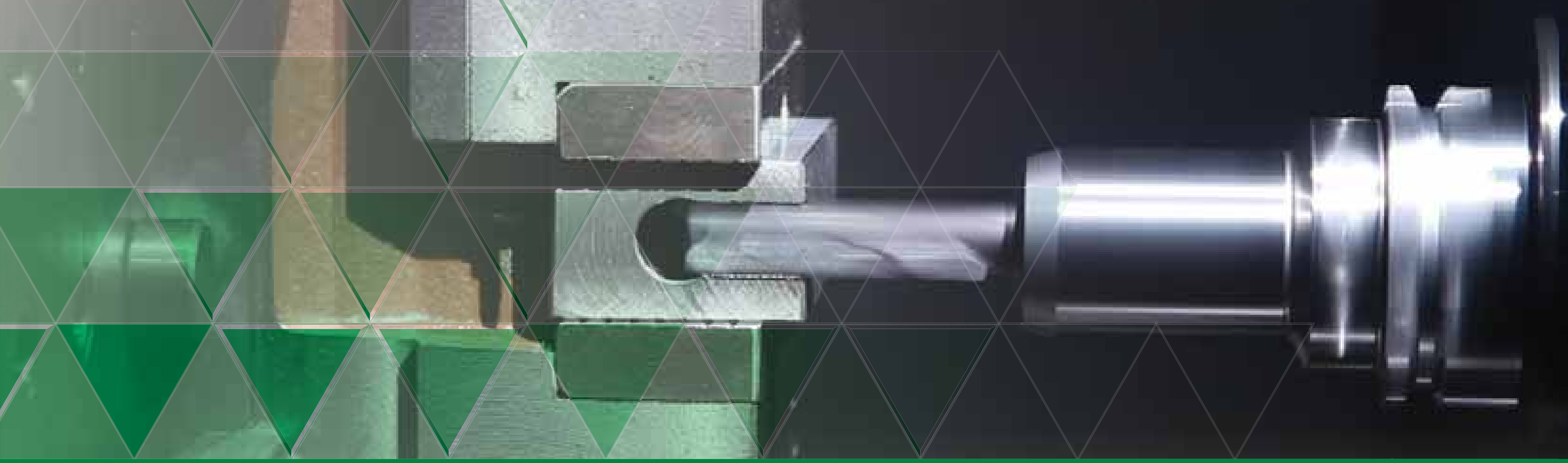
>6–10	0,000/-0,015 (h7)	0,000/-0,009
>10–18	0,000/-0,018 (h7)	0,000/-0,011
>18–20	0,000/-0,021 (h7)	0,000/-0,013



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

TDF Drills for Flat-Bottom Applications

(Available as Semi-Standards)

Primary Application

Engineered specifically to eliminate the need for a two-part operation when drilling flat-bottom holes or on an inclined surface:

- Drill flat-bottom holes in one step.
- Eliminate the need to use both an end mill and a drill to machine a flat on an inclined surface.
- After full cylindrical engagement, the drills run at normal solid carbide drilling parameters.

Features and Benefits

- Four-Margin Design
  - Increases contact with material at full diameter.
  - Improves hold quality and drill stability in the cut.
  - Enables interrupted cuts and inclined exits.
- Special Point-Thinning
  - Increases centring capability.
  - Improves chip formation and flow.
  - Reduces cutting forces.

Product Portfolio

- The Flat-Bottom Drill product series TDF51* is pre-designed in four lengths and available in two grades, WN15HD for non-ferrous materials, and WU20PD™ for steel, iron, and stainless steel.
  - TDF510* 1,5 x D
  - TDF511* 3 x D
  - TDF512* 5 x D
  - TDF513* 8 x D
- Length variations and step drills available as engineered solutions.

Ordering Process

- Please contact your local Authorised Distributor for a quote.

WIDIA™

For a Wide Range of Materials

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

VariDrill™

The VariDrill offers the ultimate solution for multipurpose drilling operations. Its advanced-point geometry design enables less chipping on the cutting edge, resulting in longer tool life. It delivers proper surface finish across multiple materials, including steel, stainless steel, cast iron, aluminium, and high-temp alloys.

- WU25PD™ drilling grade for extremely high wear resistance and longer tool life.
- VariDrill core design offers free chip flow and chip evacuation, resulting in optimum hole quality.
- Broad portfolio of items, with more than 2,200 choices.
- Reconditioning options for extended tool life.

To learn more about the benefits of **WIDIA**™ **VariDrill**, contact your local distributor.

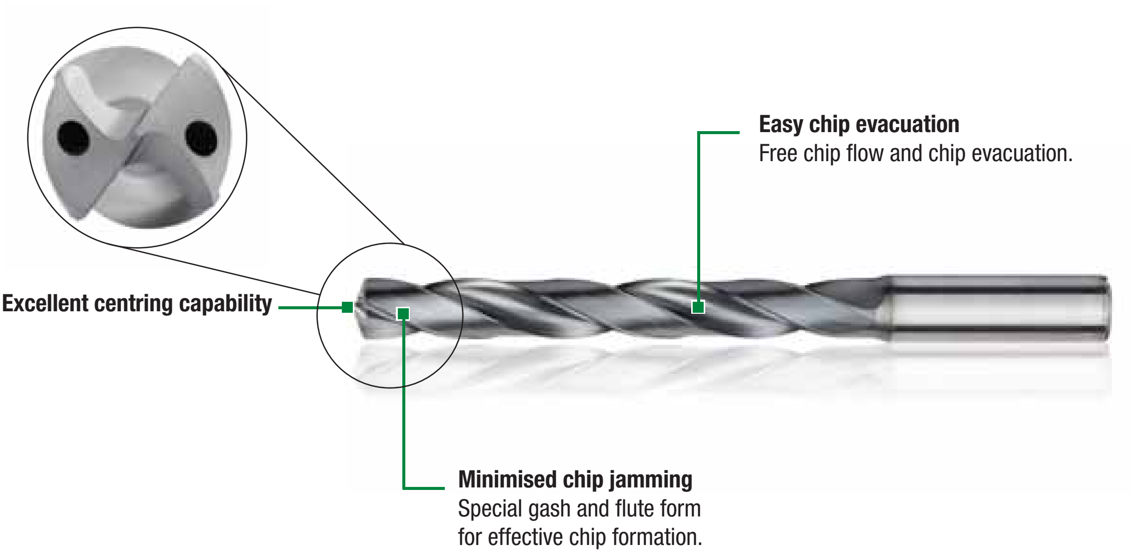
WIDIA™

Application-Specific Drilling •
WIDIA™ TOP DRILL S™ for Steel and Cast Iron

TOP DRILL S

TOP DRILL S is WIDIA's line of solid carbide drills engineered to provide maximum performance and superior finish for application-specific tasks. Available in two material applications, TDS for steel and cast iron are each specially designed and coated to maximise output and increase tool life — offering less cost-per-hole and greater productivity.

- Designed for maximum productivity and longer tool life for steel and cast iron.
- Easy to choose and apply.
- One of the broadest ranges on the market for diameter selection, length series, and coolant options.
- Highest metal removal rates possible without sacrificing tool life.
- Latest Victory™ grades from WIDIA.



TOP DRILL S™ for Steel

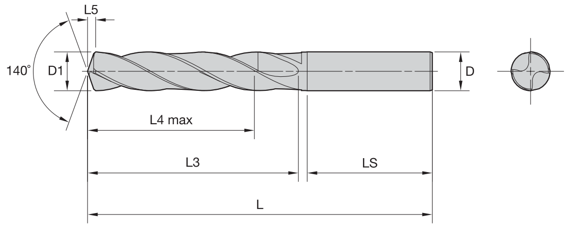
TOP DRILL S for steel is a high-performance solid carbide drill with an application-specific design. Although the point geometry is strong enough to drill stainless steel and cast iron, it is engineered to maximise performance when drilling steel. The WP20PD™ grade, designed to resist high heat and wear, is the latest in WIDIA™ technology. The two-margin design facilitates excellent hole quality and less friction when drilling steel at high speeds.

TOP DRILL S for Cast Iron

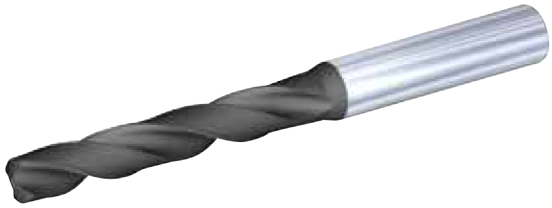
TOP DRILL S for cast iron is designed with application-specific point geometry for maximum performance in cast iron materials. The point features corner chamfers that minimise breakout on exit holes. A four-margin design improves hole straightness, increasing tool life and extending cross-hole and inclined exit capabilities when drilling tough cast iron. The technologically advanced WK15PD™ grade is specially engineered to withstand high wear.

WIDIA Advantage

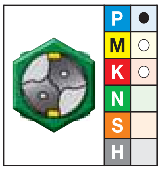
- Application-specific geometry with the latest WIDIA grade technology.
- Lower cost-per-hole due to high MRR and long tool life.
- Consistent performance from internally controlled supply chain:
  Powder > Rod > Grinding > Coating
- Part of the complete WIDIA holemaking solution.
- Broad range of standard lengths, diameters, and coolant options in one line, including extensive intermediate metric, inch, fraction, and wire sizes.

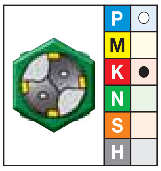


For information on L, L3, and L4 max, see page T143.



■ TDS202A • TDS212A • 5 x D



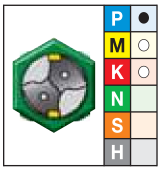


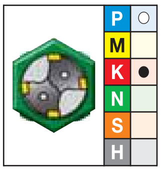
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162258	TDS202A03000	4162417	TDS212A03000	3,000	.1181	66	28	23	0,5	36	6
4162259	TDS202A03048	4162418	TDS212A03048	3,048	.1200	66	28	23	0,5	36	6
4162260	TDS202A03100	4162419	TDS212A03100	3,100	.1220	66	28	23	0,5	36	6
4162261	TDS202A03175	4162420	TDS212A03175	3,175	.1250	66	28	23	0,5	36	6
4162262	TDS202A03200	4162421	TDS212A03200	3,200	.1260	66	28	23	0,5	36	6
4162283	TDS202A03264	4162422	TDS212A03264	3,264	.1285	66	28	23	0,5	36	6
4162284	TDS202A03300	4162543	TDS212A03300	3,300	.1299	66	28	23	0,5	36	6
4162285	TDS202A03400	4162544	TDS212A03400	3,400	.1339	66	28	23	0,6	36	6
4162286	TDS202A03455	4162545	TDS212A03455	3,455	.1360	66	28	23	0,6	36	6
4162287	TDS202A03500	4162546	TDS212A03500	3,500	.1378	66	28	23	0,6	36	6
4162288	TDS202A03571	4162547	TDS212A03571	3,571	.1406	66	28	23	0,6	36	6
4162289	TDS202A03600	4162548	TDS212A03600	3,600	.1417	66	28	23	0,6	36	6
4162290	TDS202A03658	4162549	TDS212A03658	3,658	.1440	66	28	23	0,6	36	6
4162291	TDS202A03700	4162550	TDS212A03700	3,700	.1457	66	28	23	0,6	36	6
4162292	TDS202A03734	4162551	TDS212A03734	3,734	.1470	66	28	23	0,6	36	6
4162293	TDS202A03800	4162552	TDS212A03800	3,800	.1496	74	36	29	0,6	36	6
4162294	TDS202A03900	4162553	TDS212A03900	3,900	.1535	74	36	29	0,6	36	6
4162295	TDS202A03970	4162554	TDS212A03970	3,970	.1563	74	36	29	0,7	36	6
4162296	TDS202A04000	4162555	TDS212A04000	4,000	.1575	74	36	29	0,7	36	6
4162297	TDS202A04039	4162556	TDS212A04039	4,039	.1590	74	36	29	0,7	36	6
4162298	TDS202A04090	4162557	TDS212A04090	4,090	.1610	74	36	29	0,7	36	6
4162299	TDS202A04100	4162558	TDS212A04100	4,100	.1614	74	36	29	0,7	36	6
4162300	TDS202A04200	4162559	TDS212A04200	4,200	.1654	74	36	29	0,7	36	6
4162301	TDS202A04217	4162560	TDS212A04217	4,217	.1660	74	36	29	0,7	36	6

(continued)

(TDS202A • TDS212A • 5 x D — continued)





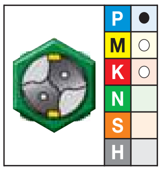
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162302	TDS202A04300	4162561	TDS212A04300	4,300	.1693	74	36	29	0,7	36	6
4162303	TDS202A04366	4162562	TDS212A04366	4,366	.1719	74	36	29	0,7	36	6
4162304	TDS202A04400	4162563	TDS212A04400	4,400	.1732	74	36	29	0,7	36	6
4162305	TDS202A04500	4162564	TDS212A04500	4,500	.1772	74	36	29	0,7	36	6
4162306	TDS202A04600	4162565	TDS212A04600	4,600	.1811	74	36	29	0,8	36	6
4162307	TDS202A04623	4162566	TDS212A04623	4,623	.1820	74	36	29	0,8	36	6
4162308	TDS202A04700	4162567	TDS212A04700	4,700	.1850	74	36	29	0,8	36	6
4162309	TDS202A04763	4162568	TDS212A04763	4,763	.1875	82	44	35	0,8	36	6
4162310	TDS202A04800	4162569	TDS212A04800	4,800	.1890	82	44	35	0,8	36	6
4162311	TDS202A04852	4162570	TDS212A04852	4,852	.1910	82	44	35	0,8	36	6
4162312	TDS202A04900	4162571	TDS212A04900	4,900	.1929	82	44	35	0,8	36	6
4162313	TDS202A05000	4162572	TDS212A05000	5,000	.1969	82	44	35	0,8	36	6
4162314	TDS202A05100	4162573	TDS212A05100	5,100	.2008	82	44	35	0,8	36	6
4162315	TDS202A05106	4162574	TDS212A05106	5,106	.2010	82	44	35	0,8	36	6
4162316	TDS202A05159	4162575	TDS212A05159	5,159	.2031	82	44	35	0,9	36	6
4162317	TDS202A05200	4162576	TDS212A05200	5,200	.2047	82	44	35	0,9	36	6
4162318	TDS202A05300	4162577	TDS212A05300	5,300	.2087	82	44	35	0,9	36	6
4162319	TDS202A05400	4162578	TDS212A05400	5,400	.2126	82	44	35	0,9	36	6
4162320	TDS202A05410	4162579	TDS212A05410	5,410	.2130	82	44	35	0,9	36	6
4162321	TDS202A05500	4162580	TDS212A05500	5,500	.2165	82	44	35	0,9	36	6
4162322	TDS202A05558	4162581	TDS212A05558	5,558	.2188	82	44	35	0,9	36	6
4162323	TDS202A05600	4162582	TDS212A05600	5,600	.2205	82	44	35	0,9	36	6
4162324	TDS202A05616	4162583	TDS212A05616	5,616	.2211	82	44	35	0,9	36	6
4162325	TDS202A05700	4162584	TDS212A05700	5,700	.2244	82	44	35	1,0	36	6
4162326	TDS202A05800	4162585	TDS212A05800	5,800	.2283	82	44	35	1,0	36	6
4162327	TDS202A05900	4162586	TDS212A05900	5,900	.2323	82	44	35	1,0	36	6
4162328	TDS202A05954	4162587	TDS212A05954	5,954	.2344	82	44	35	1,0	36	6
4162329	TDS202A06000	4162588	TDS212A06000	6,000	.2362	82	44	35	1,0	36	6
4162330	TDS202A06100	4162589	TDS212A06100	6,100	.2402	91	53	43	1,0	36	8
4162331	TDS202A06200	4162590	TDS212A06200	6,200	.2441	91	53	43	1,0	36	8
4162332	TDS202A06300	4162591	TDS212A06300	6,300	.2480	91	53	43	1,1	36	8
4162333	TDS202A06350	4162592	TDS212A06350	6,350	.2500	91	53	43	1,1	36	8
4162334	TDS202A06400	4162593	TDS212A06400	6,400	.2520	91	53	43	1,1	36	8
4162335	TDS202A06500	4162594	TDS212A06500	6,500	.2559	91	53	43	1,1	36	8
4162336	TDS202A06528	4162595	TDS212A06528	6,528	.2570	91	53	43	1,1	36	8
4162337	TDS202A06600	4162596	TDS212A06600	6,600	.2598	91	53	43	1,1	36	8
4162338	TDS202A06630	4162597	TDS212A06630	6,630	.2610	91	53	43	1,1	36	8
4162339	TDS202A06700	4162598	TDS212A06700	6,700	.2638	91	53	43	1,1	36	8
4162340	TDS202A06746	4162599	TDS212A06746	6,746	.2656	91	53	43	1,1	36	8
4148908	TDS202A06800	4148983	TDS212A06800	6,800	.2677	91	53	43	1,1	36	8

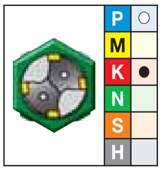
(continued)

WIDIA

(TDS202A • TDS212A • 5 x D — continued)



grade WP20PD
TiAlN



grade WK15PD
AlCrN

● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162341	TDS202A06900	4162600	TDS212A06900	6,900	.2717	91	53	43	1,2	36	8
4162342	TDS202A07000	4162601	TDS212A07000	7,000	.2756	91	53	43	1,2	36	8
4162343	TDS202A07100	4162602	TDS212A07100	7,100	.2795	91	53	43	1,2	36	8
4162344	TDS202A07145	4162603	TDS212A07145	7,145	.2813	91	53	43	1,2	36	8
4162345	TDS202A07200	4162604	TDS212A07200	7,200	.2835	91	53	43	1,2	36	8
4162346	TDS202A07300	4162605	TDS212A07300	7,300	.2874	91	53	43	1,2	36	8
4162347	TDS202A07400	4162606	TDS212A07400	7,400	.2913	91	53	43	1,3	36	8
4162348	TDS202A07500	4162607	TDS212A07500	7,500	.2953	91	53	43	1,3	36	8
4162349	TDS202A07541	4162608	TDS212A07541	7,541	.2969	91	53	43	1,3	36	8
4162350	TDS202A07600	4162609	TDS212A07600	7,600	.2992	91	53	43	1,3	36	8
4162351	TDS202A07700	4162610	TDS212A07700	7,700	.3031	91	53	43	1,3	36	8
4162352	TDS202A07800	4162611	TDS212A07800	7,800	.3071	91	53	43	1,3	36	8
4162353	TDS202A07900	4162612	TDS212A07900	7,900	.3110	91	53	43	1,3	36	8
4162354	TDS202A07938	4162613	TDS212A07938	7,938	.3125	91	53	43	1,3	36	8
4162355	TDS202A08000	4162614	TDS212A08000	8,000	.3150	91	53	43	1,4	36	8
4162356	TDS202A08100	4162615	TDS212A08100	8,100	.3189	103	61	49	1,4	40	10
4162357	TDS202A08200	4162616	TDS212A08200	8,200	.3228	103	61	49	1,4	40	10
4162358	TDS202A08300	4162617	TDS212A08300	8,300	.3268	103	61	49	1,4	40	10
4162359	TDS202A08334	4162618	TDS212A08334	8,334	.3281	103	61	49	1,4	40	10
4162360	TDS202A08400	4162619	TDS212A08400	8,400	.3307	103	61	49	1,4	40	10
4162361	TDS202A08433	4162620	TDS212A08433	8,433	.3320	103	61	49	1,4	40	10
4162362	TDS202A08500	4162621	TDS212A08500	8,500	.3346	103	61	49	1,4	40	10
4162363	TDS202A08600	4162622	TDS212A08600	8,600	.3386	103	61	49	1,5	40	10
4162364	TDS202A08700	4162623	TDS212A08700	8,700	.3425	103	61	49	1,5	40	10
4162365	TDS202A08733	4162624	TDS212A08733	8,733	.3438	103	61	49	1,5	40	10
4162366	TDS202A08800	4162625	TDS212A08800	8,800	.3465	103	61	49	1,5	40	10
4162367	TDS202A08900	4162626	TDS212A08900	8,900	.3504	103	61	49	1,5	40	10
4162368	TDS202A09000	4162627	TDS212A09000	9,000	.3543	103	61	49	1,5	40	10
4162369	TDS202A09100	4162628	TDS212A09100	9,100	.3583	103	61	49	1,5	40	10
4162370	TDS202A09129	4162629	TDS212A09129	9,129	.3594	103	61	49	1,6	40	10
4162371	TDS202A09200	4162630	TDS212A09200	9,200	.3622	103	61	49	1,6	40	10
4162372	TDS202A09300	4162631	TDS212A09300	9,300	.3661	103	61	49	1,6	40	10
4162373	TDS202A09347	4162632	TDS212A09347	9,347	.3680	103	61	49	1,6	40	10
4162374	TDS202A09400	4162633	TDS212A09400	9,400	.3701	103	61	49	1,6	40	10
4162375	TDS202A09500	4162634	TDS212A09500	9,500	.3740	103	61	49	1,6	40	10
4162376	TDS202A09525	4162635	TDS212A09525	9,525	.3750	103	61	49	1,6	40	10
4162377	TDS202A09600	4162636	TDS212A09600	9,600	.3780	103	61	49	1,6	40	10
4162378	TDS202A09700	4162637	TDS212A09700	9,700	.3819	103	61	49	1,7	40	10
4162379	TDS202A09800	4162638	TDS212A09800	9,800	.3858	103	61	49	1,7	40	10
4162380	TDS202A09900	4162639	TDS212A09900	9,900	.3898	103	61	49	1,7	40	10

(continued)

(TDS202A • TDS212A • 5 x D — continued)

P ● M ○ K ○ N S H

grade WP20PD
TiAlN

P ○ M K ● N S H

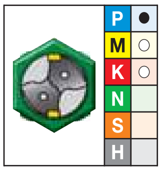
grade WK15PD
AlCrN

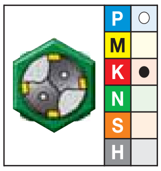
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162381	TDS202A09921	4162640	TDS212A09921	9,921	.3906	103	61	49	1,7	40	10
4167196	TDS202A10000	4162408	TDS212A10000	10,000	.3937	103	61	49	1,7	40	10
4167198	TDS202A10100	4162409	TDS212A10100	10,100	.3976	118	71	56	1,7	45	12
4167199	TDS202A10200	4162410	TDS212A10200	10,200	.4016	118	71	56	1,7	45	12
4167200	TDS202A10300	4162411	TDS212A10300	10,300	.4055	118	71	56	1,8	45	12
4167201	TDS202A10320	4162412	TDS212A10320	10,320	.4063	118	71	56	1,8	45	12
4167202	TDS202A10400	4162423	TDS212A10400	10,400	.4094	118	71	56	1,8	45	12
4167203	TDS202A10500	4162424	TDS212A10500	10,500	.4134	118	71	56	1,8	45	12
4167204	TDS202A10600	4162425	TDS212A10600	10,600	.4173	118	71	56	1,8	45	12
4167205	TDS202A10700	4162426	TDS212A10700	10,700	.4213	118	71	56	1,8	45	12
4167206	TDS202A10716	4162427	TDS212A10716	10,716	.4219	118	71	56	1,8	45	12
4167207	TDS202A10800	4162428	TDS212A10800	10,800	.4252	118	71	56	1,8	45	12
4167208	TDS202A10900	4162429	TDS212A10900	10,900	.4291	118	71	56	1,9	45	12
4167209	TDS202A11000	4162430	TDS212A11000	11,000	.4331	118	71	56	1,9	45	12
4167210	TDS202A11100	4162431	TDS212A11100	11,100	.4370	118	71	56	1,9	45	12
4167211	TDS202A11113	4162432	TDS212A11113	11,113	.4375	118	71	56	1,9	45	12
4167212	TDS202A11200	4162433	TDS212A11200	11,200	.4409	118	71	56	1,9	45	12
4167213	TDS202A11300	4162434	TDS212A11300	11,300	.4449	118	71	56	1,9	45	12
4167214	TDS202A11400	4162435	TDS212A11400	11,400	.4488	118	71	56	2,0	45	12
4167215	TDS202A11500	4162436	TDS212A11500	11,500	.4528	118	71	56	2,0	45	12
4167216	TDS202A11509	4162437	TDS212A11509	11,509	.4531	118	71	56	2,0	45	12
4167217	TDS202A11600	4162438	TDS212A11600	11,600	.4567	118	71	56	2,0	45	12
4167218	TDS202A11700	4162439	TDS212A11700	11,700	.4606	118	71	56	2,0	45	12
4167219	TDS202A11800	4162440	TDS212A11800	11,800	.4646	118	71	56	2,0	45	12
4167220	TDS202A11900	4162441	TDS212A11900	11,900	.4685	118	71	56	2,0	45	12
4167221	TDS202A11908	4162442	TDS212A11908	11,908	.4688	118	71	56	2,0	45	12
4167222	TDS202A12000	4162443	TDS212A12000	12,000	.4724	118	71	56	2,1	45	12
4167223	TDS202A12100	4162444	TDS212A12100	12,100	.4764	124	77	60	2,1	45	14
4167224	TDS202A12200	4162445	TDS212A12200	12,200	.4803	124	77	60	2,1	45	14
4167225	TDS202A12300	4162446	TDS212A12300	12,300	.4843	124	77	60	2,1	45	14
4167226	TDS202A12304	4162447	TDS212A12304	12,304	.4844	124	77	60	2,1	45	14
4167227	TDS202A12400	4162448	TDS212A12400	12,400	.4882	124	77	60	2,1	45	14
4167228	TDS202A12500	4162449	TDS212A12500	12,500	.4921	124	77	60	2,1	45	14
4167229	TDS202A12600	4162450	TDS212A12600	12,600	.4961	124	77	60	2,2	45	14
4167230	TDS202A12700	4162451	TDS212A12700	12,700	.5000	124	77	60	2,2	45	14
4167231	TDS202A12800	4162452	TDS212A12800	12,800	.5039	124	77	60	2,2	45	14
4167232	TDS202A12900	4162453	TDS212A12900	12,900	.5079	124	77	60	2,2	45	14
4167233	TDS202A13000	4162454	TDS212A13000	13,000	.5118	124	77	60	2,2	45	14
4167234	TDS202A13096	4162455	TDS212A13096	13,096	.5156	124	77	60	2,3	45	14
4167235	TDS202A13100	4162456	TDS212A13100	13,100	.5157	124	77	60	2,3	45	14

(continued)

(TDS202A • TDS212A • 5 x D — continued)



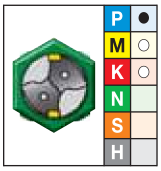


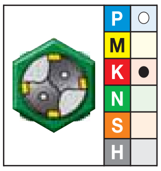
● first choice
○ alternate choice

grade WP20PD TiAlN order #	grade WP20PD TiAlN catalogue #	grade WK15PD AlCrN order #	grade WK15PD AlCrN catalogue #	D1 diameter mm	D1 diameter in	L	L3	L4 max	L5	LS	D
4167236	TDS202A13200	4162457	TDS212A13200	13,200	.5197	124	77	60	2,3	45	14
4167237	TDS202A13300	4162458	TDS212A13300	13,300	.5236	124	77	60	2,3	45	14
4167238	TDS202A13400	4162459	TDS212A13400	13,400	.5276	124	77	60	2,3	45	14
4167239	TDS202A13500	4162460	TDS212A13500	13,500	.5315	124	77	60	2,3	45	14
4167240	TDS202A13600	4162461	TDS212A13600	13,600	.5354	124	77	60	2,3	45	14
4167241	TDS202A13700	4162462	TDS212A13700	13,700	.5394	124	77	60	2,4	45	14
4167242	TDS202A13800	4162463	TDS212A13800	13,800	.5433	124	77	60	2,4	45	14
4167243	TDS202A13891	4162464	TDS212A13891	13,891	.5469	124	77	60	2,4	45	14
4167244	TDS202A13900	4162465	TDS212A13900	13,900	.5472	124	77	60	2,4	45	14
4167245	TDS202A14000	4162466	TDS212A14000	14,000	.5512	124	77	60	2,4	45	14
4167246	TDS202A14100	4162467	TDS212A14100	14,100	.5551	133	83	63	2,4	48	16
4167247	TDS202A14200	4162468	TDS212A14200	14,200	.5591	133	83	63	2,5	48	16
4167248	TDS202A14288	4162469	TDS212A14288	14,288	.5625	133	83	63	2,5	48	16
4167249	TDS202A14300	4162470	TDS212A14300	14,300	.5630	133	83	63	2,5	48	16
4167250	TDS202A14400	4162471	TDS212A14400	14,400	.5669	133	83	63	2,5	48	16
4167251	TDS202A14500	4162472	TDS212A14500	14,500	.5709	133	83	63	2,5	48	16
4167252	TDS202A14600	4162473	TDS212A14600	14,600	.5748	133	83	63	2,5	48	16
4167253	TDS202A14684	4162474	TDS212A14684	14,684	.5781	133	83	63	2,5	48	16
4167254	TDS202A14700	4162475	TDS212A14700	14,700	.5787	133	83	63	2,5	48	16
4167255	TDS202A14800	4162476	TDS212A14800	14,800	.5827	133	83	63	2,6	48	16
4167256	TDS202A14900	4162477	TDS212A14900	14,900	.5866	133	83	63	2,6	48	16
4167257	TDS202A15000	4162478	TDS212A15000	15,000	.5906	133	83	63	2,6	48	16
4167258	TDS202A15083	4162479	TDS212A15083	15,083	.5938	133	83	63	2,6	48	16
4167259	TDS202A15100	4162480	TDS212A15100	15,100	.5945	133	83	63	2,6	48	16
4167260	TDS202A15200	4162481	TDS212A15200	15,200	.5984	133	83	63	2,6	48	16
4167261	TDS202A15300	4162482	TDS212A15300	15,300	.6024	133	83	63	2,6	48	16
4167262	TDS202A15400	4162483	TDS212A15400	15,400	.6063	133	83	63	2,7	48	16
4167263	TDS202A15479	4162484	TDS212A15479	15,479	.6094	133	83	63	2,7	48	16
4167264	TDS202A15500	4162485	TDS212A15500	15,500	.6102	133	83	63	2,7	48	16
4167265	TDS202A15600	4162486	TDS212A15600	15,600	.6142	133	83	63	2,7	48	16
4167266	TDS202A15700	4162487	TDS212A15700	15,700	.6181	133	83	63	2,7	48	16
4167267	TDS202A15800	4162488	TDS212A15800	15,800	.6220	133	83	63	2,7	48	16
4167268	TDS202A15875	4162489	TDS212A15875	15,875	.6250	133	83	63	2,7	48	16
4167269	TDS202A15900	4162490	TDS212A15900	15,900	.6260	133	83	63	2,8	48	16
4167270	TDS202A16000	4162491	TDS212A16000	16,000	.6299	133	83	63	2,8	48	16
4167271	TDS202A16100	4162492	TDS212A16100	16,100	.6339	143	93	71	2,8	48	18
4167272	TDS202A16200	4162493	TDS212A16200	16,200	.6378	143	93	71	2,8	48	18
4167273	TDS202A16271	4162494	TDS212A16271	16,271	.6406	143	93	71	2,8	48	18
4167274	TDS202A16300	4162495	TDS212A16300	16,300	.6417	143	93	71	2,8	48	18
4167275	TDS202A16400	4162496	TDS212A16400	16,400	.6457	143	93	71	2,8	48	18

(continued)

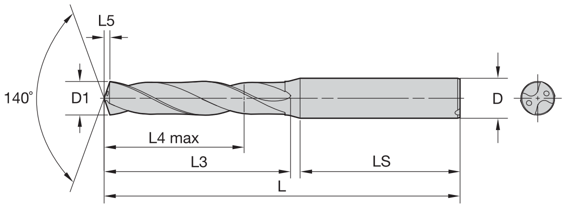
(TDS202A • TDS212A • 5 x D — continued)



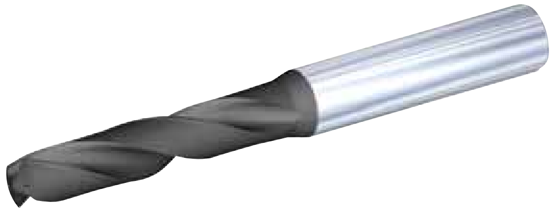


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4167276	TDS202A16500	4162497	TDS212A16500	16,500	.6496	143	93	71	2,9	48	18
4167277	TDS202A16600	4162498	TDS212A16600	16,600	.6535	143	93	71	2,9	48	18
4167278	TDS202A16670	4162499	TDS212A16670	16,670	.6563	143	93	71	2,9	48	18
4167279	TDS202A16700	4162500	TDS212A16700	16,700	.6575	143	93	71	2,9	48	18
4167280	TDS202A16800	4162501	TDS212A16800	16,800	.6614	143	93	71	2,9	48	18
4167281	TDS202A16900	4162502	TDS212A16900	16,900	.6654	143	93	71	2,9	48	18
4167282	TDS202A17000	4162503	TDS212A17000	17,000	.6693	143	93	71	2,9	48	18
4167283	TDS202A17100	4162504	TDS212A17100	17,100	.6732	143	93	71	3,0	48	18
4167284	TDS202A17200	4162505	TDS212A17200	17,200	.6772	143	93	71	3,0	48	18
4167285	TDS202A17300	4162506	TDS212A17300	17,300	.6811	143	93	71	3,0	48	18
4167286	TDS202A17400	4162507	TDS212A17400	17,400	.6850	143	93	71	3,0	48	18
4167287	TDS202A17463	4162508	TDS212A17463	17,463	.6875	143	93	71	3,0	48	18
4167288	TDS202A17500	4162509	TDS212A17500	17,500	.6890	143	93	71	3,0	48	18
4167289	TDS202A17600	4162510	TDS212A17600	17,600	.6929	143	93	71	3,1	48	18
4167290	TDS202A17700	4162511	TDS212A17700	17,700	.6969	143	93	71	3,1	48	18
4167291	TDS202A17800	4162512	TDS212A17800	17,800	.7008	143	93	71	3,1	48	18
4167292	TDS202A17859	4162513	TDS212A17859	17,859	.7031	143	93	71	3,1	48	18
4167293	TDS202A17900	4162514	TDS212A17900	17,900	.7047	143	93	71	3,1	48	18
4163313	TDS202A18000	4160528	TDS212A18000	18,000	.7087	143	93	71	3,1	48	18
4163314	TDS202A18100	4160464	TDS212A18100	18,100	.7126	153	101	77	3,1	50	20
4163305	TDS202A18200	4160465	TDS212A18200	18,200	.7165	153	101	77	3,2	50	20
4163306	TDS202A18258	4160466	TDS212A18258	18,258	.7188	153	101	77	3,2	50	20
4163307	TDS202A18300	4160467	TDS212A18300	18,300	.7205	153	101	77	3,2	50	20
4163308	TDS202A18400	4160468	TDS212A18400	18,400	.7244	153	101	77	3,2	50	20
4163309	TDS202A18500	4160469	TDS212A18500	18,500	.7283	153	101	77	3,2	50	20
4163310	TDS202A18600	4160470	TDS212A18600	18,600	.7323	153	101	77	3,2	50	20
4163311	TDS202A18654	4160471	TDS212A18654	18,654	.7344	153	101	77	3,2	50	20
4163312	TDS202A18700	4160472	TDS212A18700	18,700	.7362	153	101	77	3,2	50	20
4163323	TDS202A18800	4160583	TDS212A18800	18,800	.7402	153	101	77	3,3	50	20
4163324	TDS202A18900	4160584	TDS212A18900	18,900	.7441	153	101	77	3,3	50	20
4163325	TDS202A19000	4160585	TDS212A19000	19,000	.7480	153	101	77	3,3	50	20
4163326	TDS202A19050	4160586	TDS212A19050	19,050	.7500	153	101	77	3,3	50	20
4163327	TDS202A19100	4160587	TDS212A19100	19,100	.7520	153	101	77	3,3	50	20
4163328	TDS202A19200	4160588	TDS212A19200	19,200	.7559	153	101	77	3,3	50	20
4163329	TDS202A19300	4160589	TDS212A19300	19,300	.7598	153	101	77	3,4	50	20
4163330	TDS202A19400	4160590	TDS212A19400	19,400	.7638	153	101	77	3,4	50	20
4163331	TDS202A19500	4160591	TDS212A19500	19,500	.7677	153	101	77	3,4	50	20
4163332	TDS202A19600	4160592	TDS212A19600	19,600	.7717	153	101	77	3,4	50	20
4163333	TDS202A19700	4160593	TDS212A19700	19,700	.7756	153	101	77	3,4	50	20
4163334	TDS202A19800	4160594	TDS212A19800	19,800	.7795	153	101	77	3,4	50	20
4163335	TDS202A19900	4160595	TDS212A19900	19,900	.7835	153	101	77	3,5	50	20
4163336	TDS202A20000	4160596	TDS212A20000	20,000	.7874	153	101	77	3,5	50	20



For information on L, L3, and L4 max, see page T143.



TDS401A • TDS411A • 3 x D

P	●
M	○
K	○
N	
S	
H	

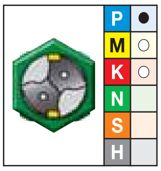
P	○
M	
K	●
N	
S	
H	

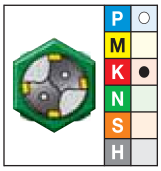
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163315	TDS401A03000	4157799	TDS411A03000	3,000	.1181	62	20	14	0,5	36	6
4163337	TDS401A03048	4157800	TDS411A03048	3,048	.1200	62	20	14	0,5	36	6
4163338	TDS401A03100	4157801	TDS411A03100	3,100	.1220	62	20	14	0,5	36	6
4163339	TDS401A03175	4157802	TDS411A03175	3,175	.1250	62	20	14	0,5	36	6
4163340	TDS401A03200	4157803	TDS411A03200	3,200	.1260	62	20	14	0,5	36	6
4163341	TDS401A03264	4157804	TDS411A03264	3,264	.1285	62	20	14	0,5	36	6
4163342	TDS401A03300	4157805	TDS411A03300	3,300	.1299	62	20	14	0,5	36	6
4163463	TDS401A03400	4157806	TDS411A03400	3,400	.1339	62	20	14	0,6	36	6
4163464	TDS401A03455	4157807	TDS411A03455	3,455	.1360	62	20	14	0,6	36	6
4163465	TDS401A03500	4157808	TDS411A03500	3,500	.1378	62	20	14	0,6	36	6
4163466	TDS401A03571	4157809	TDS411A03571	3,571	.1406	62	20	14	0,6	36	6
4163467	TDS401A03600	4157810	TDS411A03600	3,600	.1417	62	20	14	0,6	36	6
4163468	TDS401A03658	4157811	TDS411A03658	3,658	.1440	62	20	14	0,6	36	6
4163469	TDS401A03700	4157812	TDS411A03700	3,700	.1457	62	20	14	0,6	36	6
4163470	TDS401A03734	4157813	TDS411A03734	3,734	.1470	62	20	14	0,6	36	6
4163471	TDS401A03800	4157814	TDS411A03800	3,800	.1496	66	24	17	0,6	36	6
4163472	TDS401A03900	4157815	TDS411A03900	3,900	.1535	66	24	17	0,6	36	6
4163473	TDS401A03970	4157816	TDS411A03970	3,970	.1563	66	24	17	0,7	36	6
4163474	TDS401A04000	4157817	TDS411A04000	4,000	.1575	66	24	17	0,7	36	6
4163475	TDS401A04039	4157818	TDS411A04039	4,039	.1590	66	24	17	0,7	36	6
4163476	TDS401A04090	4157819	TDS411A04090	4,090	.1610	66	24	17	0,7	36	6
4163477	TDS401A04100	4157820	TDS411A04100	4,100	.1614	66	24	17	0,7	36	6
4163478	TDS401A04200	4157821	TDS411A04200	4,200	.1654	66	24	17	0,7	36	6
4163479	TDS401A04217	4157822	TDS411A04217	4,217	.1660	66	24	17	0,7	36	6

(continued)

(TDS401A • TDS411A • 3 x D — continued)



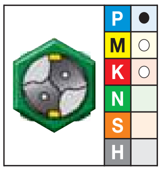


● first choice
○ alternate choice

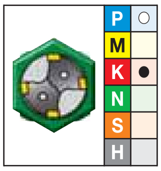
grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163480	TDS401A04300	4157823	TDS411A04300	4,300	.1693	66	24	17	0,7	36	6
4163481	TDS401A04366	4157824	TDS411A04366	4,366	.1719	66	24	17	0,7	36	6
4163482	TDS401A04400	4157825	TDS411A04400	4,400	.1732	66	24	17	0,7	36	6
4163483	TDS401A04500	4157826	TDS411A04500	4,500	.1772	66	24	17	0,7	36	6
4163484	TDS401A04600	4157827	TDS411A04600	4,600	.1811	66	24	17	0,8	36	6
4163485	TDS401A04623	4157828	TDS411A04623	4,623	.1820	66	24	17	0,8	36	6
4163486	TDS401A04700	4157829	TDS411A04700	4,700	.1850	66	24	17	0,8	36	6
4163487	TDS401A04763	4157830	TDS411A04763	4,763	.1875	66	28	20	0,8	36	6
4163488	TDS401A04800	4157831	TDS411A04800	4,800	.1890	66	28	20	0,8	36	6
4163489	TDS401A04852	4157832	TDS411A04852	4,852	.1910	66	28	20	0,8	36	6
4163490	TDS401A04900	4157833	TDS411A04900	4,900	.1929	66	28	20	0,8	36	6
4163491	TDS401A05000	4157834	TDS411A05000	5,000	.1969	66	28	20	0,8	36	6
4163492	TDS401A05100	4157835	TDS411A05100	5,100	.2008	66	28	20	0,8	36	6
4163493	TDS401A05106	4157836	TDS411A05106	5,106	.2010	66	28	20	0,8	36	6
4163494	TDS401A05159	4157837	TDS411A05159	5,159	.2031	66	28	20	0,9	36	6
4163495	TDS401A05200	4157838	TDS411A05200	5,200	.2047	66	28	20	0,9	36	6
4163496	TDS401A05300	4157839	TDS411A05300	5,300	.2087	66	28	20	0,9	36	6
4163497	TDS401A05400	4157840	TDS411A05400	5,400	.2126	66	28	20	0,9	36	6
4163498	TDS401A05410	4157841	TDS411A05410	5,410	.2130	66	28	20	0,9	36	6
4163499	TDS401A05500	4157842	TDS411A05500	5,500	.2165	66	28	20	0,9	36	6
4163500	TDS401A05558	4157843	TDS411A05558	5,558	.2188	66	28	20	0,9	36	6
4163501	TDS401A05600	4157844	TDS411A05600	5,600	.2205	66	28	20	0,9	36	6
4163502	TDS401A05616	4157845	TDS411A05616	5,616	.2211	66	28	20	0,9	36	6
4163503	TDS401A05700	4157846	TDS411A05700	5,700	.2244	66	28	20	1,0	36	6
4163504	TDS401A05800	4157847	TDS411A05800	5,800	.2283	66	28	20	1,0	36	6
4163505	TDS401A05900	4157848	TDS411A05900	5,900	.2323	66	28	20	1,0	36	6
4163506	TDS401A05954	4157849	TDS411A05954	5,954	.2344	66	28	20	1,0	36	6
4163507	TDS401A06000	4157850	TDS411A06000	6,000	.2362	66	28	20	1,0	36	6
4163508	TDS401A06100	4157851	TDS411A06100	6,100	.2402	79	34	24	1,0	36	8
4163509	TDS401A06200	4157852	TDS411A06200	6,200	.2441	79	34	24	1,0	36	8
4163510	TDS401A06300	4157853	TDS411A06300	6,300	.2480	79	34	24	1,1	36	8
4163511	TDS401A06350	4157854	TDS411A06350	6,350	.2500	79	34	24	1,1	36	8
4163512	TDS401A06400	4157855	TDS411A06400	6,400	.2520	79	34	24	1,1	36	8
4163513	TDS401A06500	4157856	TDS411A06500	6,500	.2559	79	34	24	1,1	36	8
4163514	TDS401A06528	4157857	TDS411A06528	6,528	.2570	79	34	24	1,1	36	8
4163515	TDS401A06600	4157858	TDS411A06600	6,600	.2598	79	34	24	1,1	36	8
4163516	TDS401A06630	4157859	TDS411A06630	6,630	.2610	79	34	24	1,1	36	8
4163517	TDS401A06700	4157860	TDS411A06700	6,700	.2638	79	34	24	1,1	36	8
4163518	TDS401A06746	4157861	TDS411A06746	6,746	.2656	79	34	24	1,1	36	8
4163519	TDS401A06800	4157862	TDS411A06800	6,800	.2677	79	34	24	1,1	36	8

(continued)

(TDS401A • TDS411A • 3 x D — continued)



grade WP20PD
TiAlN



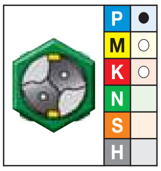
grade WK15PD
AlCrN

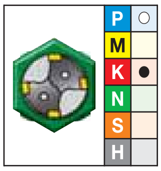
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163520	TDS401A06900	4157863	TDS411A06900	6,900	.2717	79	34	24	1,2	36	8
4163521	TDS401A07000	4157864	TDS411A07000	7,000	.2756	79	34	24	1,2	36	8
4163522	TDS401A07100	4157865	TDS411A07100	7,100	.2795	79	41	29	1,2	36	8
4163523	TDS401A07145	4157866	TDS411A07145	7,145	.2813	79	41	29	1,2	36	8
4163524	TDS401A07200	4157867	TDS411A07200	7,200	.2835	79	41	29	1,2	36	8
4163525	TDS401A07300	4157868	TDS411A07300	7,300	.2874	79	41	29	1,2	36	8
4163526	TDS401A07400	4157869	TDS411A07400	7,400	.2913	79	41	29	1,3	36	8
4163527	TDS401A07500	4157870	TDS411A07500	7,500	.2953	79	41	29	1,3	36	8
4163528	TDS401A07541	4157871	TDS411A07541	7,541	.2969	79	41	29	1,3	36	8
4163529	TDS401A07600	4157872	TDS411A07600	7,600	.2992	79	41	29	1,3	36	8
4163530	TDS401A07700	4157873	TDS411A07700	7,700	.3031	79	41	29	1,3	36	8
4163531	TDS401A07800	4157874	TDS411A07800	7,800	.3071	79	41	29	1,3	36	8
4163532	TDS401A07900	4157875	TDS411A07900	7,900	.3110	79	41	29	1,3	36	8
4163533	TDS401A07938	4157876	TDS411A07938	7,938	.3125	79	41	29	1,3	36	8
4163534	TDS401A08000	4157877	TDS411A08000	8,000	.3150	79	41	29	1,4	36	8
4163535	TDS401A08100	4157878	TDS411A08100	8,100	.3189	89	47	35	1,4	40	10
4163536	TDS401A08200	4157879	TDS411A08200	8,200	.3228	89	47	35	1,4	40	10
4163537	TDS401A08300	4157880	TDS411A08300	8,300	.3268	89	47	35	1,4	40	10
4163538	TDS401A08334	4157881	TDS411A08334	8,334	.3281	89	47	35	1,4	40	10
4163539	TDS401A08400	4157882	TDS411A08400	8,400	.3307	89	47	35	1,4	40	10
4163540	TDS401A08433	4157883	TDS411A08433	8,433	.3320	89	47	35	1,4	40	10
4163541	TDS401A08500	4157884	TDS411A08500	8,500	.3346	89	47	35	1,4	40	10
4163542	TDS401A08600	4157885	TDS411A08600	8,600	.3386	89	47	35	1,5	40	10
4163543	TDS401A08700	4157886	TDS411A08700	8,700	.3425	89	47	35	1,5	40	10
4163544	TDS401A08733	4157887	TDS411A08733	8,733	.3438	89	47	35	1,5	40	10
4163545	TDS401A08800	4157888	TDS411A08800	8,800	.3465	89	47	35	1,5	40	10
4163546	TDS401A08900	4157889	TDS411A08900	8,900	.3504	89	47	35	1,5	40	10
4163547	TDS401A09000	4157890	TDS411A09000	9,000	.3543	89	47	35	1,5	40	10
4163548	TDS401A09100	4157891	TDS411A09100	9,100	.3583	89	47	35	1,5	40	10
4163549	TDS401A09129	4157892	TDS411A09129	9,129	.3594	89	47	35	1,6	40	10
4163550	TDS401A09200	4157893	TDS411A09200	9,200	.3622	89	47	35	1,6	40	10
4163551	TDS401A09300	4157894	TDS411A09300	9,300	.3661	89	47	35	1,6	40	10
4163552	TDS401A09347	4157895	TDS411A09347	9,347	.3680	89	47	35	1,6	40	10
4163553	TDS401A09400	4157896	TDS411A09400	9,400	.3701	89	47	35	1,6	40	10
4163554	TDS401A09500	4157897	TDS411A09500	9,500	.3740	89	47	35	1,6	40	10
4163555	TDS401A09525	4157898	TDS411A09525	9,525	.3750	89	47	35	1,6	40	10
4163556	TDS401A09600	4157899	TDS411A09600	9,600	.3780	89	47	35	1,6	40	10
4163557	TDS401A09700	4157900	TDS411A09700	9,700	.3819	89	47	35	1,7	40	10
4163558	TDS401A09800	4157901	TDS411A09800	9,800	.3858	89	47	35	1,7	40	10
4163559	TDS401A09900	4157902	TDS411A09900	9,900	.3898	89	47	35	1,7	40	10

(continued)

(TDS401A • TDS411A • 3 x D — continued)



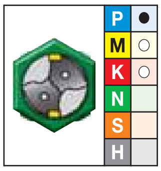


● first choice
○ alternate choice

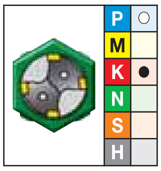
grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163560	TDS401A09921	4157903	TDS411A09921	9,921	.3906	89	47	35	1,7	40	10
4162950	TDS401A10000	4156562	TDS411A10000	10,000	.3937	89	47	35	1,7	40	10
4162951	TDS401A10100	4156603	TDS411A10100	10,100	.3976	102	55	40	1,7	45	12
4162952	TDS401A10200	4156604	TDS411A10200	10,200	.4016	102	55	40	1,7	45	12
4163343	TDS401A10300	4156605	TDS411A10300	10,300	.4055	102	55	40	1,8	45	12
4163344	TDS401A10320	4156606	TDS411A10320	10,320	.4063	102	55	40	1,8	45	12
4163345	TDS401A10400	4156607	TDS411A10400	10,400	.4094	102	55	40	1,8	45	12
4163346	TDS401A10500	4156608	TDS411A10500	10,500	.4134	102	55	40	1,8	45	12
4163347	TDS401A10600	4156609	TDS411A10600	10,600	.4173	102	55	40	1,8	45	12
4163348	TDS401A10700	4156610	TDS411A10700	10,700	.4213	102	55	40	1,8	45	12
4163349	TDS401A10716	4156611	TDS411A10716	10,716	.4219	102	55	40	1,8	45	12
4163350	TDS401A10800	4156612	TDS411A10800	10,800	.4252	102	55	40	1,8	45	12
4163351	TDS401A10900	4156613	TDS411A10900	10,900	.4291	102	55	40	1,9	45	12
4163352	TDS401A11000	4156614	TDS411A11000	11,000	.4331	102	55	40	1,9	45	12
4163353	TDS401A11100	4156615	TDS411A11100	11,100	.4370	102	55	40	1,9	45	12
4163354	TDS401A11113	4156616	TDS411A11113	11,113	.4375	102	55	40	1,9	45	12
4163355	TDS401A11200	4156617	TDS411A11200	11,200	.4409	102	55	40	1,9	45	12
4163356	TDS401A11300	4156618	TDS411A11300	11,300	.4449	102	55	40	1,9	45	12
4163357	TDS401A11400	4156619	TDS411A11400	11,400	.4488	102	55	40	2,0	45	12
4163358	TDS401A11500	4156620	TDS411A11500	11,500	.4528	102	55	40	2,0	45	12
4163359	TDS401A11509	4156621	TDS411A11509	11,509	.4531	102	55	40	2,0	45	12
4163360	TDS401A11600	4156622	TDS411A11600	11,600	.4567	102	55	40	2,0	45	12
4163361	TDS401A11700	4156623	TDS411A11700	11,700	.4606	102	55	40	2,0	45	12
4163362	TDS401A11800	4156624	TDS411A11800	11,800	.4646	102	55	40	2,0	45	12
4163363	TDS401A11900	4156625	TDS411A11900	11,900	.4685	102	55	40	2,0	45	12
4163364	TDS401A11908	4156626	TDS411A11908	11,908	.4688	102	55	40	2,0	45	12
4163365	TDS401A12000	4156627	TDS411A12000	12,000	.4724	102	55	40	2,1	45	12
4163366	TDS401A12100	4156628	TDS411A12100	12,100	.4764	107	60	43	2,1	45	14
4163367	TDS401A12200	4156629	TDS411A12200	12,200	.4803	107	60	43	2,1	45	14
4163368	TDS401A12300	4156630	TDS411A12300	12,300	.4843	107	60	43	2,1	45	14
4163369	TDS401A12304	4156631	TDS411A12304	12,304	.4844	107	60	43	2,1	45	14
4163370	TDS401A12400	4156632	TDS411A12400	12,400	.4882	107	60	43	2,1	45	14
4163371	TDS401A12500	4156633	TDS411A12500	12,500	.4921	107	60	43	2,1	45	14
4163372	TDS401A12600	4156634	TDS411A12600	12,600	.4961	107	60	43	2,2	45	14
4163373	TDS401A12700	4156635	TDS411A12700	12,700	.5000	107	60	43	2,2	45	14
4163374	TDS401A12800	4156636	TDS411A12800	12,800	.5039	107	60	43	2,2	45	14
4163375	TDS401A12900	4156637	TDS411A12900	12,900	.5079	107	60	43	2,2	45	14
4163376	TDS401A13000	4156638	TDS411A13000	13,000	.5118	107	60	43	2,2	45	14
4163377	TDS401A13096	4156639	TDS411A13096	13,096	.5156	107	60	43	2,3	45	14
4163378	TDS401A13100	4156640	TDS411A13100	13,100	.5157	107	60	43	2,3	45	14

(continued)

(TDS401A • TDS411A • 3 x D — continued)



grade WP20PD
TiAlN



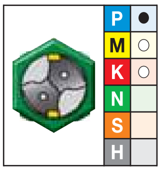
grade WK15PD
AlCrN

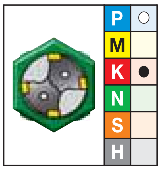
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163379	TDS401A13200	4156641	TDS411A13200	13,200	.5197	107	60	43	2,3	45	14
4163380	TDS401A13300	4156642	TDS411A13300	13,300	.5236	107	60	43	2,3	45	14
4163381	TDS401A13400	4156643	TDS411A13400	13,400	.5276	107	60	43	2,3	45	14
4163382	TDS401A13500	4156644	TDS411A13500	13,500	.5315	107	60	43	2,3	45	14
4163383	TDS401A13600	4156645	TDS411A13600	13,600	.5354	107	60	43	2,3	45	14
4163384	TDS401A13700	4156646	TDS411A13700	13,700	.5394	107	60	43	2,4	45	14
4163385	TDS401A13800	4156647	TDS411A13800	13,800	.5433	107	60	43	2,4	45	14
4163386	TDS401A13891	4156648	TDS411A13891	13,891	.5469	107	60	43	2,4	45	14
4163387	TDS401A13900	4156649	TDS411A13900	13,900	.5472	107	60	43	2,4	45	14
4163388	TDS401A14000	4156650	TDS411A14000	14,000	.5512	107	60	43	2,4	45	14
4163389	TDS401A14100	4156651	TDS411A14100	14,100	.5551	115	65	45	2,4	48	16
4163390	TDS401A14200	4156652	TDS411A14200	14,200	.5591	115	65	45	2,5	48	16
4163391	TDS401A14288	4156653	TDS411A14288	14,288	.5625	115	65	45	2,5	48	16
4163392	TDS401A14300	4156654	TDS411A14300	14,300	.5630	115	65	45	2,5	48	16
4163393	TDS401A14400	4156655	TDS411A14400	14,400	.5669	115	65	45	2,5	48	16
4163394	TDS401A14500	4156656	TDS411A14500	14,500	.5709	115	65	45	2,5	48	16
4163395	TDS401A14600	4156657	TDS411A14600	14,600	.5748	115	65	45	2,5	48	16
4163396	TDS401A14684	4156658	TDS411A14684	14,684	.5781	115	65	45	2,5	48	16
4163397	TDS401A14700	4156659	TDS411A14700	14,700	.5787	115	65	45	2,5	48	16
4163398	TDS401A14800	4156660	TDS411A14800	14,800	.5827	115	65	45	2,6	48	16
4163399	TDS401A14900	4156661	TDS411A14900	14,900	.5866	115	65	45	2,6	48	16
4163400	TDS401A15000	4156662	TDS411A15000	15,000	.5906	115	65	45	2,6	48	16
4163401	TDS401A15083	4156663	TDS411A15083	15,083	.5938	115	65	45	2,6	48	16
4163402	TDS401A15100	4156664	TDS411A15100	15,100	.5945	115	65	45	2,6	48	16
4163403	TDS401A15200	4156665	TDS411A15200	15,200	.5984	115	65	45	2,6	48	16
4163404	TDS401A15300	4156666	TDS411A15300	15,300	.6024	115	65	45	2,6	48	16
4163405	TDS401A15400	4156667	TDS411A15400	15,400	.6063	115	65	45	2,7	48	16
4163406	TDS401A15479	4156668	TDS411A15479	15,479	.6094	115	65	45	2,7	48	16
4163407	TDS401A15500	4156669	TDS411A15500	15,500	.6102	115	65	45	2,7	48	16
4163408	TDS401A15600	4156670	TDS411A15600	15,600	.6142	115	65	45	2,7	48	16
4163409	TDS401A15700	4156671	TDS411A15700	15,700	.6181	115	65	45	2,7	48	16
4163410	TDS401A15800	4156672	TDS411A15800	15,800	.6220	115	65	45	2,7	48	16
4163411	TDS401A15875	4156673	TDS411A15875	15,875	.6250	115	65	45	2,7	48	16
4163412	TDS401A15900	4156674	TDS411A15900	15,900	.6260	115	65	45	2,8	48	16
4163413	TDS401A16000	4156675	TDS411A16000	16,000	.6299	115	65	45	2,8	48	16
4163414	TDS401A16100	4156676	TDS411A16100	16,100	.6339	123	73	51	2,8	48	18
4163415	TDS401A16200	4156677	TDS411A16200	16,200	.6378	123	73	51	2,8	48	18
4163416	TDS401A16271	4156678	TDS411A16271	16,271	.6406	123	73	51	2,8	48	18
4163417	TDS401A16300	4156679	TDS411A16300	16,300	.6417	123	73	51	2,8	48	18
4163418	TDS401A16400	4156680	TDS411A16400	16,400	.6457	123	73	51	2,8	48	18

(continued)

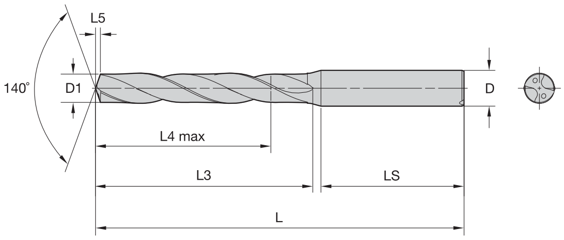
(TDS401A • TDS411A • 3 x D — continued)

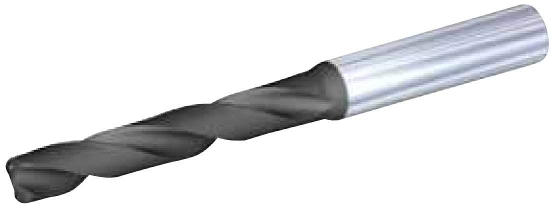




● first choice
○ alternate choice

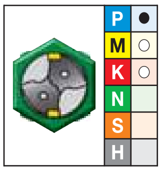
grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163419	TDS401A16500	4156681	TDS411A16500	16,500	.6496	123	73	51	2,9	48	18
4163420	TDS401A16600	4156682	TDS411A16600	16,600	.6535	123	73	51	2,9	48	18
4163421	TDS401A16670	4156683	TDS411A16670	16,670	.6563	123	73	51	2,9	48	18
4163422	TDS401A16700	4156684	TDS411A16700	16,700	.6575	123	73	51	2,9	48	18
4163423	TDS401A16800	4156685	TDS411A16800	16,800	.6614	123	73	51	2,9	48	18
4163424	TDS401A16900	4156686	TDS411A16900	16,900	.6654	123	73	51	2,9	48	18
4163425	TDS401A17000	4156687	TDS411A17000	17,000	.6693	123	73	51	2,9	48	18
4163426	TDS401A17100	4156688	TDS411A17100	17,100	.6732	123	73	51	3,0	48	18
4163427	TDS401A17200	4156689	TDS411A17200	17,200	.6772	123	73	51	3,0	48	18
4163428	TDS401A17300	4156690	TDS411A17300	17,300	.6811	123	73	51	3,0	48	18
4163429	TDS401A17400	4156691	TDS411A17400	17,400	.6850	123	73	51	3,0	48	18
4163430	TDS401A17463	4156692	TDS411A17463	17,463	.6875	123	73	51	3,0	48	18
4163431	TDS401A17500	4156693	TDS411A17500	17,500	.6890	123	73	51	3,0	48	18
4163432	TDS401A17600	4156694	TDS411A17600	17,600	.6929	123	73	51	3,1	48	18
4163433	TDS401A17700	4156695	TDS411A17700	17,700	.6969	123	73	51	3,1	48	18
4163434	TDS401A17800	4156696	TDS411A17800	17,800	.7008	123	73	51	3,1	48	18
4163435	TDS401A17859	4156697	TDS411A17859	17,859	.7031	123	73	51	3,1	48	18
4163436	TDS401A17900	4156698	TDS411A17900	17,900	.7047	123	73	51	3,1	48	18
4163271	TDS401A18000	4156699	TDS411A18000	18,000	.7087	123	73	51	3,1	48	18
4163272	TDS401A18100	4156700	TDS411A18100	18,100	.7126	131	79	55	3,1	50	20
4163283	TDS401A18200	4156701	TDS411A18200	18,200	.7165	131	79	55	3,2	50	20
4163284	TDS401A18258	4156702	TDS411A18258	18,258	.7188	131	79	55	3,2	50	20
4163285	TDS401A18300	4156713	TDS411A18300	18,300	.7205	131	79	55	3,2	50	20
4163286	TDS401A18400	4156714	TDS411A18400	18,400	.7244	131	79	55	3,2	50	20
4163287	TDS401A18500	4156715	TDS411A18500	18,500	.7283	131	79	55	3,2	50	20
4163288	TDS401A18600	4156716	TDS411A18600	18,600	.7323	131	79	55	3,2	50	20
4163289	TDS401A18654	4156717	TDS411A18654	18,654	.7344	131	79	55	3,2	50	20
4163290	TDS401A18700	4156718	TDS411A18700	18,700	.7362	131	79	55	3,2	50	20
4163291	TDS401A18800	4156719	TDS411A18800	18,800	.7402	131	79	55	3,3	50	20
4163292	TDS401A18900	4156720	TDS411A18900	18,900	.7441	131	79	55	3,3	50	20
4163293	TDS401A19000	4156721	TDS411A19000	19,000	.7480	131	79	55	3,3	50	20
4163294	TDS401A19050	4156722	TDS411A19050	19,050	.7500	131	79	55	3,3	50	20
4163295	TDS401A19100	4156723	TDS411A19100	19,100	.7520	131	79	55	3,3	50	20
4163296	TDS401A19200	4156724	TDS411A19200	19,200	.7559	131	79	55	3,3	50	20
4163297	TDS401A19300	4156725	TDS411A19300	19,300	.7598	131	79	55	3,4	50	20
4163298	TDS401A19400	4156726	TDS411A19400	19,400	.7638	131	79	55	3,4	50	20
4163299	TDS401A19500	4156727	TDS411A19500	19,500	.7677	131	79	55	3,4	50	20
4163300	TDS401A19600	4156728	TDS411A19600	19,600	.7717	131	79	55	3,4	50	20
4163301	TDS401A19700	4156729	TDS411A19700	19,700	.7756	131	79	55	3,4	50	20
4163302	TDS401A19800	4156730	TDS411A19800	19,800	.7795	131	79	55	3,4	50	20
4163303	TDS401A19900	4156731	TDS411A19900	19,900	.7835	131	79	55	3,5	50	20
4163304	TDS401A20000	4156732	TDS411A20000	20,000	.7874	131	79	55	3,5	50	20

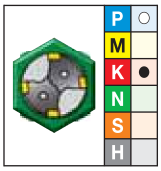




For information on L, L3, and L4 max, see page T143.

■ TDS402A • TDS412A • 5 x D





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162967	TDS402A03000	4158757	TDS412A03000	3,000	.1181	66	28	23	0,5	36	6
4162968	TDS402A03048	4158758	TDS412A03048	3,048	.1200	66	28	23	0,5	36	6
4162969	TDS402A03100	4158759	TDS412A03100	3,100	.1220	66	28	23	0,5	36	6
4162970	TDS402A03175	4158760	TDS412A03175	3,175	.1250	66	28	23	0,5	36	6
4162972	TDS402A03200	4158761	TDS412A03200	3,200	.1260	66	28	23	0,5	36	6
4162983	TDS402A03264	4158762	TDS412A03264	3,264	.1285	66	28	23	0,5	36	6
4162984	TDS402A03300	4158793	TDS412A03300	3,300	.1299	66	28	23	0,5	36	6
4162985	TDS402A03400	4158794	TDS412A03400	3,400	.1339	66	28	23	0,6	36	6
4162986	TDS402A03455	4158795	TDS412A03455	3,455	.1360	66	28	23	0,6	36	6
4162987	TDS402A03500	4158796	TDS412A03500	3,500	.1378	66	28	23	0,6	36	6
4162988	TDS402A03571	4158797	TDS412A03571	3,571	.1406	66	28	23	0,6	36	6
4162989	TDS402A03600	4158798	TDS412A03600	3,600	.1417	66	28	23	0,6	36	6
4162990	TDS402A03658	4158799	TDS412A03658	3,658	.1440	66	28	23	0,6	36	6
4162991	TDS402A03700	4158800	TDS412A03700	3,700	.1457	66	28	23	0,6	36	6
4162992	TDS402A03734	4158801	TDS412A03734	3,734	.1470	66	28	23	0,6	36	6
4162993	TDS402A03800	4158802	TDS412A03800	3,800	.1496	74	36	29	0,6	36	6
4162994	TDS402A03900	4158803	TDS412A03900	3,900	.1535	74	36	29	0,6	36	6
4162995	TDS402A03970	4158804	TDS412A03970	3,970	.1563	74	36	29	0,7	36	6
4162996	TDS402A04000	4158805	TDS412A04000	4,000	.1575	74	36	29	0,7	36	6
4162997	TDS402A04039	4158806	TDS412A04039	4,039	.1590	74	36	29	0,7	36	6
4162998	TDS402A04090	4158807	TDS412A04090	4,090	.1610	74	36	29	0,7	36	6
4162999	TDS402A04100	4158808	TDS412A04100	4,100	.1614	74	36	29	0,7	36	6
4163000	TDS402A04200	4158809	TDS412A04200	4,200	.1654	74	36	29	0,7	36	6
4163001	TDS402A04217	4158810	TDS412A04217	4,217	.1660	74	36	29	0,7	36	6

(continued)

(TDS402A • TDS412A • 5 x D — continued)


P ● M ○ K ○ N S H

grade WP20PD TiAlN


P ○ M K ● N S H

grade WK15PD AlCrN

● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163002	TDS402A04300	4158811	TDS412A04300	4,300	.1693	74	36	29	0,7	36	6
4163013	TDS402A04366	4158812	TDS412A04366	4,366	.1719	74	36	29	0,7	36	6
4163014	TDS402A04400	4158813	TDS412A04400	4,400	.1732	74	36	29	0,7	36	6
4163015	TDS402A04500	4158814	TDS412A04500	4,500	.1772	74	36	29	0,7	36	6
4163016	TDS402A04600	4158815	TDS412A04600	4,600	.1811	74	36	29	0,8	36	6
4163017	TDS402A04623	4158816	TDS412A04623	4,623	.1820	74	36	29	0,8	36	6
4163018	TDS402A04700	4158817	TDS412A04700	4,700	.1850	74	36	29	0,8	36	6
4163019	TDS402A04763	4158818	TDS412A04763	4,763	.1875	82	44	35	0,8	36	6
4163020	TDS402A04800	4158819	TDS412A04800	4,800	.1890	82	44	35	0,8	36	6
4163021	TDS402A04852	4158820	TDS412A04852	4,852	.1910	82	44	35	0,8	36	6
4163022	TDS402A04900	4158821	TDS412A04900	4,900	.1929	82	44	35	0,8	36	6
4163023	TDS402A05000	4158822	TDS412A05000	5,000	.1969	82	44	35	0,8	36	6
4163024	TDS402A05100	4158823	TDS412A05100	5,100	.2008	82	44	35	0,8	36	6
4163025	TDS402A05106	4158824	TDS412A05106	5,106	.2010	82	44	35	0,8	36	6
4163026	TDS402A05159	4158825	TDS412A05159	5,159	.2031	82	44	35	0,9	36	6
4163027	TDS402A05200	4158826	TDS412A05200	5,200	.2047	82	44	35	0,9	36	6
4163028	TDS402A05300	4158827	TDS412A05300	5,300	.2087	82	44	35	0,9	36	6
4163029	TDS402A05400	4158828	TDS412A05400	5,400	.2126	82	44	35	0,9	36	6
4163030	TDS402A05410	4158829	TDS412A05410	5,410	.2130	82	44	35	0,9	36	6
4163031	TDS402A05500	4158830	TDS412A05500	5,500	.2165	82	44	35	0,9	36	6
4163032	TDS402A05558	4158831	TDS412A05558	5,558	.2188	82	44	35	0,9	36	6
4163034	TDS402A05600	4158832	TDS412A05600	5,600	.2205	82	44	35	0,9	36	6
4163035	TDS402A05616	4158833	TDS412A05616	5,616	.2211	82	44	35	0,9	36	6
4163036	TDS402A05700	4158834	TDS412A05700	5,700	.2244	82	44	35	1,0	36	6
4163037	TDS402A05800	4158835	TDS412A05800	5,800	.2283	82	44	35	1,0	36	6
4163038	TDS402A05900	4158836	TDS412A05900	5,900	.2323	82	44	35	1,0	36	6
4163039	TDS402A05954	4158837	TDS412A05954	5,954	.2344	82	44	35	1,0	36	6
4163040	TDS402A06000	4158838	TDS412A06000	6,000	.2362	82	44	35	1,0	36	6
4163041	TDS402A06100	4158839	TDS412A06100	6,100	.2402	91	53	43	1,0	36	8
4163042	TDS402A06200	4158840	TDS412A06200	6,200	.2441	91	53	43	1,0	36	8
4163043	TDS402A06300	4158841	TDS412A06300	6,300	.2480	91	53	43	1,1	36	8
4163044	TDS402A06350	4158842	TDS412A06350	6,350	.2500	91	53	43	1,1	36	8
4163045	TDS402A06400	4158843	TDS412A06400	6,400	.2520	91	53	43	1,1	36	8
4163046	TDS402A06500	4158844	TDS412A06500	6,500	.2559	91	53	43	1,1	36	8
4163047	TDS402A06528	4158845	TDS412A06528	6,528	.2570	91	53	43	1,1	36	8
4163048	TDS402A06600	4158846	TDS412A06600	6,600	.2598	91	53	43	1,1	36	8
4163049	TDS402A06630	4158847	TDS412A06630	6,630	.2610	91	53	43	1,1	36	8
4163050	TDS402A06700	4158848	TDS412A06700	6,700	.2638	91	53	43	1,1	36	8
4163051	TDS402A06746	4158849	TDS412A06746	6,746	.2656	91	53	43	1,1	36	8
4163052	TDS402A06800	4158850	TDS412A06800	6,800	.2677	91	53	43	1,1	36	8

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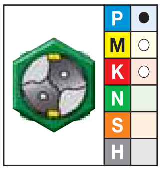
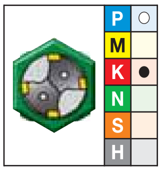
(TDS402A • TDS412A • 5 x D — continued)





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163053	TDS402A06900	4158851	TDS412A06900	6,900	.2717	91	53	43	1,2	36	8
4163054	TDS402A07000	4158852	TDS412A07000	7,000	.2756	91	53	43	1,2	36	8
4163055	TDS402A07100	4158853	TDS412A07100	7,100	.2795	91	53	43	1,2	36	8
4163056	TDS402A07145	4158854	TDS412A07145	7,145	.2813	91	53	43	1,2	36	8
4163057	TDS402A07200	4158855	TDS412A07200	7,200	.2835	91	53	43	1,2	36	8
4163058	TDS402A07300	4158856	TDS412A07300	7,300	.2874	91	53	43	1,2	36	8
4163059	TDS402A07400	4158857	TDS412A07400	7,400	.2913	91	53	43	1,3	36	8
4163060	TDS402A07500	4158858	TDS412A07500	7,500	.2953	91	53	43	1,3	36	8
4163061	TDS402A07541	4158859	TDS412A07541	7,541	.2969	91	53	43	1,3	36	8
4163062	TDS402A07600	4158860	TDS412A07600	7,600	.2992	91	53	43	1,3	36	8
4163063	TDS402A07700	4158861	TDS412A07700	7,700	.3031	91	53	43	1,3	36	8
4163064	TDS402A07800	4158862	TDS412A07800	7,800	.3071	91	53	43	1,3	36	8
4163065	TDS402A07900	4158863	TDS412A07900	7,900	.3110	91	53	43	1,3	36	8
4163066	TDS402A07938	4158864	TDS412A07938	7,938	.3125	91	53	43	1,3	36	8
4163067	TDS402A08000	4158865	TDS412A08000	8,000	.3150	91	53	43	1,4	36	8
4163068	TDS402A08100	4158866	TDS412A08100	8,100	.3189	103	61	49	1,4	40	10
4163069	TDS402A08200	4158867	TDS412A08200	8,200	.3228	103	61	49	1,4	40	10
4163070	TDS402A08300	4158868	TDS412A08300	8,300	.3268	103	61	49	1,4	40	10
4163071	TDS402A08334	4158869	TDS412A08334	8,334	.3281	103	61	49	1,4	40	10
4163072	TDS402A08400	4158870	TDS412A08400	8,400	.3307	103	61	49	1,4	40	10
4163073	TDS402A08433	4158871	TDS412A08433	8,433	.3320	103	61	49	1,4	40	10
4163074	TDS402A08500	4158872	TDS412A08500	8,500	.3346	103	61	49	1,4	40	10
4163075	TDS402A08600	4158873	TDS412A08600	8,600	.3386	103	61	49	1,5	40	10
4163077	TDS402A08700	4158874	TDS412A08700	8,700	.3425	103	61	49	1,5	40	10
4163078	TDS402A08733	4158875	TDS412A08733	8,733	.3438	103	61	49	1,5	40	10
4163079	TDS402A08800	4158876	TDS412A08800	8,800	.3465	103	61	49	1,5	40	10
4163080	TDS402A08900	4158877	TDS412A08900	8,900	.3504	103	61	49	1,5	40	10
4163081	TDS402A09000	4158878	TDS412A09000	9,000	.3543	103	61	49	1,5	40	10
4163082	TDS402A09100	4158879	TDS412A09100	9,100	.3583	103	61	49	1,5	40	10
4163083	TDS402A09129	4158880	TDS412A09129	9,129	.3594	103	61	49	1,6	40	10
4163084	TDS402A09200	4158881	TDS412A09200	9,200	.3622	103	61	49	1,6	40	10
4163085	TDS402A09300	4158882	TDS412A09300	9,300	.3661	103	61	49	1,6	40	10
4163086	TDS402A09347	4158883	TDS412A09347	9,347	.3680	103	61	49	1,6	40	10
4163087	TDS402A09400	4158884	TDS412A09400	9,400	.3701	103	61	49	1,6	40	10
4163088	TDS402A09500	4158885	TDS412A09500	9,500	.3740	103	61	49	1,6	40	10
4163089	TDS402A09525	4158886	TDS412A09525	9,525	.3750	103	61	49	1,6	40	10
4163090	TDS402A09600	4158887	TDS412A09600	9,600	.3780	103	61	49	1,6	40	10
4163091	TDS402A09700	4158888	TDS412A09700	9,700	.3819	103	61	49	1,7	40	10
4163092	TDS402A09800	4158889	TDS412A09800	9,800	.3858	103	61	49	1,7	40	10
4163093	TDS402A09900	4158890	TDS412A09900	9,900	.3898	103	61	49	1,7	40	10

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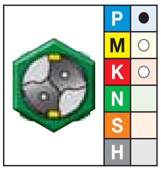
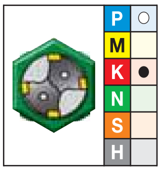
(TDS402A • TDS412A • 5 x D — continued)





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163094	TDS402A09921	4158891	TDS412A09921	9,921	.3906	103	61	49	1,7	40	10
4162803	TDS402A10000	4156602	TDS412A10000	10,000	.3937	103	61	49	1,7	40	10
4162804	TDS402A10100	4156733	TDS412A10100	10,100	.3976	118	71	56	1,7	45	12
4162805	TDS402A10200	4156734	TDS412A10200	10,200	.4016	118	71	56	1,7	45	12
4162806	TDS402A10300	4156735	TDS412A10300	10,300	.4055	118	71	56	1,8	45	12
4162807	TDS402A10320	4156736	TDS412A10320	10,320	.4063	118	71	56	1,8	45	12
4162808	TDS402A10400	4156737	TDS412A10400	10,400	.4094	118	71	56	1,8	45	12
4162809	TDS402A10500	4156738	TDS412A10500	10,500	.4134	118	71	56	1,8	45	12
4162810	TDS402A10600	4156739	TDS412A10600	10,600	.4173	118	71	56	1,8	45	12
4162811	TDS402A10700	4156740	TDS412A10700	10,700	.4213	118	71	56	1,8	45	12
4162812	TDS402A10716	4156741	TDS412A10716	10,716	.4219	118	71	56	1,8	45	12
4162813	TDS402A10800	4156742	TDS412A10800	10,800	.4252	118	71	56	1,8	45	12
4162814	TDS402A10900	4156743	TDS412A10900	10,900	.4291	118	71	56	1,9	45	12
4162815	TDS402A11000	4156744	TDS412A11000	11,000	.4331	118	71	56	1,9	45	12
4162816	TDS402A11100	4156745	TDS412A11100	11,100	.4370	118	71	56	1,9	45	12
4162817	TDS402A11113	4156746	TDS412A11113	11,113	.4375	118	71	56	1,9	45	12
4162818	TDS402A11200	4156747	TDS412A11200	11,200	.4409	118	71	56	1,9	45	12
4162819	TDS402A11300	4156748	TDS412A11300	11,300	.4449	118	71	56	1,9	45	12
4162820	TDS402A11400	4156749	TDS412A11400	11,400	.4488	118	71	56	2,0	45	12
4162821	TDS402A11500	4156750	TDS412A11500	11,500	.4528	118	71	56	2,0	45	12
4162822	TDS402A11509	4156751	TDS412A11509	11,509	.4531	118	71	56	2,0	45	12
4162823	TDS402A11600	4156752	TDS412A11600	11,600	.4567	118	71	56	2,0	45	12
4162824	TDS402A11700	4156753	TDS412A11700	11,700	.4606	118	71	56	2,0	45	12
4162825	TDS402A11800	4156754	TDS412A11800	11,800	.4646	118	71	56	2,0	45	12
4162826	TDS402A11900	4156755	TDS412A11900	11,900	.4685	118	71	56	2,0	45	12
4162827	TDS402A11908	4156756	TDS412A11908	11,908	.4688	118	71	56	2,0	45	12
4162828	TDS402A12000	4156757	TDS412A12000	12,000	.4724	118	71	56	2,1	45	12
4162829	TDS402A12100	4156758	TDS412A12100	12,100	.4764	124	77	60	2,1	45	14
4162830	TDS402A12200	4156759	TDS412A12200	12,200	.4803	124	77	60	2,1	45	14
4162831	TDS402A12300	4156760	TDS412A12300	12,300	.4843	124	77	60	2,1	45	14
4162832	TDS402A12304	4156761	TDS412A12304	12,304	.4844	124	77	60	2,1	45	14
4162833	TDS402A12400	4156762	TDS412A12400	12,400	.4882	124	77	60	2,1	45	14
4162834	TDS402A12500	4156763	TDS412A12500	12,500	.4921	124	77	60	2,1	45	14
4162835	TDS402A12600	4156764	TDS412A12600	12,600	.4961	124	77	60	2,2	45	14
4162836	TDS402A12700	4156765	TDS412A12700	12,700	.5000	124	77	60	2,2	45	14
4162837	TDS402A12800	4156766	TDS412A12800	12,800	.5039	124	77	60	2,2	45	14
4162838	TDS402A12900	4156767	TDS412A12900	12,900	.5079	124	77	60	2,2	45	14
4162839	TDS402A13000	4156768	TDS412A13000	13,000	.5118	124	77	60	2,2	45	14
4162840	TDS402A13096	4156769	TDS412A13096	13,096	.5156	124	77	60	2,3	45	14
4162841	TDS402A13100	4156770	TDS412A13100	13,100	.5157	124	77	60	2,3	45	14

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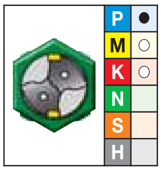
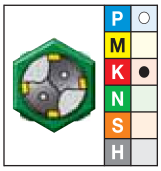
(TDS402A • TDS412A • 5 x D — continued)



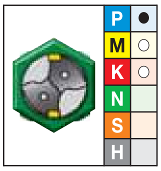


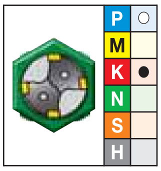
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162842	TDS402A13200	4156771	TDS412A13200	13,200	.5197	124	77	60	2,3	45	14
4162843	TDS402A13300	4156772	TDS412A13300	13,300	.5236	124	77	60	2,3	45	14
4162844	TDS402A13400	4156773	TDS412A13400	13,400	.5276	124	77	60	2,3	45	14
4162845	TDS402A13500	4156774	TDS412A13500	13,500	.5315	124	77	60	2,3	45	14
4162846	TDS402A13600	4156775	TDS412A13600	13,600	.5354	124	77	60	2,3	45	14
4162847	TDS402A13700	4156776	TDS412A13700	13,700	.5394	124	77	60	2,4	45	14
4162848	TDS402A13800	4156777	TDS412A13800	13,800	.5433	124	77	60	2,4	45	14
4162849	TDS402A13891	4156778	TDS412A13891	13,891	.5469	124	77	60	2,4	45	14
4162850	TDS402A13900	4156779	TDS412A13900	13,900	.5472	124	77	60	2,4	45	14
4162851	TDS402A14000	4156780	TDS412A14000	14,000	.5512	124	77	60	2,4	45	14
4162852	TDS402A14100	4156781	TDS412A14100	14,100	.5551	133	83	63	2,4	48	16
4162853	TDS402A14200	4156782	TDS412A14200	14,200	.5591	133	83	63	2,5	48	16
4162854	TDS402A14288	4156783	TDS412A14288	14,288	.5625	133	83	63	2,5	48	16
4162855	TDS402A14300	4156784	TDS412A14300	14,300	.5630	133	83	63	2,5	48	16
4162856	TDS402A14400	4156785	TDS412A14400	14,400	.5669	133	83	63	2,5	48	16
4162857	TDS402A14500	4156786	TDS412A14500	14,500	.5709	133	83	63	2,5	48	16
4162858	TDS402A14600	4156787	TDS412A14600	14,600	.5748	133	83	63	2,5	48	16
4162859	TDS402A14684	4156788	TDS412A14684	14,684	.5781	133	83	63	2,5	48	16
4162860	TDS402A14700	4156789	TDS412A14700	14,700	.5787	133	83	63	2,5	48	16
4162861	TDS402A14800	4156790	TDS412A14800	14,800	.5827	133	83	63	2,6	48	16
4162862	TDS402A14900	4156791	TDS412A14900	14,900	.5866	133	83	63	2,6	48	16
4162863	TDS402A15000	4156792	TDS412A15000	15,000	.5906	133	83	63	2,6	48	16
4162864	TDS402A15083	4156793	TDS412A15083	15,083	.5938	133	83	63	2,6	48	16
4162865	TDS402A15100	4156794	TDS412A15100	15,100	.5945	133	83	63	2,6	48	16
4162866	TDS402A15200	4156795	TDS412A15200	15,200	.5984	133	83	63	2,6	48	16
4162867	TDS402A15300	4156796	TDS412A15300	15,300	.6024	133	83	63	2,6	48	16
4162868	TDS402A15400	4156797	TDS412A15400	15,400	.6063	133	83	63	2,7	48	16
4162869	TDS402A15479	4156798	TDS412A15479	15,479	.6094	133	83	63	2,7	48	16
4162870	TDS402A15500	4156799	TDS412A15500	15,500	.6102	133	83	63	2,7	48	16
4162871	TDS402A15600	4156800	TDS412A15600	15,600	.6142	133	83	63	2,7	48	16
4162872	TDS402A15700	4156801	TDS412A15700	15,700	.6181	133	83	63	2,7	48	16
4162873	TDS402A15800	4156802	TDS412A15800	15,800	.6220	133	83	63	2,7	48	16
4162874	TDS402A15875	4156803	TDS412A15875	15,875	.6250	133	83	63	2,7	48	16
4162875	TDS402A15900	4156804	TDS412A15900	15,900	.6260	133	83	63	2,8	48	16
4162876	TDS402A16000	4156805	TDS412A16000	16,000	.6299	133	83	63	2,8	48	16
4162877	TDS402A16100	4156806	TDS412A16100	16,100	.6339	143	93	71	2,8	48	18
4162878	TDS402A16200	4156807	TDS412A16200	16,200	.6378	143	93	71	2,8	48	18
4162879	TDS402A16271	4156808	TDS412A16271	16,271	.6406	143	93	71	2,8	48	18
4162880	TDS402A16300	4156809	TDS412A16300	16,300	.6417	143	93	71	2,8	48	18
4162881	TDS402A16400	4156810	TDS412A16400	16,400	.6457	143	93	71	2,8	48	18

(continued)

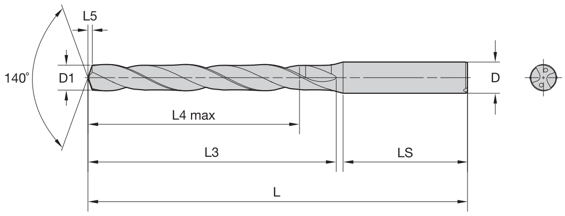
(TDS402A • TDS412A • 5 x D — continued)



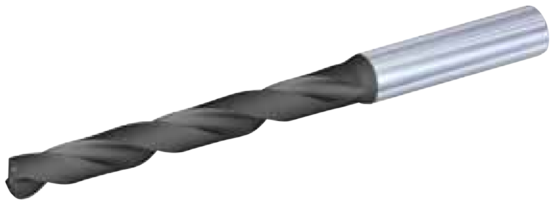


● first choice
○ alternate choice

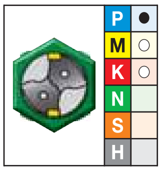
grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162882	TDS402A16500	4156811	TDS412A16500	16,500	.6496	143	93	71	2,9	48	18
4162883	TDS402A16600	4156812	TDS412A16600	16,600	.6535	143	93	71	2,9	48	18
4162884	TDS402A16670	4156813	TDS412A16670	16,670	.6563	143	93	71	2,9	48	18
4162885	TDS402A16700	4156814	TDS412A16700	16,700	.6575	143	93	71	2,9	48	18
4162886	TDS402A16800	4156815	TDS412A16800	16,800	.6614	143	93	71	2,9	48	18
4162887	TDS402A16900	4156816	TDS412A16900	16,900	.6654	143	93	71	2,9	48	18
4162888	TDS402A17000	4156817	TDS412A17000	17,000	.6693	143	93	71	2,9	48	18
4162889	TDS402A17100	4156818	TDS412A17100	17,100	.6732	143	93	71	3,0	48	18
4162890	TDS402A17200	4156819	TDS412A17200	17,200	.6772	143	93	71	3,0	48	18
4162891	TDS402A17300	4156820	TDS412A17300	17,300	.6811	143	93	71	3,0	48	18
4162892	TDS402A17400	4156821	TDS412A17400	17,400	.6850	143	93	71	3,0	48	18
4162893	TDS402A17463	4156822	TDS412A17463	17,463	.6875	143	93	71	3,0	48	18
4162894	TDS402A17500	4156823	TDS412A17500	17,500	.6890	143	93	71	3,0	48	18
4162895	TDS402A17600	4156824	TDS412A17600	17,600	.6929	143	93	71	3,1	48	18
4162896	TDS402A17700	4156825	TDS412A17700	17,700	.6969	143	93	71	3,1	48	18
4162897	TDS402A17800	4156826	TDS412A17800	17,800	.7008	143	93	71	3,1	48	18
4162898	TDS402A17859	4156827	TDS412A17859	17,859	.7031	143	93	71	3,1	48	18
4162899	TDS402A17900	4156828	TDS412A17900	17,900	.7047	143	93	71	3,1	48	18
4162274	TDS402A18000	4156853	TDS412A18000	18,000	.7087	143	93	71	3,1	48	18
4162275	TDS402A18100	4156854	TDS412A18100	18,100	.7126	153	101	77	3,1	50	20
4162276	TDS402A18200	4156855	TDS412A18200	18,200	.7165	153	101	77	3,2	50	20
4162277	TDS402A18258	4156856	TDS412A18258	18,258	.7188	153	101	77	3,2	50	20
4162278	TDS402A18300	4156857	TDS412A18300	18,300	.7205	153	101	77	3,2	50	20
4162279	TDS402A18400	4156858	TDS412A18400	18,400	.7244	153	101	77	3,2	50	20
4162280	TDS402A18500	4156859	TDS412A18500	18,500	.7283	153	101	77	3,2	50	20
4162281	TDS402A18600	4156860	TDS412A18600	18,600	.7323	153	101	77	3,2	50	20
4162282	TDS402A18654	4156861	TDS412A18654	18,654	.7344	153	101	77	3,2	50	20
4162393	TDS402A18700	4156862	TDS412A18700	18,700	.7362	153	101	77	3,2	50	20
4162394	TDS402A18800	4156863	TDS412A18800	18,800	.7402	153	101	77	3,3	50	20
4162395	TDS402A18900	4156864	TDS412A18900	18,900	.7441	153	101	77	3,3	50	20
4162396	TDS402A19000	4156865	TDS412A19000	19,000	.7480	153	101	77	3,3	50	20
4162397	TDS402A19050	4156866	TDS412A19050	19,050	.7500	153	101	77	3,3	50	20
4162398	TDS402A19100	4156867	TDS412A19100	19,100	.7520	153	101	77	3,3	50	20
4162399	TDS402A19200	4156868	TDS412A19200	19,200	.7559	153	101	77	3,3	50	20
4162400	TDS402A19300	4156869	TDS412A19300	19,300	.7598	153	101	77	3,4	50	20
4162401	TDS402A19400	4156870	TDS412A19400	19,400	.7638	153	101	77	3,4	50	20
4162402	TDS402A19500	4156871	TDS412A19500	19,500	.7677	153	101	77	3,4	50	20
4162403	TDS402A19600	4156872	TDS412A19600	19,600	.7717	153	101	77	3,4	50	20
4162404	TDS402A19700	4156873	TDS412A19700	19,700	.7756	153	101	77	3,4	50	20
4162405	TDS402A19800	4156874	TDS412A19800	19,800	.7795	153	101	77	3,4	50	20
4162406	TDS402A19900	4156875	TDS412A19900	19,900	.7835	153	101	77	3,5	50	20
4162407	TDS402A20000	4156876	TDS412A20000	20,000	.7874	153	101	77	3,5	50	20

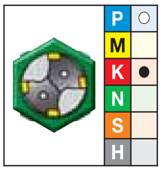


For information on L, L3, and L4 max, see page T143.



TDS403A • TDS413A • 8 x D



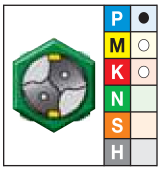


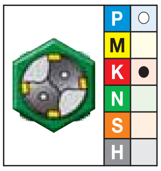
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162796	TDS403A03000	4156972	TDS413A03000	3,000	.1181	78	40	33	0,5	36	6
4162797	TDS403A03048	4156993	TDS413A03048	3,048	.1200	78	40	33	0,5	36	6
4162798	TDS403A03100	4156994	TDS413A03100	3,100	.1220	78	40	33	0,5	36	6
4162799	TDS403A03175	4156995	TDS413A03175	3,175	.1250	78	40	33	0,5	36	6
4162800	TDS403A03200	4156996	TDS413A03200	3,200	.1260	78	40	33	0,5	36	6
4162801	TDS403A03264	4156997	TDS413A03264	3,264	.1285	78	40	33	0,5	36	6
4162802	TDS403A03300	4156998	TDS413A03300	3,300	.1299	78	40	33	0,5	36	6
4163163	TDS403A03400	4156999	TDS413A03400	3,400	.1339	78	40	33	0,6	36	6
4163164	TDS403A03455	4157000	TDS413A03455	3,455	.1360	78	40	33	0,6	36	6
4163165	TDS403A03500	4157001	TDS413A03500	3,500	.1378	78	40	33	0,6	36	6
4163166	TDS403A03571	4157002	TDS413A03571	3,571	.1406	78	40	33	0,6	36	6
4163167	TDS403A03600	4157003	TDS413A03600	3,600	.1417	78	40	33	0,6	36	6
4163168	TDS403A03658	4157004	TDS413A03658	3,658	.1440	78	40	33	0,6	36	6
4163169	TDS403A03700	4157005	TDS413A03700	3,700	.1457	78	40	33	0,6	36	6
4163170	TDS403A03734	4157006	TDS413A03734	3,734	.1470	78	40	33	0,6	36	6
4163171	TDS403A03800	4157007	TDS413A03800	3,800	.1496	87	49	41	0,6	36	6
4163172	TDS403A03900	4157008	TDS413A03900	3,900	.1535	87	49	41	0,6	36	6
4163173	TDS403A03970	4157009	TDS413A03970	3,970	.1563	87	49	41	0,7	36	6
4163174	TDS403A04000	4157010	TDS413A04000	4,000	.1575	87	49	41	0,7	36	6
4163175	TDS403A04039	4157011	TDS413A04039	4,039	.1590	87	49	41	0,7	36	6
4163176	TDS403A04090	4157012	TDS413A04090	4,090	.1610	87	49	41	0,7	36	6
4163177	TDS403A04100	4157013	TDS413A04100	4,100	.1614	87	49	41	0,7	36	6
4163178	TDS403A04200	4157014	TDS413A04200	4,200	.1654	87	49	41	0,7	36	6
4163179	TDS403A04217	4157015	TDS413A04217	4,217	.1660	87	49	41	0,7	36	6
4163180	TDS403A04300	4157016	TDS413A04300	4,300	.1693	87	49	41	0,7	36	6
4163181	TDS403A04366	4157017	TDS413A04366	4,366	.1719	87	49	41	0,7	36	6
4163182	TDS403A04400	4157018	TDS413A04400	4,400	.1732	87	49	41	0,7	36	6
4163193	TDS403A04500	4157019	TDS413A04500	4,500	.1772	87	49	41	0,7	36	6

(continued)

(TDS403A • TDS413A • 8 x D — continued)



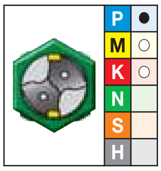


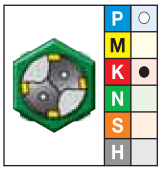
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163194	TDS403A04600	4157020	TDS413A04600	4,600	.1811	87	49	41	0,8	36	6
4163195	TDS403A04623	4157021	TDS413A04623	4,623	.1820	87	49	41	0,8	36	6
4163196	TDS403A04700	4157022	TDS413A04700	4,700	.1850	87	49	41	0,8	36	6
4163197	TDS403A04763	4157023	TDS413A04763	4,763	.1875	94	56	48	0,8	36	6
4163198	TDS403A04800	4157024	TDS413A04800	4,800	.1890	94	56	48	0,8	36	6
4163199	TDS403A04852	4157025	TDS413A04852	4,852	.1910	94	56	48	0,8	36	6
4163200	TDS403A04900	4157026	TDS413A04900	4,900	.1929	94	56	48	0,8	36	6
4163201	TDS403A05000	4157027	TDS413A05000	5,000	.1969	94	56	48	0,8	36	6
4163202	TDS403A05100	4157028	TDS413A05100	5,100	.2008	94	56	48	0,8	36	6
4163203	TDS403A05106	4157029	TDS413A05106	5,106	.2010	94	56	48	0,8	36	6
4163204	TDS403A05159	4157030	TDS413A05159	5,159	.2031	94	56	48	0,9	36	6
4163205	TDS403A05200	4157031	TDS413A05200	5,200	.2047	94	56	48	0,9	36	6
4163206	TDS403A05300	4157032	TDS413A05300	5,300	.2087	94	56	48	0,9	36	6
4163207	TDS403A05400	4157033	TDS413A05400	5,400	.2126	94	56	48	0,9	36	6
4163208	TDS403A05410	4157034	TDS413A05410	5,410	.2130	94	56	48	0,9	36	6
4163209	TDS403A05500	4157035	TDS413A05500	5,500	.2165	94	56	48	0,9	36	6
4163210	TDS403A05558	4157036	TDS413A05558	5,558	.2188	94	56	48	0,9	36	6
4163211	TDS403A05600	4157037	TDS413A05600	5,600	.2205	94	56	48	0,9	36	6
4163212	TDS403A05616	4157038	TDS413A05616	5,616	.2211	94	56	48	0,9	36	6
4163213	TDS403A05700	4157039	TDS413A05700	5,700	.2244	94	56	48	1,0	36	6
4163214	TDS403A05800	4157040	TDS413A05800	5,800	.2283	94	56	48	1,0	36	6
4163215	TDS403A05900	4157041	TDS413A05900	5,900	.2323	94	56	48	1,0	36	6
4163216	TDS403A05954	4157042	TDS413A05954	5,954	.2344	94	56	48	1,0	36	6
4163217	TDS403A06000	4157043	TDS413A06000	6,000	.2362	94	56	48	1,0	36	6
4163218	TDS403A06100	4157044	TDS413A06100	6,100	.2402	105	67	57	1,0	36	8
4163219	TDS403A06200	4157045	TDS413A06200	6,200	.2441	105	67	57	1,0	36	8
4163220	TDS403A06300	4157046	TDS413A06300	6,300	.2480	105	67	57	1,1	36	8
4163221	TDS403A06350	4157047	TDS413A06350	6,350	.2500	105	67	57	1,1	36	8
4163222	TDS403A06400	4157048	TDS413A06400	6,400	.2520	105	67	57	1,1	36	8
4163223	TDS403A06500	4157049	TDS413A06500	6,500	.2559	105	67	57	1,1	36	8
4163224	TDS403A06528	4157050	TDS413A06528	6,528	.2570	105	67	57	1,1	36	8
4163225	TDS403A06600	4157051	TDS413A06600	6,600	.2598	105	67	57	1,1	36	8
4163226	TDS403A06630	4157052	TDS413A06630	6,630	.2610	105	67	57	1,1	36	8
4163227	TDS403A06700	4157053	TDS413A06700	6,700	.2638	105	67	57	1,1	36	8
4163228	TDS403A06746	4157054	TDS413A06746	6,746	.2656	105	67	57	1,1	36	8
4163229	TDS403A06800	4157055	TDS413A06800	6,800	.2677	105	67	57	1,1	36	8
4163230	TDS403A06900	4157056	TDS413A06900	6,900	.2717	105	67	57	1,2	36	8
4163231	TDS403A07000	4157057	TDS413A07000	7,000	.2756	105	67	57	1,2	36	8
4163232	TDS403A07100	4157058	TDS413A07100	7,100	.2795	110	72	61	1,2	36	8
4163233	TDS403A07145	4157059	TDS413A07145	7,145	.2813	110	72	61	1,2	36	8

(continued)

(TDS403A • TDS413A • 8 x D — continued)





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163234	TDS403A07200	4157060	TDS413A07200	7,200	.2835	110	72	61	1,2	36	8
4163235	TDS403A07300	4157061	TDS413A07300	7,300	.2874	110	72	61	1,2	36	8
4163236	TDS403A07400	4157062	TDS413A07400	7,400	.2913	110	72	61	1,3	36	8
4163237	TDS403A07500	4157063	TDS413A07500	7,500	.2953	110	72	61	1,3	36	8
4163238	TDS403A07541	4157064	TDS413A07541	7,541	.2969	110	72	61	1,3	36	8
4163239	TDS403A07600	4157065	TDS413A07600	7,600	.2992	110	72	61	1,3	36	8
4163240	TDS403A07700	4157066	TDS413A07700	7,700	.3031	110	72	61	1,3	36	8
4163241	TDS403A07800	4157067	TDS413A07800	7,800	.3071	110	72	61	1,3	36	8
4163242	TDS403A07900	4157068	TDS413A07900	7,900	.3110	110	72	61	1,3	36	8
4163243	TDS403A07938	4157069	TDS413A07938	7,938	.3125	110	72	61	1,3	36	8
4163244	TDS403A08000	4157070	TDS413A08000	8,000	.3150	110	72	61	1,4	36	8
4163245	TDS403A08100	4157071	TDS413A08100	8,100	.3189	122	80	68	1,4	40	10
4163246	TDS403A08200	4157072	TDS413A08200	8,200	.3228	122	80	68	1,4	40	10
4163247	TDS403A08300	4157073	TDS413A08300	8,300	.3268	122	80	68	1,4	40	10
4163248	TDS403A08334	4157074	TDS413A08334	8,334	.3281	122	80	68	1,4	40	10
4163249	TDS403A08400	4157075	TDS413A08400	8,400	.3307	122	80	68	1,4	40	10
4163250	TDS403A08433	4157076	TDS413A08433	8,433	.3320	122	80	68	1,4	40	10
4163251	TDS403A08500	4157077	TDS413A08500	8,500	.3346	122	80	68	1,4	40	10
4163252	TDS403A08600	4157078	TDS413A08600	8,600	.3386	122	80	68	1,5	40	10
4163253	TDS403A08700	4157079	TDS413A08700	8,700	.3425	122	80	68	1,5	40	10
4163254	TDS403A08733	4157080	TDS413A08733	8,733	.3438	122	80	68	1,5	40	10
4163255	TDS403A08800	4157081	TDS413A08800	8,800	.3465	122	80	68	1,5	40	10
4163256	TDS403A08900	4157082	TDS413A08900	8,900	.3504	122	80	68	1,5	40	10
4163257	TDS403A09000	4157083	TDS413A09000	9,000	.3543	122	80	68	1,5	40	10
4163258	TDS403A09100	4157084	TDS413A09100	9,100	.3583	122	80	68	1,5	40	10
4163259	TDS403A09129	4157085	TDS413A09129	9,129	.3594	122	80	68	1,6	40	10
4163260	TDS403A09200	4157086	TDS413A09200	9,200	.3622	122	80	68	1,6	40	10
4163261	TDS403A09300	4157087	TDS413A09300	9,300	.3661	122	80	68	1,6	40	10
4163262	TDS403A09347	4157088	TDS413A09347	9,347	.3680	122	80	68	1,6	40	10
4163263	TDS403A09400	4157089	TDS413A09400	9,400	.3701	122	80	68	1,6	40	10
4163264	TDS403A09500	4157090	TDS413A09500	9,500	.3740	122	80	68	1,6	40	10
4163265	TDS403A09525	4157091	TDS413A09525	9,525	.3750	122	80	68	1,6	40	10
4163266	TDS403A09600	4157092	TDS413A09600	9,600	.3780	122	80	68	1,6	40	10
4163267	TDS403A09700	4157093	TDS413A09700	9,700	.3819	122	80	68	1,7	40	10
4163268	TDS403A09800	4157094	TDS413A09800	9,800	.3858	122	80	68	1,7	40	10
4163269	TDS403A09900	4157095	TDS413A09900	9,900	.3898	122	80	68	1,7	40	10
4163270	TDS403A09921	4157096	TDS413A09921	9,921	.3906	122	80	68	1,7	40	10
4162679	TDS403A10000	4156836	TDS413A10000	10,000	.3937	122	80	68	1,7	40	10
4162680	TDS403A10100	4156837	TDS413A10100	10,100	.3976	141	94	79	1,7	45	12
4162382	TDS403A10200	4156838	TDS413A10200	10,200	.4016	141	94	79	1,7	45	12

(continued)

(TDS403A • TDS413A • 8 x D — continued)

P	●
M	○
K	○
N	
S	
H	

grade WP20PD
TiAlN

P	○
M	
K	●
N	
S	
H	

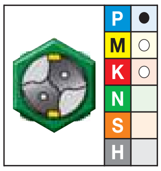
grade WK15PD
AlCrN

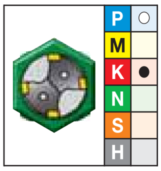
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162703	TDS403A10300	4156839	TDS413A10300	10,300	.4055	141	94	79	1,8	45	12
4162704	TDS403A10320	4156840	TDS413A10320	10,320	.4063	141	94	79	1,8	45	12
4162705	TDS403A10400	4156841	TDS413A10400	10,400	.4094	141	94	79	1,8	45	12
4162706	TDS403A10500	4156842	TDS413A10500	10,500	.4134	141	94	79	1,8	45	12
4162707	TDS403A10600	4156883	TDS413A10600	10,600	.4173	141	94	79	1,8	45	12
4162708	TDS403A10700	4156884	TDS413A10700	10,700	.4213	141	94	79	1,8	45	12
4162709	TDS403A10716	4156885	TDS413A10716	10,716	.4219	141	94	79	1,8	45	12
4162710	TDS403A10800	4156886	TDS413A10800	10,800	.4252	141	94	79	1,8	45	12
4162711	TDS403A10900	4156887	TDS413A10900	10,900	.4291	141	94	79	1,9	45	12
4162712	TDS403A11000	4156888	TDS413A11000	11,000	.4331	141	94	79	1,9	45	12
4162713	TDS403A11100	4156889	TDS413A11100	11,100	.4370	141	94	79	1,9	45	12
4162714	TDS403A11113	4156890	TDS413A11113	11,113	.4375	141	94	79	1,9	45	12
4162715	TDS403A11200	4156891	TDS413A11200	11,200	.4409	141	94	79	1,9	45	12
4162716	TDS403A11300	4156892	TDS413A11300	11,300	.4449	141	94	79	1,9	45	12
4162717	TDS403A11400	4156893	TDS413A11400	11,400	.4488	141	94	79	2,0	45	12
4162718	TDS403A11500	4156894	TDS413A11500	11,500	.4528	141	94	79	2,0	45	12
4162719	TDS403A11509	4156895	TDS413A11509	11,509	.4531	141	94	79	2,0	45	12
4162720	TDS403A11600	4156896	TDS413A11600	11,600	.4567	141	94	79	2,0	45	12
4162721	TDS403A11700	4156897	TDS413A11700	11,700	.4606	141	94	79	2,0	45	12
4162722	TDS403A11800	4156898	TDS413A11800	11,800	.4646	141	94	79	2,0	45	12
4162723	TDS403A11900	4156899	TDS413A11900	11,900	.4685	141	94	79	2,0	45	12
4162724	TDS403A11908	4156900	TDS413A11908	11,908	.4688	141	94	79	2,0	45	12
4162725	TDS403A12000	4156901	TDS413A12000	12,000	.4724	141	94	79	2,1	45	12
4162726	TDS403A12100	4156902	TDS413A12100	12,100	.4764	155	108	91	2,1	45	14
4162727	TDS403A12200	4156903	TDS413A12200	12,200	.4803	155	108	91	2,1	45	14
4162728	TDS403A12300	4156904	TDS413A12300	12,300	.4843	155	108	91	2,1	45	14
4162729	TDS403A12304	4156905	TDS413A12304	12,304	.4844	155	108	91	2,1	45	14
4162730	TDS403A12400	4156906	TDS413A12400	12,400	.4882	155	108	91	2,1	45	14
4162681	TDS403A12500	4148984	TDS413A12500	12,500	.4921	155	108	91	2,1	45	14
4162731	TDS403A12600	4156907	TDS413A12600	12,600	.4961	155	108	91	2,2	45	14
4162732	TDS403A12700	4156908	TDS413A12700	12,700	.5000	155	108	91	2,2	45	14
4162733	TDS403A12800	4156909	TDS413A12800	12,800	.5039	155	108	91	2,2	45	14
4162734	TDS403A12900	4156910	TDS413A12900	12,900	.5079	155	108	91	2,2	45	14
4162735	TDS403A13000	4156911	TDS413A13000	13,000	.5118	155	108	91	2,2	45	14
4162736	TDS403A13096	4156912	TDS413A13096	13,096	.5156	155	108	91	2,3	45	14
4162737	TDS403A13100	4156913	TDS413A13100	13,100	.5157	155	108	91	2,3	45	14
4162738	TDS403A13200	4156914	TDS413A13200	13,200	.5197	155	108	91	2,3	45	14
4162739	TDS403A13300	4156915	TDS413A13300	13,300	.5236	155	108	91	2,3	45	14
4162740	TDS403A13400	4156916	TDS413A13400	13,400	.5276	155	108	91	2,3	45	14
4162741	TDS403A13500	4156917	TDS413A13500	13,500	.5315	155	108	91	2,3	45	14

(continued)

(TDS403A • TDS413A • 8 x D — continued)



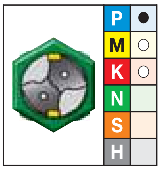


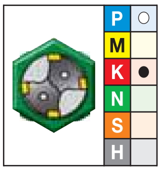
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162742	TDS403A13600	4156918	TDS413A13600	13,600	.5354	155	108	91	2,3	45	14
4162743	TDS403A13700	4156919	TDS413A13700	13,700	.5394	155	108	91	2,4	45	14
4162744	TDS403A13800	4156920	TDS413A13800	13,800	.5433	155	108	91	2,4	45	14
4162745	TDS403A13891	4156921	TDS413A13891	13,891	.5469	155	108	91	2,4	45	14
4162746	TDS403A13900	4156922	TDS413A13900	13,900	.5472	155	108	91	2,4	45	14
4162747	TDS403A14000	4156923	TDS413A14000	14,000	.5512	155	108	91	2,4	45	14
4162748	TDS403A14100	4156924	TDS413A14100	14,100	.5551	171	121	101	2,4	48	16
4162749	TDS403A14200	4156925	TDS413A14200	14,200	.5591	171	121	101	2,5	48	16
4162750	TDS403A14288	4156926	TDS413A14288	14,288	.5625	171	121	101	2,5	48	16
4162751	TDS403A14300	4156927	TDS413A14300	14,300	.5630	171	121	101	2,5	48	16
4162752	TDS403A14400	4156928	TDS413A14400	14,400	.5669	171	121	101	2,5	48	16
4162753	TDS403A14500	4156929	TDS413A14500	14,500	.5709	171	121	101	2,5	48	16
4162754	TDS403A14600	4156930	TDS413A14600	14,600	.5748	171	121	101	2,5	48	16
4162755	TDS403A14684	4156931	TDS413A14684	14,684	.5781	171	121	101	2,5	48	16
4162756	TDS403A14700	4156932	TDS413A14700	14,700	.5787	171	121	101	2,5	48	16
4162757	TDS403A14800	4156933	TDS413A14800	14,800	.5827	171	121	101	2,6	48	16
4162758	TDS403A14900	4156934	TDS413A14900	14,900	.5866	171	121	101	2,6	48	16
4162759	TDS403A15000	4156935	TDS413A15000	15,000	.5906	171	121	101	2,6	48	16
4162760	TDS403A15083	4156936	TDS413A15083	15,083	.5938	171	121	101	2,6	48	16
4162761	TDS403A15100	4156937	TDS413A15100	15,100	.5945	171	121	101	2,6	48	16
4162762	TDS403A15200	4156938	TDS413A15200	15,200	.5984	171	121	101	2,6	48	16
4162763	TDS403A15300	4156939	TDS413A15300	15,300	.6024	171	121	101	2,6	48	16
4162764	TDS403A15400	4156940	TDS413A15400	15,400	.6063	171	121	101	2,7	48	16
4162765	TDS403A15479	4156941	TDS413A15479	15,479	.6094	171	121	101	2,7	48	16
4162766	TDS403A15500	4156942	TDS413A15500	15,500	.6102	171	121	101	2,7	48	16
4162767	TDS403A15600	4156943	TDS413A15600	15,600	.6142	171	121	101	2,7	48	16
4162768	TDS403A15700	4156944	TDS413A15700	15,700	.6181	171	121	101	2,7	48	16
4162769	TDS403A15800	4156945	TDS413A15800	15,800	.6220	171	121	101	2,7	48	16
4162770	TDS403A15875	4156946	TDS413A15875	15,875	.6250	171	121	101	2,7	48	16
4162771	TDS403A15900	4156947	TDS413A15900	15,900	.6260	171	121	101	2,8	48	16
4162772	TDS403A16000	4156948	TDS413A16000	16,000	.6299	171	121	101	2,8	48	16
4162773	TDS403A16100	4156949	TDS413A16100	16,100	.6339	185	135	113	2,8	48	18
4162774	TDS403A16200	4156950	TDS413A16200	16,200	.6378	185	135	113	2,8	48	18
4162775	TDS403A16271	4156951	TDS413A16271	16,271	.6406	185	135	113	2,8	48	18
4162776	TDS403A16300	4156952	TDS413A16300	16,300	.6417	185	135	113	2,8	48	18
4162777	TDS403A16400	4156953	TDS413A16400	16,400	.6457	185	135	113	2,8	48	18
4162778	TDS403A16500	4156954	TDS413A16500	16,500	.6496	185	135	113	2,9	48	18
4162779	TDS403A16600	4156955	TDS413A16600	16,600	.6535	185	135	113	2,9	48	18
4162780	TDS403A16670	4156956	TDS413A16670	16,670	.6563	185	135	113	2,9	48	18
4162781	TDS403A16700	4156957	TDS413A16700	16,700	.6575	185	135	113	2,9	48	18

(continued)

(TDS403A • TDS413A • 8 x D — continued)





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162782	TDS403A16800	4156958	TDS413A16800	16,800	.6614	185	135	113	2,9	48	18
4162783	TDS403A16900	4156959	TDS413A16900	16,900	.6654	185	135	113	2,9	48	18
4162784	TDS403A17000	4156960	TDS413A17000	17,000	.6693	185	135	113	2,9	48	18
4162785	TDS403A17100	4156961	TDS413A17100	17,100	.6732	185	135	113	3,0	48	18
4162786	TDS403A17200	4156962	TDS413A17200	17,200	.6772	185	135	113	3,0	48	18
4162787	TDS403A17300	4156963	TDS413A17300	17,300	.6811	185	135	113	3,0	48	18
4162788	TDS403A17400	4156964	TDS413A17400	17,400	.6850	185	135	113	3,0	48	18
4162789	TDS403A17463	4156965	TDS413A17463	17,463	.6875	185	135	113	3,0	48	18
4162790	TDS403A17500	4156966	TDS413A17500	17,500	.6890	185	135	113	3,0	48	18
4162791	TDS403A17600	4156967	TDS413A17600	17,600	.6929	185	135	113	3,1	48	18
4162792	TDS403A17700	4156968	TDS413A17700	17,700	.6969	185	135	113	3,1	48	18
4162793	TDS403A17800	4156969	TDS413A17800	17,800	.7008	185	135	113	3,1	48	18
4162794	TDS403A17859	4156970	TDS413A17859	17,859	.7031	185	135	113	3,1	48	18
4162795	TDS403A17900	4156971	TDS413A17900	17,900	.7047	185	135	113	3,1	48	18
4162515	TDS403A18000	4157206	TDS413A18000	18,000	.7087	185	135	113	3,1	48	18
4162516	TDS403A18100	4157207	TDS413A18100	18,100	.7126	200	148	124	3,1	50	20
4162517	TDS403A18200	4157208	TDS413A18200	18,200	.7165	200	148	124	3,2	50	20
4162518	TDS403A18258	4157209	TDS413A18258	18,258	.7188	200	148	124	3,2	50	20
4162519	TDS403A18300	4157210	TDS413A18300	18,300	.7205	200	148	124	3,2	50	20
4162520	TDS403A18400	4157211	TDS413A18400	18,400	.7244	200	148	124	3,2	50	20
4162521	TDS403A18500	4157212	TDS413A18500	18,500	.7283	200	148	124	3,2	50	20
4162522	TDS403A18600	4157253	TDS413A18600	18,600	.7323	200	148	124	3,2	50	20
4162663	TDS403A18654	4157254	TDS413A18654	18,654	.7344	200	148	124	3,2	50	20
4162664	TDS403A18700	4157255	TDS413A18700	18,700	.7362	200	148	124	3,2	50	20
4162665	TDS403A18800	4157256	TDS413A18800	18,800	.7402	200	148	124	3,3	50	20
4162666	TDS403A18900	4157257	TDS413A18900	18,900	.7441	200	148	124	3,3	50	20
4162667	TDS403A19000	4157258	TDS413A19000	19,000	.7480	200	148	124	3,3	50	20
4162668	TDS403A19050	4157259	TDS413A19050	19,050	.7500	200	148	124	3,3	50	20
4162669	TDS403A19100	4157260	TDS413A19100	19,100	.7520	200	148	124	3,3	50	20
4162670	TDS403A19200	4157261	TDS413A19200	19,200	.7559	200	148	124	3,3	50	20
4162671	TDS403A19300	4157262	TDS413A19300	19,300	.7598	200	148	124	3,4	50	20
4162672	TDS403A19400	4157263	TDS413A19400	19,400	.7638	200	148	124	3,4	50	20
4162673	TDS403A19500	4157264	TDS413A19500	19,500	.7677	200	148	124	3,4	50	20
4162674	TDS403A19600	4157265	TDS413A19600	19,600	.7717	200	148	124	3,4	50	20
4162675	TDS403A19700	4157266	TDS413A19700	19,700	.7756	200	148	124	3,4	50	20
4162676	TDS403A19800	4157267	TDS413A19800	19,800	.7795	200	148	124	3,4	50	20
4162677	TDS403A19900	4157268	TDS413A19900	19,900	.7835	200	148	124	3,5	50	20
4162678	TDS403A20000	4157269	TDS413A20000	20,000	.7874	200	148	124	3,5	50	20

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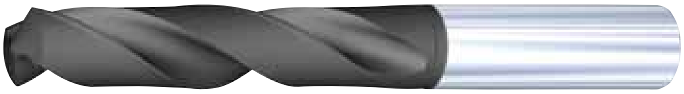
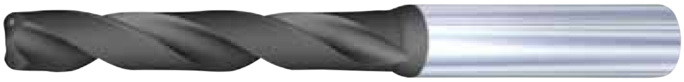


Material Group		Cutting Speed — vc Range — m/min: min	–	max	Tool Diameter (mm)	Recommended Feed Rate (f) by Diameter: 3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	70	–	140	mm/r	0,08–0,15	0,10–0,18	0,12–0,25	0,15–0,30	0,15–0,34	0,20–0,38	0,23–0,45	0,28–0,55
P	2, 3, 4, 6, 7	70	–	140	mm/r	0,08–0,16	0,10–0,19	0,12–0,25	0,15–0,30	0,19–0,34	0,22–0,38	0,28–0,48	0,34–0,60
P	5, 9, 10, 11	60	–	120	mm/r	0,08–0,16	0,10–0,19	0,12–0,25	0,14–0,30	0,17–0,33	0,20–0,38	0,24–0,48	0,29–0,60
P	12, 13.1, 13.2	40	–	60	mm/r	0,06–0,10	0,08–0,12	0,10–0,20	0,10–0,22	0,13–0,24	0,14–0,27	0,18–0,32	0,24–0,42
M	14.1	30	–	50	mm/r	0,05–0,09	0,06–0,11	0,08–0,13	0,09–0,15	0,10–0,17	0,12–0,20	0,14–0,22	0,16–0,25
M	14.3	40	–	60	mm/r	0,05–0,10	0,07–0,12	0,09–0,13	0,10–0,18	0,10–0,20	0,12–0,22	0,14–0,25	0,16–0,28
M	14.2, 14.4	30	–	50	mm/r	0,05–0,09	0,07–0,11	0,08–0,12	0,09–0,15	0,10–0,17	0,12–0,19	0,14–0,21	0,16–0,25

TOP DRILL S • TDS401/TDS402/TDS403 • WP20PD • Through Coolant • Metric



Material Group		Cutting Speed — vc Range — m/min: min	–	max	Tool Diameter (mm)	Recommended Feed Rate (f) by Diameter: 3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	80	–	180	mm/r	0,08–0,16	0,11–0,19	0,13–0,26	0,16–0,32	0,16–0,36	0,21–0,40	0,24–0,47	0,29–0,58
P	2, 3, 4, 6, 7	80	–	160	mm/r	0,09–0,17	0,11–0,20	0,13–0,26	0,16–0,32	0,20–0,36	0,23–0,40	0,29–0,50	0,36–0,63
P	5, 9, 10, 11	80	–	140	mm/r	0,08–0,17	0,11–0,20	0,12–0,26	0,15–0,32	0,18–0,35	0,21–0,40	0,25–0,50	0,30–0,63
P	12, 13.1, 13.2	50	–	80	mm/r	0,06–0,11	0,08–0,13	0,11–0,21	0,10–0,23	0,13–0,25	0,14–0,28	0,29–0,33	0,25–0,44
M	14.1	40	–	60	mm/r	0,05–0,09	0,06–0,12	0,08–0,14	0,09–0,16	0,11–0,18	0,13–0,21	0,15–0,23	0,17–0,26
M	14.3	40	–	70	mm/r	0,05–0,11	0,07–0,13	0,09–0,14	0,11–0,19	0,11–0,21	0,13–0,23	0,15–0,26	0,17–0,29
M	14.2, 14.4	35	–	50	mm/r	0,05–0,09	0,07–0,12	0,08–0,13	0,09–0,16	0,11–0,18	0,13–0,20	0,15–0,22	0,17–0,26

nominal size range	Metric tolerance: D1 tolerance m7	D tolerance h6
>3–6	0,004/0,016	0,000/-0,008
>6–10	0,006/0,021	0,000/-0,009
>10–18	0,007/0,025	0,000/-0,011
>18–25,4	0,008/0,029	0,000/-0,013

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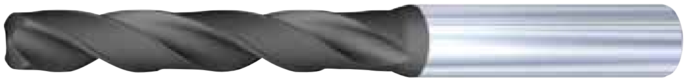


Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter								
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
K	15, 16	70	–	170	mm/r	0,16–0,31	0,20–0,38	0,23–0,44	0,25–0,49	0,31–0,60	0,38–0,74	0,31–0,60	0,38–0,74
K	17, 18, 19	80	–	140	mm/r	0,16–0,25	0,20–0,31	0,23–0,36	0,25–0,40	0,31–0,48	0,38–0,60	0,31–0,48	0,38–0,60
K	20	70	–	130	mm/r	0,12–0,25	0,14–0,30	0,17–0,35	0,19–0,40	0,24–0,48	0,30–0,60	0,24–0,48	0,30–0,60

TOP DRILL S • TDS411/TDS412/TDS413 • WK15PD • Through Coolant • Metric

Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter								
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
K	15, 16	80	–	190	mm/r	0,11–0,22	0,12–0,24	0,16–0,31	0,20–0,38	0,23–0,44	0,25–0,49	0,31–0,60	0,38–0,74
K	17, 18, 19	90	–	170	mm/r	0,12–0,16	0,13–0,19	0,16–0,25	0,20–0,31	0,23–0,36	0,25–0,40	0,31–0,48	0,38–0,60
K	20	80	–	150	mm/r	0,08–0,17	0,09–0,19	0,12–0,25	0,14–0,30	0,17–0,35	0,19–0,40	0,24–0,48	0,30–0,60

	Metric tolerance	
nominal size range	D1 tolerance m7	D tolerance h6
>3–6	0,004/0,016	0,000/-0,008
>6–10	0,006/0,021	0,000/-0,009
>10–18	0,007/0,025	0,000/-0,011
>18–25,4	0,008/0,029	0,000/-0,013

TOP DRILL S+

The WIDIA™ line of TOP DRILL S+ enables superior performance across a wide variety of even the most complex and challenging applications, such as drilling through inclined entries, x-holes, and exits. Proprietary technology ensures the highest speed and feed rates available. Advanced grade and geometry features define the TOP DRILL S+ as a true troubleshooter.

- Suitable for a broad range of materials and applications.
- Ensures increased tool life and enhanced wear resistance.
- Facilitates consistent chip forming and breaking.

The versatile TOP DRILL S+ provides reliable performance across a broad scope of applications, including alloyed and unalloyed steel, cast iron, and some stainless steels and high-temperature alloys.

- Four-margin design ensures stability, consistency, and improved hole quality.
- PVD coating provides increased tool life and wear resistance.
- Through tool coolant and solid versions available standard.

Use as Pilot Drill

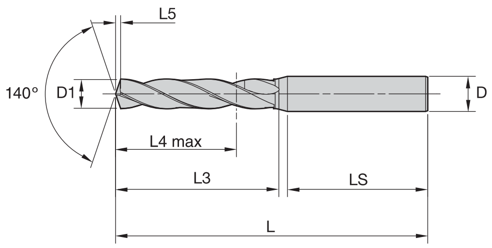
- Ideal point angle and tolerance make the TOP DRILL S+™ drill the preferred pilot drill for TDD Series solid carbide deep-hole drills.

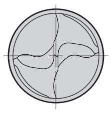
TOP DRILL S+ Drill-Point Design

- Low thrust. Works well on a variety of machines.
- Excellent centring capabilities.
- Easy to regrind.

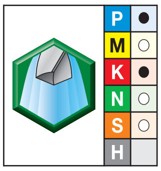
Four-Margin Land Design

- Improves hole straightness and roundness.
- Provides good alignment and stability in tough drilling applications — even when drilling through cross holes.





TDS301A • 3 x D



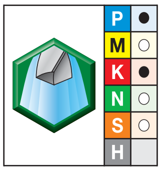
● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2964222	TDS301A03000	3,000	.1181	6	20	14	0,48	36	62
2964233	TDS301A03100	3,100	.1220	6	20	14	0,50	36	62
2964234	TDS301A03200	3,200	.1260	6	20	14	0,52	36	62
2964235	TDS301A03250	3,250	.1280	6	20	14	0,53	36	62
2964236	TDS301A03300	3,300	.1299	6	20	14	0,54	36	62
2964237	TDS301A03400	3,400	.1339	6	20	14	0,55	36	62
2964238	TDS301A03500	3,500	.1378	6	20	14	0,57	36	62
2964239	TDS301A03600	3,600	.1417	6	20	14	0,59	36	62
2964240	TDS301A03700	3,700	.1457	6	20	14	0,61	36	62
2964241	TDS301A03800	3,800	.1496	6	24	17	0,62	36	66
2964242	TDS301A03900	3,900	.1535	6	24	17	0,64	36	66
2964243	TDS301A04000	4,000	.1575	6	24	17	0,66	36	66
2964244	TDS301A04100	4,100	.1614	6	24	17	0,67	36	66
2964245	TDS301A04200	4,200	.1654	6	24	17	0,69	36	66
2964246	TDS301A04300	4,300	.1693	6	24	17	0,71	36	66
2964247	TDS301A04370	4,370	.1720	6	24	17	0,72	36	66
2964248	TDS301A04400	4,400	.1732	6	24	17	0,73	36	66
2964249	TDS301A04500	4,500	.1772	6	24	17	0,74	36	66
2964250	TDS301A04600	4,600	.1811	6	24	17	0,76	36	66
2964251	TDS301A04650	4,650	.1831	6	24	17	0,77	36	66
2964252	TDS301A04700	4,700	.1850	6	24	17	0,78	36	66
2964273	TDS301A04760	4,760	.1874	6	28	20	0,79	36	66
2964274	TDS301A04800	4,800	.1890	6	28	20	0,80	36	66
2964275	TDS301A04900	4,900	.1929	6	28	20	0,81	36	66

(continued)

(TDS301A • 3 x D — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964276	TDS301A05000	5,000	.1969	6	28	20	0,83	36	66
2964277	TDS301A05100	5,100	.2008	6	28	20	0,85	36	66
2964278	TDS301A05160	5,160	.2031	6	28	20	0,86	36	66
2964279	TDS301A05200	5,200	.2047	6	28	20	0,87	36	66
2964280	TDS301A05300	5,300	.2087	6	28	20	0,88	36	66
2964281	TDS301A05400	5,400	.2126	6	28	20	0,90	36	66
2964282	TDS301A05500	5,500	.2165	6	28	20	0,92	36	66
2964293	TDS301A05550	5,550	.2185	6	28	20	0,93	36	66
2964294	TDS301A05560	5,560	.2189	6	28	20	0,93	36	66
2964295	TDS301A05600	5,600	.2205	6	28	20	0,94	36	66
2964296	TDS301A05700	5,700	.2244	6	28	20	0,95	36	66
2964297	TDS301A05800	5,800	.2283	6	28	20	0,97	36	66
2964298	TDS301A05900	5,900	.2323	6	28	20	0,99	36	66
2964299	TDS301A05950	5,950	.2343	6	28	20	1,00	36	66
2964300	TDS301A06000	6,000	.2362	6	28	20	1,00	36	66
2964301	TDS301A06100	6,100	.2402	8	34	24	1,02	36	79
2964302	TDS301A06200	6,200	.2441	8	34	24	1,04	36	79
2964313	TDS301A06300	6,300	.2480	8	34	24	1,06	36	79
2964314	TDS301A06350	6,350	.2500	8	34	24	1,07	36	79
2964315	TDS301A06400	6,400	.2520	8	34	24	1,07	36	79
2964316	TDS301A06500	6,500	.2559	8	34	24	1,09	36	79
2964317	TDS301A06600	6,600	.2598	8	34	24	1,11	36	79
2964318	TDS301A06700	6,700	.2638	8	34	24	1,13	36	79
2964319	TDS301A06750	6,750	.2657	8	34	24	1,14	36	79
2964320	TDS301A06800	6,800	.2677	8	34	24	1,14	36	79
2964321	TDS301A06900	6,900	.2717	8	34	24	1,16	36	79
2964322	TDS301A07000	7,000	.2756	8	34	24	1,18	36	79
2964333	TDS301A07100	7,100	.2795	8	41	29	1,20	36	79
2964334	TDS301A07140	7,140	.2811	8	41	29	1,20	36	79
2964335	TDS301A07200	7,200	.2835	8	41	29	1,21	36	79
2964336	TDS301A07300	7,300	.2874	8	41	29	1,23	36	79
2964337	TDS301A07400	7,400	.2913	8	41	29	1,25	36	79
2964338	TDS301A07500	7,500	.2953	8	41	29	1,27	36	79
2964339	TDS301A07540	7,540	.2969	8	41	29	1,27	36	79
2964340	TDS301A07600	7,600	.2992	8	41	29	1,29	36	79
2964341	TDS301A07700	7,700	.3031	8	41	29	1,30	36	79
2964342	TDS301A07800	7,800	.3071	8	41	29	1,32	36	79
2964353	TDS301A07900	7,900	.3110	8	41	29	1,34	36	79
2964354	TDS301A07940	7,940	.3126	8	41	29	1,34	36	79
2964355	TDS301A08000	8,000	.3150	8	41	29	1,36	36	79

(continued)

(TDS301A • 3 x D — continued)

P	●
M	○
K	●
N	○
S	○
H	

● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964356	TDS301A08100	8,100	.3189	10	47	35	1,37	40	89
2964357	TDS301A08200	8,200	.3228	10	47	35	1,39	40	89
2964358	TDS301A08300	8,300	.3268	10	47	35	1,41	40	89
2964359	TDS301A08330	8,330	.3280	10	47	35	1,41	40	89
2964360	TDS301A08400	8,400	.3307	10	47	35	1,43	40	89
2964361	TDS301A08500	8,500	.3346	10	47	35	1,44	40	89
2964362	TDS301A08600	8,600	.3386	10	47	35	1,46	40	89
2964373	TDS301A08700	8,700	.3425	10	47	35	1,48	40	89
2964374	TDS301A08800	8,800	.3465	10	47	35	1,50	40	89
2964375	TDS301A08900	8,900	.3504	10	47	35	1,51	40	89
2964376	TDS301A09000	9,000	.3543	10	47	35	1,53	40	89
2964377	TDS301A09100	9,100	.3583	10	47	35	1,55	40	89
2964378	TDS301A09130	9,130	.3594	10	47	35	1,55	40	89
2964379	TDS301A09200	9,200	.3622	10	47	35	1,57	40	89
2964380	TDS301A09300	9,300	.3661	10	47	35	1,58	40	89
2964381	TDS301A09400	9,400	.3701	10	47	35	1,60	40	89
2964382	TDS301A09500	9,500	.3740	10	47	35	1,62	40	89
2964393	TDS301A09520	9,520	.3748	10	47	35	1,62	40	89
2964394	TDS301A09600	9,600	.3780	10	47	35	1,64	40	89
2964395	TDS301A09700	9,700	.3819	10	47	35	1,65	40	89
2964396	TDS301A09800	9,800	.3858	10	47	35	1,67	40	89
2964397	TDS301A09900	9,900	.3898	10	47	35	1,69	40	89
2964398	TDS301A09920	9,920	.3906	10	47	35	1,69	40	89
2964399	TDS301A10000	10,000	.3937	10	47	35	1,71	40	89
2964400	TDS301A10100	10,100	.3976	12	55	40	1,73	45	102
2964401	TDS301A10200	10,200	.4016	12	55	40	1,74	45	102
2964402	TDS301A10300	10,300	.4055	12	55	40	1,76	45	102
2964413	TDS301A10320	10,320	.4063	12	55	40	1,76	45	102
2964414	TDS301A10400	10,400	.4094	12	55	40	1,78	45	102
2964415	TDS301A10500	10,500	.4134	12	55	40	1,80	45	102
2964416	TDS301A10600	10,600	.4173	12	55	40	1,81	45	102
2964417	TDS301A10700	10,700	.4213	12	55	40	1,83	45	102
2964418	TDS301A10720	10,720	.4220	12	55	40	1,83	45	102
2964419	TDS301A10800	10,800	.4252	12	55	40	1,85	45	102
2964420	TDS301A10900	10,900	.4291	12	55	40	1,87	45	102
2964421	TDS301A11000	11,000	.4331	12	55	40	1,88	45	102
2964423	TDS301A11100	11,100	.4370	12	55	40	1,90	45	102
2964424	TDS301A11110	11,110	.4374	12	55	40	1,90	45	102
2964425	TDS301A11200	11,200	.4409	12	55	40	1,92	45	102
2964426	TDS301A11300	11,300	.4449	12	55	40	1,94	45	102

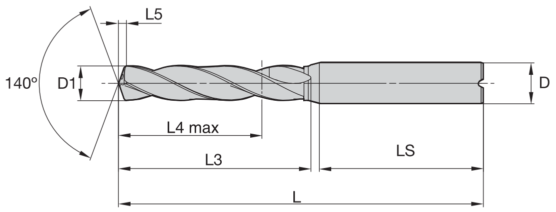
(continued)

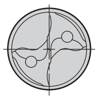
(TDS301A • 3 x D — continued)

P	●
M	○
K	●
N	○
S	○
H	

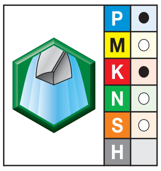
● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964427	TDS301A11400	11,400	.4488	12	55	40	1,95	45	102
2964428	TDS301A11500	11,500	.4528	12	55	40	1,97	45	102
2964429	TDS301A11600	11,600	.4567	12	55	40	1,99	45	102
2964430	TDS301A11700	11,700	.4606	12	55	40	2,01	45	102
2964431	TDS301A11800	11,800	.4646	12	55	40	2,03	45	102
2964432	TDS301A11900	11,900	.4685	12	55	40	2,04	45	102
2964433	TDS301A11910	11,910	.4689	12	55	40	2,04	45	102
2964434	TDS301A12000	12,000	.4724	12	55	40	2,06	45	102
2964435	TDS301A12300	12,300	.4843	14	60	43	2,11	45	107
2964436	TDS301A12500	12,500	.4921	14	60	43	2,15	45	107
2964437	TDS301A12700	12,700	.5000	14	60	43	2,18	45	107
2964438	TDS301A12800	12,800	.5039	14	60	43	2,20	45	107
2964439	TDS301A13000	13,000	.5118	14	60	43	2,24	45	107
2964440	TDS301A13500	13,500	.5315	14	60	43	2,33	45	107
2964441	TDS301A13800	13,800	.5433	14	60	43	2,38	45	107
2964442	TDS301A14000	14,000	.5512	14	60	43	2,41	45	107
2964443	TDS301A14290	14,290	.5626	16	65	45	2,47	48	115
2964444	TDS301A14500	14,500	.5709	16	65	45	2,50	48	115
2964445	TDS301A14800	14,800	.5827	16	65	45	2,56	48	115
2964446	TDS301A15000	15,000	.5906	16	65	45	2,59	48	115
2964447	TDS301A15500	15,500	.6102	16	65	45	2,68	48	115
2964448	TDS301A15800	15,800	.6220	16	65	45	2,73	48	115
2964449	TDS301A15870	15,870	.6248	16	65	45	2,75	48	115
2964450	TDS301A16000	16,000	.6299	16	65	45	2,77	48	115
2964451	TDS301A16500	16,500	.6496	18	73	51	2,86	48	123
2964452	TDS301A16670	16,670	.6563	18	73	51	2,89	48	123
2964453	TDS301A16800	16,800	.6614	18	73	51	2,91	48	123
2964454	TDS301A17000	17,000	.6693	18	73	51	2,95	48	123
2964455	TDS301A17500	17,500	.6890	18	73	51	3,04	48	123
2964456	TDS301A17800	17,800	.7008	18	73	51	3,09	48	123
2964457	TDS301A18000	18,000	.7087	18	73	51	3,12	48	123
2964458	TDS301A18500	18,500	.7283	20	79	55	3,21	50	131
2964459	TDS301A18800	18,800	.7402	20	79	55	3,27	50	131
2964460	TDS301A19000	19,000	.7480	20	79	55	3,30	50	131
2964461	TDS301A19050	19,050	.7500	20	79	55	3,31	50	131
2964462	TDS301A19500	19,500	.7677	20	79	55	3,39	50	131
2964463	TDS301A19800	19,800	.7795	20	79	55	3,44	50	131
2964464	TDS301A20000	20,000	.7874	20	79	55	3,48	50	131





■ TDS501A • 3 x D



● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2964947	**TDS501A03000**	3,000	.1181	6	20	14	0,48	36	62
2964948	**TDS501A03100**	3,100	.1220	6	20	14	0,50	36	62
4051234	**TDS501A03175**	3,175	.1250	6	20	14	0,64	36	62
2964949	**TDS501A03200**	3,200	.1260	6	20	14	0,52	36	62
2964950	**TDS501A03250**	3,250	.1280	6	20	14	0,53	36	62
2964951	**TDS501A03300**	3,300	.1299	6	20	14	0,54	36	62
2964952	**TDS501A03400**	3,400	.1339	6	20	14	0,55	36	62
4051233	**TDS501A03455**	3,450	.1358	6	20	14	0,56	36	62
2964953	**TDS501A03500**	3,500	.1378	6	20	14	0,57	36	62
5661464	**TDS501A03571**	3,571	.1406	6	20	14	0,58	36	62
2964954	**TDS501A03600**	3,600	.1417	6	20	14	0,59	36	62
2964955	**TDS501A03700**	3,700	.1457	6	20	14	0,61	36	62
2964956	**TDS501A03800**	3,800	.1496	6	24	17	0,62	36	66
2964957	**TDS501A03900**	3,900	.1535	6	24	17	0,64	36	66
2964958	**TDS501A04000**	4,000	.1575	6	24	17	0,66	36	66
2964959	**TDS501A04100**	4,100	.1614	6	24	17	0,67	36	66
2964960	**TDS501A04200**	4,200	.1654	6	24	17	0,69	36	66
2964961	**TDS501A04300**	4,300	.1693	6	24	17	0,71	36	66
2964962	**TDS501A04370**	4,370	.1720	6	24	17	0,72	36	66
2964963	**TDS501A04400**	4,400	.1732	6	24	17	0,73	36	66
2964964	**TDS501A04500**	4,500	.1772	6	24	17	0,74	36	66
2964965	**TDS501A04600**	4,600	.1811	6	24	17	0,76	36	66
5661502	**TDS501A04623**	4,623	.1820	6	24	17	0,77	36	66
2964966	**TDS501A04650**	4,650	.1831	6	24	17	0,77	36	66

(continued)

(TDS501A • 3 x D — continued)

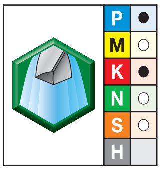
P	●
M	○
K	●
N	○
S	○
H	

● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964967	TDS501A04700	4,700	.1850	6	24	17	0,78	36	66
5661503	TDS501A04763	4,763	.1875	6	28	20	0,79	36	66
2964969	TDS501A04800	4,800	.1890	6	28	20	0,80	36	66
2964970	TDS501A04900	4,900	.1929	6	28	20	0,81	36	66
2964971	TDS501A05000	5,000	.1969	6	28	20	0,83	36	66
2964972	TDS501A05100	5,100	.2008	6	28	20	0,85	36	66
2964973	TDS501A05160	5,160	.2031	6	28	20	0,86	36	66
2964974	TDS501A05200	5,200	.2047	6	28	20	0,87	36	66
2964975	TDS501A05300	5,300	.2087	6	28	20	0,88	36	66
2964976	TDS501A05400	5,400	.2126	6	28	20	0,90	36	66
5661504	TDS501A05410	5,410	.2130	6	28	20	0,90	36	66
2964977	TDS501A05500	5,500	.2165	6	28	20	0,92	36	66
2964978	TDS501A05550	5,550	.2185	6	28	20	0,93	36	66
5661505	TDS501A05558	5,558	.2188	6	28	20	0,93	36	66
2964980	TDS501A05600	5,600	.2205	6	28	20	0,94	36	66
2964981	TDS501A05700	5,700	.2244	6	28	20	0,95	36	66
2964982	TDS501A05800	5,800	.2283	6	28	20	0,97	36	66
2964983	TDS501A05900	5,900	.2323	6	28	20	0,99	36	66
2964984	TDS501A05950	5,950	.2343	6	28	20	1,00	36	66
2964985	TDS501A06000	6,000	.2362	6	28	20	1,00	36	66
2964986	TDS501A06100	6,100	.2402	8	34	24	1,02	36	79
2964987	TDS501A06200	6,200	.2441	8	34	24	1,04	36	79
2964988	TDS501A06300	6,300	.2480	8	34	24	1,06	36	79
2964989	TDS501A06350	6,350	.2500	8	34	24	1,07	36	79
2964990	TDS501A06400	6,400	.2520	8	34	24	1,07	36	79
2964991	TDS501A06500	6,500	.2559	8	34	24	1,09	36	79
5661506	TDS501A06528	6,528	.2570	8	34	24	1,10	36	79
2964992	TDS501A06600	6,600	.2598	8	34	24	1,11	36	79
2964993	TDS501A06700	6,700	.2638	8	34	24	1,13	36	79
5661507	TDS501A06746	6,746	.2656	8	34	24	1,14	36	79
2964995	TDS501A06800	6,800	.2677	8	34	24	1,14	36	79
2964996	TDS501A06900	6,900	.2717	8	34	24	1,16	36	79
2964997	TDS501A07000	7,000	.2756	8	34	24	1,18	36	79
2964998	TDS501A07100	7,100	.2795	8	41	29	1,20	36	79
5661509	TDS501A07145	7,145	.2813	8	41	29	1,21	36	79
2965000	TDS501A07200	7,200	.2835	8	41	29	1,21	36	79
2965001	TDS501A07300	7,300	.2874	8	41	29	1,23	36	79
2965002	TDS501A07400	7,400	.2913	8	41	29	1,25	36	79
2965003	TDS501A07500	7,500	.2953	8	41	29	1,27	36	79
2965004	TDS501A07541	7,540	.2969	8	41	29	1,27	36	79

(continued)

(TDS501A • 3 x D — continued)



● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2965005	**TDS501A07600**	7,600	.2992	8	41	29	1,29	36	79
2965006	**TDS501A07700**	7,700	.3031	8	41	29	1,30	36	79
2965007	**TDS501A07800**	7,800	.3071	8	41	29	1,32	36	79
2965008	**TDS501A07900**	7,900	.3110	8	41	29	1,34	36	79
5661540	**TDS501A07938**	7,938	.3125	8	41	29	1,34	36	79
2965010	**TDS501A08000**	8,000	.3150	8	41	29	1,36	36	79
2965011	**TDS501A08100**	8,100	.3189	10	47	35	1,37	40	89
2965012	**TDS501A08200**	8,200	.3228	10	47	35	1,39	40	89
2965013	**TDS501A08300**	8,300	.3268	10	47	35	1,41	40	89
5661541	**TDS501A08334**	8,334	.3281	10	47	35	1,41	40	89
2965015	**TDS501A08400**	8,400	.3307	10	47	35	1,43	40	89
5661542	**TDS501A08433**	8,433	.3320	10	47	35	1,43	40	89
2965016	**TDS501A08500**	8,500	.3346	10	47	35	1,44	40	89
2965017	**TDS501A08600**	8,600	.3386	10	47	35	1,46	40	89
2965018	**TDS501A08700**	8,700	.3425	10	47	35	1,48	40	89
5661543	**TDS501A08733**	8,733	.3438	10	47	35	1,48	40	89
2965019	**TDS501A08800**	8,800	.3465	10	47	35	1,50	40	89
2965020	**TDS501A08900**	8,900	.3504	10	47	35	1,51	40	89
2965021	**TDS501A09000**	9,000	.3543	10	47	35	1,53	40	89
2965022	**TDS501A09100**	9,100	.3583	10	47	35	1,55	40	89
2965023	**TDS501A09129**	9,130	.3594	10	47	35	1,55	40	89
2965024	**TDS501A09200**	9,200	.3622	10	47	35	1,57	40	89
2965025	**TDS501A09300**	9,300	.3661	10	47	35	1,58	40	89
5661544	**TDS501A09347**	9,347	.3680	10	47	35	1,59	40	89
2965026	**TDS501A09400**	9,400	.3701	10	47	35	1,60	40	89
2965027	**TDS501A09500**	9,500	.3740	10	47	35	1,62	40	89
2965029	**TDS501A09600**	9,600	.3780	10	47	35	1,64	40	89
2965030	**TDS501A09700**	9,700	.3819	10	47	35	1,65	40	89
5661546	**TDS501A09750**	9,750	.3839	10	47	35	1,66	40	89
2965031	**TDS501A09800**	9,800	.3858	10	47	35	1,67	40	89
2965032	**TDS501A09900**	9,900	.3898	10	47	35	1,69	40	89
2965033	**TDS501A09921**	9,920	.3906	10	47	35	1,69	40	89
2965034	**TDS501A10000**	10,000	.3937	10	47	35	1,71	40	89
2965035	**TDS501A10100**	10,100	.3976	12	55	40	1,73	45	102
2965036	**TDS501A10200**	10,200	.4016	12	55	40	1,74	45	102
2965037	**TDS501A10300**	10,300	.4055	12	55	40	1,76	45	102
2965038	**TDS501A10320**	10,320	.4063	12	55	40	1,76	45	102
2965039	**TDS501A10400**	10,400	.4094	12	55	40	1,78	45	102
2965040	**TDS501A10500**	10,500	.4134	12	55	40	1,80	45	102
2965041	**TDS501A10600**	10,600	.4173	12	55	40	1,81	45	102

(continued)

(TDS501A • 3 x D — continued)

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S	○
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● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2965042	**TDS501A10700**	10,700	.4213	12	55	40	1,83	45	102
5661547	**TDS501A10716**	10,716	.4219	12	55	40	1,83	45	102
2965044	**TDS501A10800**	10,800	.4252	12	55	40	1,85	45	102
2965045	**TDS501A10900**	10,900	.4291	12	55	40	1,87	45	102
2965046	**TDS501A11000**	11,000	.4331	12	55	40	1,88	45	102
2965047	**TDS501A11100**	11,100	.4370	12	55	40	1,90	45	102
2965048	**TDS501A11113**	11,113	.4375	12	55	40	1,90	45	102
2964736	**TDS501A11200**	11,200	.4409	12	55	40	1,92	45	102
2964737	**TDS501A11300**	11,300	.4449	12	55	40	1,94	45	102
2964738	**TDS501A11400**	11,400	.4488	12	55	40	1,95	45	102
2964739	**TDS501A11500**	11,500	.4528	12	55	40	1,97	45	102
2964740	**TDS501A11600**	11,600	.4567	12	55	40	1,99	45	102
2964741	**TDS501A11700**	11,700	.4606	12	55	40	2,01	45	102
2964742	**TDS501A11800**	11,800	.4646	12	55	40	2,03	45	102
2965053	**TDS501A11900**	11,900	.4685	12	55	40	2,04	45	102
2965054	**TDS501A11910**	11,910	.4689	12	55	40	2,04	45	102
2965055	**TDS501A12000**	12,000	.4724	12	55	40	2,06	45	102
2965056	**TDS501A12300**	12,300	.4843	14	60	43	2,11	45	107
5661548	**TDS501A12304**	12,304	.4844	14	60	43	2,11	45	107
2965057	**TDS501A12500**	12,500	.4921	14	60	43	2,15	45	107
2965058	**TDS501A12700**	12,700	.5000	14	60	43	2,18	45	107
2965059	**TDS501A12800**	12,800	.5039	14	60	43	2,20	45	107
2965060	**TDS501A13000**	13,000	.5118	14	60	43	2,24	45	107
4051235	**TDS501A13100**	13,100	.5157	14	60	43	2,79	45	107
2965061	**TDS501A13500**	13,500	.5315	14	60	43	2,33	45	107
2965062	**TDS501A13800**	13,800	.5433	14	60	43	2,38	45	107
2965063	**TDS501A14000**	14,000	.5512	14	60	43	2,41	45	107
2965064	**TDS501A14290**	14,290	.5626	16	65	45	2,47	48	115
2965065	**TDS501A14500**	14,500	.5709	16	65	45	2,50	48	115
2965066	**TDS501A14800**	14,800	.5827	16	65	45	2,56	48	115
2965067	**TDS501A15000**	15,000	.5906	16	65	45	2,59	48	115
2965068	**TDS501A15500**	15,500	.6102	16	65	45	2,68	48	115
2965069	**TDS501A15800**	15,800	.6220	16	65	45	2,73	48	115
2965070	**TDS501A15870**	15,870	.6248	16	65	45	2,75	48	115
2965071	**TDS501A16000**	16,000	.6299	16	65	45	2,77	48	115
2965072	**TDS501A16500**	16,500	.6496	18	73	51	2,86	48	123
2965073	**TDS501A16670**	16,670	.6563	18	73	51	2,89	48	123
2965074	**TDS501A16800**	16,800	.6614	18	73	51	2,91	48	123
2965075	**TDS501A17000**	17,000	.6693	18	73	51	2,95	48	123
2965076	**TDS501A17500**	17,500	.6890	18	73	51	3,04	48	123

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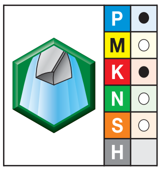
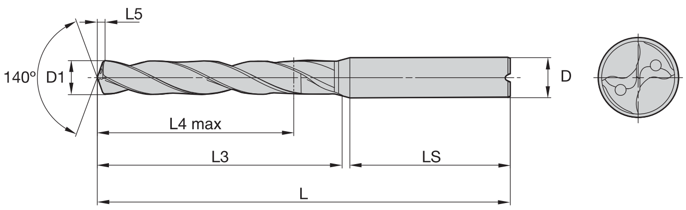
(TDS501A • 3 x D — continued)



● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2965077	**TDS501A17800**	17,800	.7008	18	73	51	3,09	48	123
2965078	**TDS501A18000**	18,000	.7087	18	73	51	3,12	48	123
2965079	**TDS501A18500**	18,500	.7283	20	79	55	3,21	50	131
2965080	**TDS501A18800**	18,800	.7402	20	79	55	3,27	50	131
2965081	**TDS501A19000**	19,000	.7480	20	79	55	3,30	50	131
2965082	**TDS501A19050**	19,050	.7500	20	79	55	3,31	50	131
2965083	**TDS501A19500**	19,500	.7677	20	79	55	3,39	50	131
2965084	**TDS501A19800**	19,800	.7795	20	79	55	3,44	50	131
2965085	**TDS501A20000**	20,000	.7874	20	79	55	3,48	50	131



■ TDS502A • 5 x D

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S	○
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● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964803	**TDS502A03000**	3,000	.1181	6	28	23	0,48	36	66
2964804	**TDS502A03100**	3,100	.1220	6	28	23	0,50	36	66
4051237	**TDS502A03175**	3,175	.1250	6	28	23	0,64	36	66
2964805	**TDS502A03200**	3,200	.1260	6	28	23	0,52	36	66
2964806	**TDS502A03250**	3,250	.1280	6	28	23	0,53	36	66
2964807	**TDS502A03300**	3,300	.1299	6	28	23	0,54	36	66
2964808	**TDS502A03400**	3,400	.1339	6	28	23	0,55	36	66
4051236	**TDS502A03455**	3,455	.1360	6	28	23	0,70	36	66
2964809	**TDS502A03500**	3,500	.1378	6	28	23	0,57	36	66
2964810	**TDS502A03600**	3,600	.1417	6	28	23	0,59	36	66
2964811	**TDS502A03700**	3,700	.1457	6	28	23	0,61	36	66
2964812	**TDS502A03800**	3,800	.1496	6	36	29	0,62	36	74
2964813	**TDS502A03900**	3,900	.1535	6	36	29	0,64	36	74
2964814	**TDS502A04000**	4,000	.1575	6	36	29	0,66	36	74
2964815	**TDS502A04100**	4,100	.1614	6	36	29	0,67	36	74
2964816	**TDS502A04200**	4,200	.1654	6	36	29	0,69	36	74
2964817	**TDS502A04300**	4,300	.1693	6	36	29	0,71	36	74
2964818	**TDS502A04370**	4,370	.1720	6	36	29	0,72	36	74
2964819	**TDS502A04400**	4,400	.1732	6	36	29	0,73	36	74
2964820	**TDS502A04500**	4,500	.1772	6	36	29	0,74	36	74
2964821	**TDS502A04600**	4,600	.1811	6	36	29	0,76	36	74
2964822	**TDS502A04650**	4,650	.1831	6	36	29	0,77	36	74
2964823	**TDS502A04700**	4,700	.1850	6	36	29	0,78	36	74
2964824	**TDS502A04760**	4,760	.1874	6	44	35	0,79	36	82

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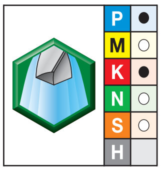
(TDS502A • 5 x D — continued)



● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2964825	**TDS502A04800**	4,800	.1890	6	44	35	0,80	36	82
2964826	**TDS502A04900**	4,900	.1929	6	44	35	0,81	36	82
2964827	**TDS502A05000**	5,000	.1969	6	44	35	0,83	36	82
2964828	**TDS502A05100**	5,100	.2008	6	44	35	0,85	36	82
2964829	**TDS502A05160**	5,160	.2031	6	44	35	0,86	36	82
2964830	**TDS502A05200**	5,200	.2047	6	44	35	0,87	36	82
2964831	**TDS502A05300**	5,300	.2087	6	44	35	0,88	36	82
2964832	**TDS502A05400**	5,400	.2126	6	44	35	0,90	36	82
2964833	**TDS502A05500**	5,500	.2165	6	44	35	0,92	36	82
2964834	**TDS502A05550**	5,550	.2185	6	44	35	0,93	36	82
2964835	**TDS502A05560**	5,560	.2189	6	44	35	0,93	36	82
2964836	**TDS502A05600**	5,600	.2205	6	44	35	0,94	36	82
2964837	**TDS502A05700**	5,700	.2244	6	44	35	0,95	36	82
2964838	**TDS502A05800**	5,800	.2283	6	44	35	0,97	36	82
2964839	**TDS502A05900**	5,900	.2323	6	44	35	0,99	36	82
2964840	**TDS502A05950**	5,950	.2343	6	44	35	1,00	36	82
2964841	**TDS502A06000**	6,000	.2362	6	44	35	1,00	36	82
2964842	**TDS502A06100**	6,100	.2402	8	53	43	1,02	36	91
2964843	**TDS502A06200**	6,200	.2441	8	53	43	1,04	36	91
2964844	**TDS502A06300**	6,300	.2480	8	53	43	1,06	36	91
2964845	**TDS502A06350**	6,350	.2500	8	53	43	1,07	36	91
2964846	**TDS502A06400**	6,400	.2520	8	53	43	1,07	36	91
2964847	**TDS502A06500**	6,500	.2559	8	53	43	1,09	36	91
2964848	**TDS502A06600**	6,600	.2598	8	53	43	1,11	36	91
2964849	**TDS502A06700**	6,700	.2638	8	53	43	1,13	36	91
2964850	**TDS502A06750**	6,750	.2657	8	53	43	1,14	36	91
2964851	**TDS502A06800**	6,800	.2677	8	53	43	1,14	36	91
2964852	**TDS502A06900**	6,900	.2717	8	53	43	1,16	36	91
2964853	**TDS502A07000**	7,000	.2756	8	53	43	1,18	36	91
2964854	**TDS502A07100**	7,100	.2795	8	53	43	1,20	36	91
2964855	**TDS502A07140**	7,140	.2811	8	53	43	1,20	36	91
2964856	**TDS502A07200**	7,200	.2835	8	53	43	1,21	36	91
2964857	**TDS502A07300**	7,300	.2874	8	53	43	1,23	36	91
2964858	**TDS502A07400**	7,400	.2913	8	53	43	1,25	36	91
2964859	**TDS502A07500**	7,500	.2953	8	53	43	1,27	36	91
2964860	**TDS502A07540**	7,540	.2969	8	53	43	1,27	36	91
2964861	**TDS502A07600**	7,600	.2992	8	53	43	1,29	36	91
2964862	**TDS502A07700**	7,700	.3031	8	53	43	1,30	36	91
2964863	**TDS502A07800**	7,800	.3071	8	53	43	1,32	36	91
2964864	**TDS502A07900**	7,900	.3110	8	53	43	1,34	36	91

(continued)

(TDS502A • 5 x D — continued)

P	M	K	N	S	H
●	○	●	○	○	

● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2964865	**TDS502A07940**	7,940	.3126	8	53	43	1,34	36	91
2964866	**TDS502A08000**	8,000	.3150	8	53	43	1,36	36	91
2964867	**TDS502A08100**	8,100	.3189	10	61	49	1,37	40	103
2964868	**TDS502A08200**	8,200	.3228	10	61	49	1,39	40	103
2964869	**TDS502A08300**	8,300	.3268	10	61	49	1,41	40	103
2964870	**TDS502A08330**	8,330	.3280	10	61	49	1,41	40	103
2964871	**TDS502A08400**	8,400	.3307	10	61	49	1,43	40	103
2964872	**TDS502A08500**	8,500	.3346	10	61	49	1,44	40	103
2964873	**TDS502A08600**	8,600	.3386	10	61	49	1,46	40	103
2964874	**TDS502A08700**	8,700	.3425	10	61	49	1,48	40	103
2964875	**TDS502A08800**	8,800	.3465	10	61	49	1,50	40	103
2964876	**TDS502A08900**	8,900	.3504	10	61	49	1,51	40	103
2964877	**TDS502A09000**	9,000	.3543	10	61	49	1,53	40	103
2964878	**TDS502A09100**	9,100	.3583	10	61	49	1,55	40	103
2964879	**TDS502A09130**	9,130	.3594	10	61	49	1,55	40	103
2964880	**TDS502A09200**	9,200	.3622	10	61	49	1,57	40	103
2964881	**TDS502A09300**	9,300	.3661	10	61	49	1,58	40	103
2964882	**TDS502A09400**	9,400	.3701	10	61	49	1,60	40	103
2964883	**TDS502A09500**	9,500	.3740	10	61	49	1,62	40	103
2964884	**TDS502A09520**	9,520	.3748	10	61	49	1,62	40	103
2964885	**TDS502A09600**	9,600	.3780	10	61	49	1,64	40	103
2964886	**TDS502A09700**	9,700	.3819	10	61	49	1,65	40	103
2964887	**TDS502A09800**	9,800	.3858	10	61	49	1,67	40	103
2964888	**TDS502A09900**	9,900	.3898	10	61	49	1,69	40	103
2964889	**TDS502A09920**	9,920	.3906	10	61	49	1,69	40	103
2964890	**TDS502A10000**	10,000	.3937	10	61	49	1,71	40	103
2964891	**TDS502A10100**	10,100	.3976	12	71	56	1,73	45	118
2964892	**TDS502A10200**	10,200	.4016	12	71	56	1,74	45	118
2964893	**TDS502A10300**	10,300	.4055	12	71	56	1,76	45	118
2964894	**TDS502A10320**	10,320	.4063	12	71	56	1,76	45	118
2964895	**TDS502A10400**	10,400	.4094	12	71	56	1,78	45	118
2964896	**TDS502A10500**	10,500	.4134	12	71	56	1,80	45	118
2964897	**TDS502A10600**	10,600	.4173	12	71	56	1,81	45	118
2964898	**TDS502A10700**	10,700	.4213	12	71	56	1,83	45	118
2964899	**TDS502A10720**	10,720	.4220	12	71	56	1,83	45	118
2964900	**TDS502A10800**	10,800	.4252	12	71	56	1,85	45	118
2964901	**TDS502A10900**	10,900	.4291	12	71	56	1,87	45	118
2964902	**TDS502A11000**	11,000	.4331	12	71	56	1,88	45	118
2964903	**TDS502A11100**	11,100	.4370	12	71	56	1,90	45	118
2964904	**TDS502A11110**	11,110	.4374	12	71	56	1,90	45	118

(continued)

(TDS502A • 5 x D — continued)

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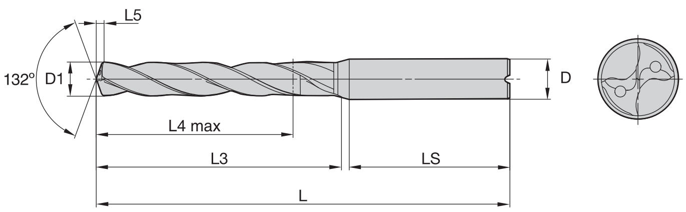
● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964905	TDS502A11200	11,200	.4409	12	71	56	1,92	45	118
2964906	TDS502A11300	11,300	.4449	12	71	56	1,94	45	118
2968374	TDS502A11400	11,400	.4488	12	71	56	1,95	45	118
2968375	TDS502A11500	11,500	.4528	12	71	56	1,97	45	118
2968376	TDS502A11600	11,600	.4567	12	71	56	1,99	45	118
2968377	TDS502A11700	11,700	.4606	12	71	56	2,01	45	118
2968378	TDS502A11800	11,800	.4646	12	71	56	2,03	45	118
2968379	TDS502A11900	11,900	.4685	12	71	56	2,04	45	118
2968380	TDS502A11910	11,910	.4689	12	71	56	2,04	45	118
2968381	TDS502A12000	12,000	.4724	12	71	56	2,06	45	118
2968382	TDS502A12300	12,300	.4843	14	77	60	2,11	45	124
2968393	TDS502A12500	12,500	.4921	14	77	60	2,15	45	124
2968394	TDS502A12700	12,700	.5000	14	77	60	2,18	45	124
2968395	TDS502A12800	12,800	.5039	14	77	60	2,20	45	124
2968396	TDS502A13000	13,000	.5118	14	77	60	2,24	45	124
4051238	TDS502A13100	13,100	.5157	14	77	60	2,79	45	124
2968397	TDS502A13500	13,500	.5315	14	77	60	2,33	45	124
2968398	TDS502A13800	13,800	.5433	14	77	60	2,38	45	124
2968399	TDS502A14000	14,000	.5512	14	77	60	2,41	45	124
2968400	TDS502A14290	14,290	.5626	16	83	63	2,47	48	133
2968401	TDS502A14500	14,500	.5709	16	83	63	2,50	48	133
2968402	TDS502A14800	14,800	.5827	16	83	63	2,56	48	133
2968403	TDS502A15000	15,000	.5906	16	83	63	2,59	48	133
2968404	TDS502A15500	15,500	.6102	16	83	63	2,68	48	133
2968405	TDS502A15800	15,800	.6220	16	83	63	2,73	48	133
2968406	TDS502A15870	15,870	.6248	16	83	63	2,75	48	133
2968407	TDS502A16000	16,000	.6299	16	83	63	2,77	48	133
2968408	TDS502A16500	16,500	.6496	18	93	71	2,86	48	143
2968409	TDS502A16670	16,670	.6563	18	93	71	2,89	48	143
2968410	TDS502A16800	16,800	.6614	18	93	71	2,91	48	143
2968411	TDS502A17000	17,000	.6693	18	93	71	2,95	48	143
2968412	TDS502A17500	17,500	.6890	18	93	71	3,04	48	143
2968413	TDS502A17800	17,800	.7008	18	93	71	3,09	48	143
2968414	TDS502A18000	18,000	.7087	18	93	71	3,12	48	143
2968415	TDS502A18500	18,500	.7283	20	101	77	3,21	50	153
2968416	TDS502A18800	18,800	.7402	20	101	77	3,27	50	153
2968417	TDS502A19000	19,000	.7480	20	101	77	3,30	50	153
2968418	TDS502A19050	19,050	.7500	20	101	77	3,31	50	153
2968419	TDS502A19500	19,500	.7677	20	101	77	3,39	50	153
2968420	TDS502A19800	19,800	.7795	20	101	77	3,44	50	153
2968421	TDS502A20000	20,000	.7874	20	101	77	3,48	50	153



■ TDS503A • 8 x D

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S	○
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grade WU25PD
TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2968422	TDS503A03000	3,000	.1181	6	40	33	0,61	36	78
4051239	TDS503A03100	3,100	.1220	6	40	33	0,63	36	78
4051240	TDS503A03175	3,175	.1250	6	40	33	0,64	36	78
4051241	TDS503A03200	3,200	.1260	6	40	33	0,65	36	78
4051242	TDS503A03250	3,250	.1280	6	40	33	0,66	36	78
2968503	TDS503A03300	3,300	.1299	6	40	33	0,67	36	78
4051243	TDS503A03400	3,400	.1339	6	40	33	0,69	36	78
4051244	TDS503A03455	3,455	.1360	6	40	33	0,70	36	78
2968504	TDS503A03500	3,500	.1378	6	40	33	0,71	36	78
2968505	TDS503A03700	3,700	.1457	6	40	33	0,76	36	78
2968506	TDS503A03800	3,800	.1496	6	49	41	0,78	36	87
4051245	TDS503A03900	3,900	.1535	6	49	41	0,80	36	87
2968507	TDS503A04000	4,000	.1575	6	49	41	0,82	36	87
4051246	TDS503A04100	4,100	.1614	6	49	41	0,84	36	87
2968508	TDS503A04200	4,200	.1654	6	49	41	0,86	36	87
4051247	TDS503A04300	4,300	.1693	6	49	41	0,88	36	87
2968509	TDS503A04370	4,370	.1720	6	49	41	0,90	36	87
4051248	TDS503A04400	4,400	.1732	6	49	41	0,91	36	87
2968510	TDS503A04500	4,500	.1772	6	49	41	0,93	36	87
4051249	TDS503A04600	4,600	.1811	6	49	41	0,95	36	87
4051250	TDS503A04650	4,650	.1831	6	49	41	0,96	36	87
2968511	TDS503A04700	4,700	.1850	6	49	41	0,97	36	87
2968512	TDS503A04760	4,760	.1874	6	56	48	0,98	36	94
2968513	TDS503A04800	4,800	.1890	6	56	48	0,99	36	94

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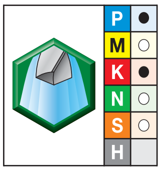
(TDS503A • 8 x D — continued)



grade WU25PD
TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
4051251	TDS503A04900	4,900	.1929	6	56	48	1,01	36	94
2968514	TDS503A05000	5,000	.1969	6	56	48	1,03	36	94
4051252	TDS503A05100	5,100	.2008	6	56	48	1,06	36	94
2968515	TDS503A05160	5,160	.2031	6	56	48	1,07	36	94
4051253	TDS503A05200	5,200	.2047	6	56	48	1,08	36	94
4051254	TDS503A05300	5,300	.2087	6	56	48	1,10	36	94
4051255	TDS503A05400	5,400	.2126	6	56	48	1,12	36	94
2968516	TDS503A05500	5,500	.2165	6	56	48	1,14	36	94
4051256	TDS503A05550	5,550	.2185	6	56	48	1,15	36	94
2968517	TDS503A05560	5,560	.2189	6	56	48	1,15	36	94
4051257	TDS503A05600	5,600	.2205	6	56	48	1,16	36	94
4051258	TDS503A05700	5,700	.2244	6	56	48	1,18	36	94
2968518	TDS503A05800	5,800	.2283	6	56	48	1,21	36	94
4051259	TDS503A05900	5,900	.2323	6	56	48	1,23	36	94
2968519	TDS503A05950	5,950	.2343	6	56	48	1,24	36	94
2968520	TDS503A06000	6,000	.2362	6	56	48	1,25	36	94
4051260	TDS503A06100	6,100	.2402	8	67	57	1,27	36	105
4051261	TDS503A06200	6,200	.2441	8	67	57	1,29	36	105
4051262	TDS503A06300	6,300	.2480	8	67	57	1,31	36	105
2968521	TDS503A06350	6,350	.2500	8	67	57	1,32	36	105
4051263	TDS503A06400	6,400	.2520	8	67	57	1,33	36	105
2968522	TDS503A06500	6,500	.2559	8	67	57	1,36	36	105
4051264	TDS503A06600	6,600	.2598	8	67	57	1,38	36	105
4051265	TDS503A06700	6,700	.2638	8	67	57	1,40	36	105
2968523	TDS503A06750	6,750	.2657	8	67	57	1,41	36	105
2968524	TDS503A06800	6,800	.2677	8	67	57	1,42	36	105
4051266	TDS503A06900	6,900	.2717	8	67	57	1,44	36	105
2968525	TDS503A07000	7,000	.2756	8	67	57	1,46	36	105
4051267	TDS503A07100	7,100	.2795	8	72	61	1,49	36	110
2968526	TDS503A07140	7,140	.2811	8	72	61	1,49	36	110
4051268	TDS503A07200	7,200	.2835	8	72	61	1,51	36	110
4051269	TDS503A07300	7,300	.2874	8	72	61	1,53	36	110
4051270	TDS503A07400	7,400	.2913	8	72	61	1,55	36	110
2968527	TDS503A07500	7,500	.2953	8	72	61	1,57	36	110
2968528	TDS503A07540	7,540	.2969	8	72	61	1,58	36	110
3998454	TDS503A07600	7,600	.2992	8	72	61	1,59	36	110
4051271	TDS503A07700	7,700	.3031	8	72	61	1,62	36	110
2968529	TDS503A07800	7,800	.3071	8	72	61	1,64	36	110
4051272	TDS503A07900	7,900	.3110	8	72	61	1,66	36	110
2968530	TDS503A07940	7,940	.3126	8	72	61	1,67	36	110

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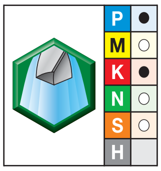
(TDS503A • 8 x D — continued)



● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2968531	**TDS503A08000**	8,000	.3150	8	72	61	1,68	36	110
4051273	**TDS503A08100**	8,100	.3189	10	80	68	1,70	40	122
4051274	**TDS503A08200**	8,200	.3228	10	80	68	1,72	40	122
4051275	**TDS503A08300**	8,300	.3268	10	80	68	1,75	40	122
2968532	**TDS503A08330**	8,330	.3280	10	80	68	1,75	40	122
4051276	**TDS503A08400**	8,400	.3307	10	80	68	1,77	40	122
2968533	**TDS503A08500**	8,500	.3346	10	80	68	1,79	40	122
4051277	**TDS503A08600**	8,600	.3386	10	80	68	1,81	40	122
4051278	**TDS503A08700**	8,700	.3425	10	80	68	1,83	40	122
4051279	**TDS503A08800**	8,800	.3465	10	80	68	1,85	40	122
4051280	**TDS503A08900**	8,900	.3504	10	80	68	1,88	40	122
2968534	**TDS503A09000**	9,000	.3543	10	80	68	1,90	40	122
4051281	**TDS503A09100**	9,100	.3583	10	80	68	1,92	40	122
2968535	**TDS503A09130**	9,130	.3594	10	80	68	1,93	40	122
4051282	**TDS503A09200**	9,200	.3622	10	80	68	1,94	40	122
4051283	**TDS503A09300**	9,300	.3661	10	80	68	1,96	40	122
4051284	**TDS503A09400**	9,400	.3701	10	80	68	1,98	40	122
2968536	**TDS503A09500**	9,500	.3740	10	80	68	2,01	40	122
2968537	**TDS503A09520**	9,520	.3748	10	80	68	2,01	40	122
4051285	**TDS503A09600**	9,600	.3780	10	80	68	2,03	40	122
4051286	**TDS503A09700**	9,700	.3819	10	80	68	2,05	40	122
2968538	**TDS503A09800**	9,800	.3858	10	80	68	2,07	40	122
4051287	**TDS503A09900**	9,900	.3898	10	80	68	2,09	40	122
2968539	**TDS503A09920**	9,920	.3906	10	80	68	2,10	40	122
2968540	**TDS503A10000**	10,000	.3937	10	80	68	2,11	40	122
4051288	**TDS503A10100**	10,100	.3976	12	94	79	2,14	45	141
2968541	**TDS503A10200**	10,200	.4016	12	94	79	2,16	45	141
4051289	**TDS503A10300**	10,300	.4055	12	94	79	2,18	45	141
2968542	**TDS503A10320**	10,320	.4063	12	94	79	2,18	45	141
4051290	**TDS503A10400**	10,400	.4094	12	94	79	2,20	45	141
2968543	**TDS503A10500**	10,500	.4134	12	94	79	2,22	45	141
4051291	**TDS503A10600**	10,600	.4173	12	94	79	2,24	45	141
4051292	**TDS503A10700**	10,700	.4213	12	94	79	2,27	45	141
2968544	**TDS503A10720**	10,720	.4220	12	94	79	2,27	45	141
2968545	**TDS503A10800**	10,800	.4252	12	94	79	2,29	45	141
4051293	**TDS503A10900**	10,900	.4291	12	94	79	2,31	45	141
2968546	**TDS503A11000**	11,000	.4331	12	94	79	2,33	45	141
4051294	**TDS503A11100**	11,100	.4370	12	94	79	2,35	45	141
3998456	**TDS503A11110**	11,110	.4374	12	94	79	2,35	45	141
4051295	**TDS503A11200**	11,200	.4409	12	94	79	2,37	45	141

(continued)

(TDS503A • 8 x D — continued)

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● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	in	D	L3	L4 max	L5	LS	L
4051296	TDS503A11300	11,300	.4449	12	94	79	2,40	45	141
4051297	TDS503A11400	11,400	.4488	12	94	79	2,42	45	141
2968547	TDS503A11500	11,500	.4528	12	94	79	2,44	45	141
4051298	TDS503A11600	11,600	.4567	12	94	79	2,46	45	141
4051299	TDS503A11700	11,700	.4606	12	94	79	2,48	45	141
2968548	TDS503A11800	11,800	.4646	12	94	79	2,50	45	141
4051300	TDS503A11900	11,900	.4685	12	94	79	2,53	45	141
2968549	TDS503A11910	11,910	.4689	12	94	79	2,53	45	141
2968550	TDS503A12000	12,000	.4724	12	94	79	2,55	45	141
2968551	TDS503A12300	12,300	.4843	14	108	91	2,61	45	155
2968552	TDS503A12500	12,500	.4921	14	108	91	2,66	45	155
2968553	TDS503A12700	12,700	.5000	14	108	91	2,70	45	155
2968554	TDS503A12800	12,800	.5039	14	108	91	2,72	45	155
2968555	TDS503A13000	13,000	.5118	14	108	91	2,77	45	155
4051301	TDS503A13100	13,100	.5157	14	108	91	2,79	45	155
2968556	TDS503A13500	13,500	.5315	14	108	91	2,87	45	155
2968557	TDS503A13800	13,800	.5433	14	108	91	2,94	45	155
2968558	TDS503A14000	14,000	.5512	14	108	91	2,98	45	155
2968559	TDS503A14290	14,290	.5626	16	121	101	3,05	48	171
2968560	TDS503A14500	14,500	.5709	16	121	101	3,09	48	171
2968561	TDS503A14800	14,800	.5827	16	121	101	3,16	48	171
2968562	TDS503A15000	15,000	.5906	16	121	101	3,20	48	171
2968563	TDS503A15500	15,500	.6102	16	121	101	3,31	48	171
2968564	TDS503A15800	15,800	.6220	16	121	101	3,38	48	171
2968565	TDS503A15870	15,870	.6248	16	121	101	3,39	48	171
2968566	TDS503A16000	16,000	.6299	16	121	101	3,42	48	171
4051302	TDS503A16500	16,500	.6496	18	135	113	3,53	48	185
4051303	TDS503A16670	16,670	.6563	18	135	113	3,57	48	185
4051304	TDS503A16800	16,800	.6614	18	135	113	3,59	48	185
4051305	TDS503A17000	17,000	.6693	18	135	113	3,64	48	185
4051306	TDS503A17500	17,500	.6890	18	135	113	3,75	48	185
4051307	TDS503A17800	17,800	.7008	18	135	113	3,81	48	185
4051308	TDS503A18000	18,000	.7087	18	135	113	3,86	48	185
4051309	TDS503A18500	18,500	.7283	20	148	124	3,97	50	200
4051310	TDS503A18800	18,800	.7402	20	148	124	4,03	50	200
4051311	TDS503A19000	19,000	.7480	20	148	124	4,07	50	200
4051312	TDS503A19050	19,050	.7500	20	148	124	4,09	50	200
4051313	TDS503A19500	19,500	.7677	20	148	124	4,18	50	200
4051314	TDS503A19800	19,800	.7795	20	148	124	4,25	50	200
4051315	TDS503A20000	20,000	.7874	20	148	124	4,29	50	200

TOP DRILL S+ • TDS301 • WU25PD™ • Flood Coolant • Metric

Material Group		Cutting Speed — vc Range — m/min min	–	max	Tool Diameter (mm)	Recommended Feed Rate (f) by Diameter 3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	80	–	130	mm/r	0,06–0,12	0,10–0,18	0,12–0,24	0,14–0,29	0,17–0,34	0,20–0,39	0,24–0,47	0,31–0,60
P	2, 3, 4, 6, 7	60	–	120	mm/r	0,07–0,13	0,10–0,19	0,14–0,25	0,17–0,31	0,21–0,37	0,24–0,42	0,29–0,52	0,38–0,65
P	5, 9, 10, 11	60	–	120	mm/r	0,07–0,13	0,09–0,19	0,13–0,25	0,16–0,31	0,19–0,37	0,21–0,42	0,26–0,52	0,32–0,65
P	12, 13.1, 13.2	40	–	70	mm/r	0,05–0,08	0,06–0,11	0,09–0,16	0,11–0,20	0,13–0,24	0,15–0,27	0,20–0,35	0,26–0,45
M	14.1	30	–	50	mm/r	0,04–0,07	0,05–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
M	14.3	30	–	60	mm/r	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,14	0,10–0,16	0,12–0,18	0,14–0,20	0,16–0,22
M	14.2, 14.4	30	–	50	mm/r	0,04–0,07	0,06–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
K	15, 16	100	–	210	mm/r	0,08–0,16	0,12–0,24	0,16–0,31	0,20–0,38	0,23–0,44	0,25–0,49	0,31–0,06	0,38–0,74
K	17, 18, 19	130	–	160	mm/r	0,08–0,13	0,12–0,19	0,16–0,25	0,20–0,31	0,23–0,36	0,25–0,40	0,31–0,48	0,38–0,60
K	20	100	–	170	mm/r	0,06–0,13	0,09–0,19	0,12–0,25	0,14–0,30	0,17–0,35	0,19–0,40	0,25–0,48	0,30–0,60
N	21	100	–	300	mm/r	0,10–0,18	0,12–0,20	0,15–0,25	0,20–0,30	0,25–0,35	0,30–0,40	0,35–0,50	0,40–0,60
N	22, 23, 24	100	–	300	mm/r	0,10–0,20	0,12–0,25	0,15–0,30	0,20–0,35	0,25–0,40	0,30–0,45	0,35–0,55	0,40–0,65
N	25	100	–	300	mm/r	0,15–0,18	0,16–0,20	0,18–0,25	0,20–0,30	0,25–0,35	0,30–0,40	0,35–0,50	0,40–0,55
N	26, 27, 28	100	–	250	mm/r	0,10–0,20	0,12–0,25	0,15–0,30	0,20–0,35	0,25–0,40	0,30–0,45	0,35–0,50	0,40–0,60
S	31, 32	20	–	30	mm/r	0,03–0,06	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,13	0,10–0,14	0,12–0,16	0,14–0,18
S	33, 34, 35	10	–	30	mm/r	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16
S	36	20	–	40	mm/r	0,02–0,04	0,02–0,05	0,04–0,07	0,06–0,09	0,07–0,10	0,08–0,11	0,09–0,13	0,10–0,15
S	37	20	–	50	mm/r	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16

nominal size range	Metric tolerance D1 tolerance	D tolerance h6
>3–6	0,004/0,016	0,000/–0,008
>6–10	0,006/0,021	0,000/–0,009
>10–18	0,007/0,025	0,000/–0,011
>18–21	0,008/0,029	0,000/–0,013

TOP DRILL S+ • TDS501 TDS502 TDS503 • WU25PD™ • Through Coolant • Metric

Material Group		Cutting Speed — vc Range — m/min				Recommended Feed Rate (f) by Diameter							
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	90	–	180	mm/r	0,08–0,16	0,09–0,18	0,12–0,24	0,14–0,29	0,17–0,34	0,20–0,39	0,24–0,47	0,31–0,60
P	2, 3, 4, 6, 7	80	–	120	mm/r	0,09–0,17	0,10–0,19	0,14–0,25	0,17–0,31	0,21–0,37	0,24–0,42	0,29–0,52	0,38–0,65
P	5, 9, 10, 11	70	–	120	mm/r	0,08–0,17	0,09–0,19	0,13–0,25	0,16–0,31	0,19–0,37	0,21–0,42	0,26–0,52	0,32–0,65
P	12, 13.1, 13.2	50	–	80	mm/r	0,05–0,09	0,06–0,11	0,09–0,16	0,11–0,20	0,14–0,24	0,15–0,27	0,20–0,35	0,26–0,45
M	14.1	30	–	50	mm/r	0,04–0,07	0,05–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
M	14.3	30	–	60	mm/r	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,14	0,10–0,16	0,12–0,18	0,14–0,20	0,16–0,22
M	14.2, 14.4	30	–	50	mm/r	0,04–0,07	0,06–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
K	15, 16	100	–	210	mm/r	0,11–0,22	0,12–0,24	0,16–0,31	0,20–0,38	0,23–0,44	0,25–0,49	0,31–0,60	0,38–0,74
K	17, 18, 19	130	–	160	mm/r	0,11–0,17	0,12–0,19	0,16–0,25	0,20–0,31	0,23–0,36	0,25–0,40	0,31–0,48	0,38–0,60
K	20	100	–	170	mm/r	0,08–0,17	0,09–0,19	0,12–0,25	0,14–0,30	0,17–0,35	0,19–0,40	0,24–0,48	0,30–0,60
N	21	100	–	350	mm/r	0,10–0,18	0,12–0,20	0,15–0,25	0,20–0,30	0,25–0,35	0,30–0,40	0,35–0,50	0,40–0,60
N	22, 23, 24	100	–	300	mm/r	0,10–0,20	0,12–0,25	0,15–0,30	0,20–0,35	0,25–0,40	0,30–0,45	0,35–0,55	0,40–0,65
N	25	100	–	300	mm/r	0,15–0,18	0,16–0,20	0,18–0,25	0,20–0,30	0,25–0,35	0,30–0,40	0,35–0,50	0,40–0,55
N	26, 27, 28	100	–	250	mm/r	0,10–0,20	0,12–0,25	0,15–0,30	0,20–0,35	0,25–0,40	0,30–0,45	0,35–0,50	0,40–0,60
S	31, 32	20	–	30	mm/r	0,03–0,06	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,13	0,10–0,14	0,12–0,16	0,14–0,18
S	33, 34, 35	10	–	30	mm/r	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16
S	36	20	–	40	mm/r	0,02–0,04	0,02–0,05	0,04–0,07	0,06–0,09	0,07–0,10	0,08–0,11	0,09–0,13	0,10–0,15
S	37	20	–	50	mm/r	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16

	Metric tolerance	
nominal size range	D1 tolerance	D tolerance h6
>3–6	0,004/0,016	0,000/–0,008
>6–10	0,006/0,021	0,000/–0,009
>10–18	0,007/0,025	0,000/–0,011
>18–21	0,008/0,029	0,000/–0,013

Good for You, Better for the Environment!

The WIDIA™ Carbide Recycling Program can turn accumulated scrap carbide tooling in your shop into cash.

Carbide Recycling

EXTREME **CHALLENGES.** EXTREME **RESULTS.**

We pay cash for used carbide tooling, including coated or non-coated carbide inserts, drills, end mills, reamers, and taps, regardless of brand.

It's good for the environment and a responsible way to dispose of scrap carbide.

Our carbide recycling program features:

- Easy-to-use web portal that shows what your scrap carbide is worth before sending it to us.
- Online forms that make it easy to ship scrap carbide to WIDIA.
- Green Box™ containers for safe, convenient shipping of scrap carbide to WIDIA.
- Cash payment for used carbide tooling.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

Deep-Hole Drilling without Piloting •

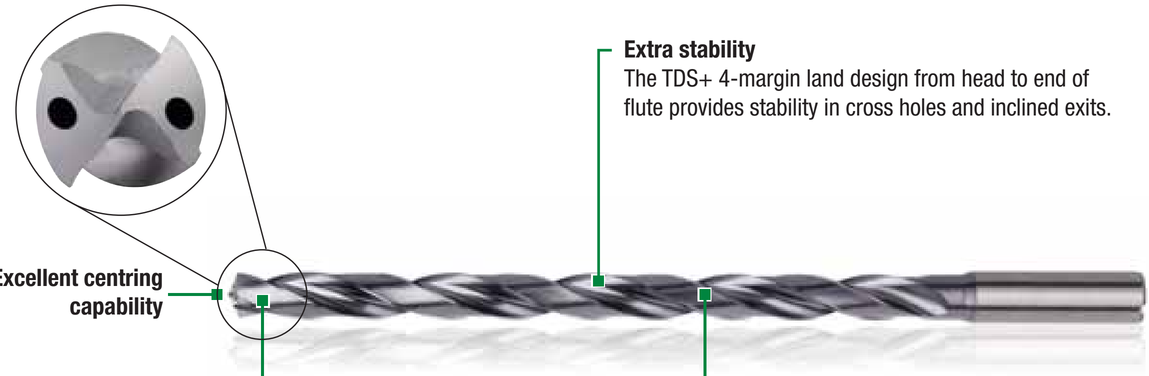
WIDIA™ TOP DRILL S+™ 12 x D

The versatile TOP DRILL S+ provides reliable performance across a broad scope of applications, including alloyed and unalloyed steel, cast iron, and some stainless steels and high-temperature alloys. TDS+ is now available in 12 x D, adding to its already wide range of options from 3–8 x D.

TOP DRILL S+ 12 x D

TDS+ 12 x D is capable of drilling an array of materials. The 4-margin land configuration offers stability, minimises chipping and jamming, and promotes chip evacuation. Because TDS+ 12 x D does not require a pilot drill, it increases efficiency by reducing the number of steps required for basic applications.

- 12 x D fits the gap between 8 x D and 15 x D.
- One drill that covers all materials.
- Can be used without a pilot.



Extra stability
The TDS+ 4-margin land design from head to end of flute provides stability in cross holes and inclined exits.

Excellent centring capability

Minimised chip jamming
Special gash and flute form for effective chip formation across a variety of materials.

Easy chip evacuation
The TDS+ utilises the same technology developed for WIDIA deep-hole drills. The polished surface enables effective chip evacuation from deep holes.

Improved Productivity

- Excellent centring capability — the new TDS+ 12 x D point is engineered to provide excellent centring capability.
- No pilot drill required — save time and money by reducing the number of steps required for your 12 x D application.

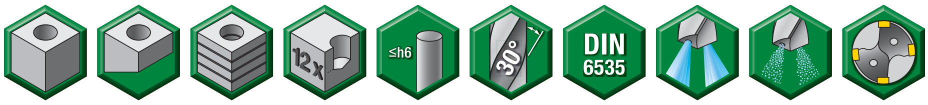
Increased Tool Life

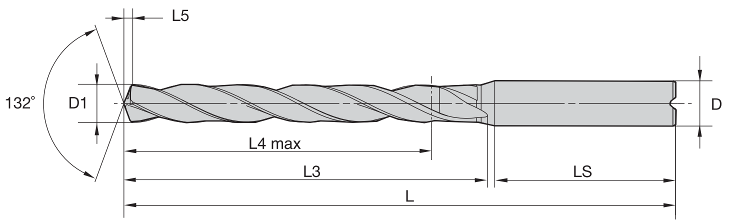
- Minimised runout — cylindrical body design provides guidance, and precision h6 shank is standard for better runout and less breakage.
- New WU20PD™ grade — designed specifically for long tool life.
- Factory regrind service — available through your WIDIA™ reconditioning service.

WIDIA Advantage

- Lower cost-per-hole due to high MRR and long tool life.
- Consistent performance from internally controlled supply chain:

  Powder > Rod > Grinding > Coating
- Part of the complete WIDIA holemaking solution.
- Get more predictable results from local regrind services using OEM standards to recondition, ensuring value throughout the entire life of the drill.
- Broad range of standard lengths, diameters, and coolant options in one line. Includes extensive intermediate metric, inch, fraction, and wire size, including tap drill sizes.





For information on L, L3, and L4 max, see page T143.

TDS504A • 12 x D

P	●
M	●
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S	○
H	

grade WU20PD
TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4173459	TDS504A03000	3,000	.1181	93	44	52,0	0,6	36	6
4173460	TDS504A03175	3,175	.1250	93	44	52,0	0,7	36	6
4173461	TDS504A03264	3,264	.1285	93	44	53,0	0,7	36	6
4173545	TDS504A03455	3,455	.1360	93	44	53,0	0,7	36	6
4173462	TDS504A03500	3,500	.1378	93	44	53,0	0,7	36	6
4173546	TDS504A03734	3,734	.1470	93	45	54,0	0,8	36	6
4173463	TDS504A03970	3,970	.1563	107	56	66,0	0,8	36	6
4173464	TDS504A04000	4,000	.1575	107	56	66,0	0,8	36	6
4173465	TDS504A04500	4,500	.1772	107	56	67,0	0,9	36	6
4173466	TDS504A04600	4,600	.1811	107	57	68,0	1,0	36	6
4173467	TDS504A04763	4,763	.1875	125	69	82,0	1,0	36	6
4173468	TDS504A04800	4,800	.1890	125	69	82,0	1,0	36	6
4173469	TDS504A05000	5,000	.1969	125	70	83,0	1,1	36	6
4173470	TDS504A05100	5,100	.2008	125	70	83,0	1,1	36	6
4173471	TDS504A05200	5,200	.2047	125	70	83,0	1,1	36	6
4173472	TDS504A05300	5,300	.2087	125	71	84,0	1,1	36	6
4173473	TDS504A05410	5,410	.2130	125	71	84,0	1,1	36	6
4173474	TDS504A05500	5,500	.2165	125	71	84,0	1,2	36	6
4173475	TDS504A05558	5,558	.2188	125	71	84,0	1,2	36	6
4173476	TDS504A05600	5,600	.2205	125	72	85,0	1,2	36	6
4173477	TDS504A05700	5,700	.2244	125	72	85,0	1,2	36	6
4173478	TDS504A05800	5,800	.2283	125	71	85,0	1,2	36	6
4173479	TDS504A06000	6,000	.2362	125	72	86,0	1,3	36	6
4173480	TDS504A06200	6,200	.2441	139	82	97,0	1,3	36	8

(continued)

(TDS504A • 12 x D — continued)

P	●
M	●
K	●
N	
S	○
H	

● first choice
○ alternate choice

grade WU20PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4173481	TDS504A06350	6,350	.2500	139	83	98,0	1,3	36	8
4173482	TDS504A06500	6,500	.2559	139	83	98,0	1,4	36	8
4173483	TDS504A06528	6,528	.2570	139	83	98,0	1,4	36	8
4173484	TDS504A06600	6,600	.2598	139	84	99,0	1,4	36	8
4173485	TDS504A06746	6,746	.2656	139	83	99,0	1,4	36	8
4173486	TDS504A06800	6,800	.2677	139	83	99,0	1,4	36	8
4173487	TDS504A06909	6,909	.2720	139	84	100,0	1,5	36	8
4173488	TDS504A07000	7,000	.2756	139	84	100,0	1,5	36	8
4173489	TDS504A07145	7,145	.2813	153	94	111,0	1,5	36	8
4173490	TDS504A07500	7,500	.2953	153	95	112,0	1,6	36	8
4173491	TDS504A07541	7,541	.2969	153	95	112,0	1,6	36	8
4173492	TDS504A07700	7,700	.3031	153	96	113,0	1,6	36	8
4173493	TDS504A07800	7,800	.3071	153	95	113,0	1,7	36	8
4173494	TDS504A07938	7,938	.3125	153	96	114,0	1,7	36	8
4173495	TDS504A08000	8,000	.3150	153	96	114,0	1,7	36	8
4173496	TDS504A08100	8,100	.3189	185	116	136,0	1,7	40	10
4173497	TDS504A08334	8,334	.3281	185	117	137,0	1,8	40	10
4173498	TDS504A08433	8,433	.3320	185	117	137,0	1,8	40	10
4173499	TDS504A08500	8,500	.3346	185	117	137,0	1,8	40	10
4173500	TDS504A08700	8,700	.3425	185	118	138,0	1,9	40	10
4173501	TDS504A08733	8,733	.3438	185	117	138,0	1,9	40	10
4173502	TDS504A09000	9,000	.3543	185	118	139,0	1,9	40	10
4173503	TDS504A09100	9,100	.3583	185	118	139,0	1,9	40	10
4173504	TDS504A09129	9,129	.3594	185	118	139,0	1,9	40	10
4173547	TDS504A09347	9,347	.3680	185	119	140,0	2,0	40	10
4173505	TDS504A09500	9,500	.3740	185	119	140,0	2,0	40	10
4173506	TDS504A09525	9,525	.3750	185	119	140,0	2,0	40	10
4173507	TDS504A09921	9,921	.3906	185	120	142,0	2,1	40	10
4173508	TDS504A10000	10,000	.3937	185	120	142,0	2,1	40	10
4173509	TDS504A10200	10,200	.4016	218	140	164,0	2,2	45	12
4173510	TDS504A10300	10,300	.4055	218	141	165,0	2,2	45	12
4173511	TDS504A10320	10,320	.4063	218	141	165,0	2,2	45	12
4173512	TDS504A10500	10,500	.4134	218	141	165,0	2,2	45	12
4173513	TDS504A10716	10,716	.4219	218	142	166,0	2,3	45	12
4173514	TDS504A10800	10,800	.4252	218	141	166,0	2,3	45	12
4173515	TDS504A11000	11,000	.4331	218	142	167,0	2,4	45	12
4173516	TDS504A11113	11,113	.4375	218	142	167,0	2,4	45	12
4173517	TDS504A11500	11,500	.4528	218	143	168,0	2,5	45	12
4173518	TDS504A11800	11,800	.4646	218	143	169,0	2,5	45	12
4173519	TDS504A12000	12,000	.4724	218	144	170,0	2,6	45	12

(continued)

(TDS504A • 12 x D — continued)

12x

P ●
M ●
K ●
N
S ○
H

● first choice
○ alternate choice

grade WU20PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4173520	**TDS504A12100**	12,100	.4764	246	164	192,0	2,6	45	14
4173521	**TDS504A12304**	12,304	.4844	246	165	193,0	2,6	45	14
4148906	**TDS504A12500**	12,500	.4921	246	165	193,0	2,7	45	14
4173522	**TDS504A12700**	12,700	.5000	246	166	194,0	2,7	45	14
4173523	**TDS504A13000**	13,000	.5118	246	166	195,0	2,8	45	14
4173524	**TDS504A13100**	13,100	.5157	246	166	195,0	2,8	45	14
4173525	**TDS504A13500**	13,500	.5315	246	167	196,0	2,9	45	14
4173526	**TDS504A14000**	14,000	.5512	246	168	198,0	3,0	45	14
4173527	**TDS504A14100**	14,100	.5551	277	188	220,0	3,0	48	16
4173528	**TDS504A14288**	14,288	.5625	277	188	220,0	3,1	48	16
4173529	**TDS504A14500**	14,500	.5709	277	189	221,0	3,1	48	16
4173530	**TDS504A14684**	14,684	.5781	277	190	222,0	3,2	48	16
4173531	**TDS504A15000**	15,000	.5906	277	190	223,0	3,2	48	16
4173532	**TDS504A15500**	15,500	.6102	277	191	224,0	3,3	48	16
4173533	**TDS504A15875**	15,875	.6250	277	192	225,0	3,4	48	16
4173534	**TDS504A16000**	16,000	.6299	277	192	226,0	3,4	48	16
4173535	**TDS504A16500**	16,500	.6496	305	213	249,0	3,6	48	18
4173536	**TDS504A17000**	17,000	.6693	305	214	250,0	3,7	48	18
4173537	**TDS504A17463**	17,463	.6875	305	215	252,0	3,8	48	18
4173538	**TDS504A17500**	17,500	.6890	305	215	252,0	3,8	48	18
4173539	**TDS504A18000**	18,000	.7087	305	216	253,0	3,9	48	18
4173540	**TDS504A18500**	18,500	.7283	334	237	277,0	4,0	50	20
4173541	**TDS504A19000**	19,000	.7480	334	238	278,0	4,1	50	20
4173542	**TDS504A19050**	19,050	.7500	334	239	279,0	4,1	50	20
4173543	**TDS504A19500**	19,500	.7677	334	239	280,0	4,2	50	20
4173544	**TDS504A20000**	20,000	.7874	334	240	281,0	4,3	50	20

TOP DRILL S+ • TDS504 • WU20PD™ • Through Coolant • Metric

Material Group		Cutting Speed — vc Range — m/min min		max	Tool Diameter (mm)	Recommended Feed Rate (f) by Diameter 3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	90	–	180	mm/r	0,08–0,16	0,09–0,18	0,12–0,24	0,14–0,29	0,17–0,34	0,20–0,39	0,24–0,47	0,31–0,60
P	2, 3, 4, 6, 7	80	–	120	mm/r	0,09–0,17	0,10–0,19	0,14–0,25	0,17–0,31	0,21–0,37	0,24–0,42	0,29–0,52	0,38–0,65
P	5, 9, 10, 11	70	–	120	mm/r	0,08–0,17	0,09–0,19	0,13–0,25	0,16–0,31	0,19–0,37	0,21–0,42	0,26–0,52	0,32–0,65
P	12, 13	50	–	80	mm/r	0,05–0,09	0,06–0,11	0,09–0,16	0,11–0,20	0,14–0,24	0,15–0,27	0,20–0,35	0,26–0,45
M	14,1	30	–	50	mm/r	0,04–0,07	0,05–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
M	14,3	30	–	60	mm/r	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,14	0,10–0,16	0,12–0,18	0,14–0,20	0,16–0,22
M	14.2, 14.4	30	–	50	mm/r	0,04–0,07	0,06–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
K	15, 16	100	–	210	mm/r	0,11–0,22	0,12–0,24	0,16–0,31	0,20–0,38	0,23–0,44	0,25–0,49	0,31–0,60	0,38–0,74
K	17, 18, 19	130	–	160	mm/r	0,11–0,17	0,12–0,19	0,16–0,25	0,20–0,31	0,23–0,36	0,25–0,40	0,31–0,48	0,38–0,60
K	20	100	–	170	mm/r	0,08–0,17	0,09–0,19	0,12–0,25	0,14–0,30	0,17–0,35	0,19–0,40	0,24–0,48	0,30–0,60

nominal size range	Metric tolerance D1 tolerance m7	D tolerance h6
>3–6	0,004/0,016	0,000/-0,008
>6–10	0,006/0,021	0,000/-0,009
>10–18	0,007/0,025	0,000/-0,011
>18–25,4	0,008/0,029	0,000/-0,013

Solid Carbide Drills

Top Drill Deep-Hole Drills

Solid carbide deep-hole drills outperform gun drills and HSS deep-hole drills in deep-hole applications up to 30 x D by increasing metal removal rates by 3–4 times. Increased MRR equals bottom-line savings to customers in throughput, machine time, and personnel hours.

The TDD1*Z* Series in the WU20PD™ grade offers secure and consistent performance, excellent hole quality, and reduced cycle times. The standard lines are available from 3 to 13mm and lengths of 15, 20, 25, and 30 x D. It eliminates the traditional HSS or gun drilling without pecking, at up to 100% increased penetration rates.

132° TDS Point Geometry

- Low thrust.
- Excellent centring capabilities.
- Easy to regrind.

30° Helix with Optimised Flute Profile

- Reduces risk of chip jamming and catastrophic failure.

Four-Margin Lands

- Improves hole straightness.
- Improves hole alignment when drilling through cross holes and inclined exits.

Highly Polished Surfaces

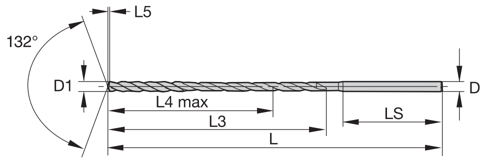
- Reduction of friction in the chip flute and on the lands, resulting in superior chip evacuation.
- Shorter drilling time through omission of reversing cycles.

WU20PD™ Grade

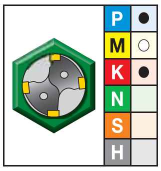
- Advanced TiAlN multilayer PVD coating for steel and cast iron.
- Ultra fine-grain carbide ensures process reliability at high feed rates.

Customisation

- Intermediate sizes, even up to 16mm diameter, available as semi-standards.
- Length variations, including longer versions up to 550mm, available as custom solutions.
- For drilling non-ferrous and uncoated materials, sharp versions are recommended and available as custom solutions.
- Excellent surface finish and concentricity.



Deep Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 15 x D • Z Shank



grade WU20PD
TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L	pilot drill
3899626	TDD105Z03000	3,000	.1181	3	53	45	0,6	30	86	TDS501A03000
3899627	TDD105Z03175	3,175	.1250	4	67	58	0,6	32	105	TDS501A03175
3899628	TDD105Z03500	3,500	.1378	4	68	59	0,7	32	105	TDS501A03500
3899629	TDD105Z03571	3,571	.1406	4	68	59	0,7	32	105	TDS501A03571
3899630	TDD105Z03800	3,800	.1496	4	69	60	0,8	32	105	TDS501A03800
3899631	TDD105Z03970	3,970	.1563	4	70	60	0,8	32	105	TDS501A03970
3899632	TDD105Z04000	4,000	.1575	4	70	60	0,8	32	105	TDS501A04000
3899683	TDD105Z04039	4,039	.1590	5	84	73	0,8	34	124	TDS501A04039
3899684	TDD105Z04300	4,300	.1693	5	85	74	0,9	34	124	TDS501A04300
3899685	TDD105Z04500	4,500	.1772	5	85	74	0,9	34	124	TDS501A04500
3899686	TDD105Z04623	4,623	.1820	5	86	74	1,0	34	124	TDS501A04623
3899687	TDD105Z04763	4,763	.1875	5	86	75	1,0	34	124	TDS501A04763
3899688	TDD105Z05000	5,000	.1969	5	87	75	1,0	34	124	TDS501A05000
3899689	TDD105Z05159	5,159	.2031	6	102	88	1,1	36	143	TDS501A05160
3899690	TDD105Z05410	5,410	.2130	6	102	89	1,1	36	143	TDS501A05410
3899691	TDD105Z05500	5,500	.2165	6	102	89	1,1	36	143	TDS501A05500
3899692	TDD105Z05558	5,558	.2188	6	102	89	1,2	36	143	TDS501A05558
3899693	TDD105Z05800	5,800	.2283	6	103	90	1,2	36	143	TDS501A05800
3899694	TDD105Z06000	6,000	.2362	6	104	90	1,2	36	143	TDS501A06000
3899695	TDD105Z06200	6,200	.2441	7	118	103	1,3	38	162	TDS501A06200
3899696	TDD105Z06350	6,350	.2500	7	119	104	1,3	38	162	TDS501A06350
3899697	TDD105Z06500	6,500	.2559	7	119	104	1,4	38	162	TDS501A06500
3899698	TDD105Z06528	6,528	.2570	7	119	104	1,4	38	162	TDS501A06528
3899699	TDD105Z06746	6,746	.2656	7	120	105	1,4	38	162	TDS501A06746

(continued)

(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 15 x D • Z Shank — continued)

P	●
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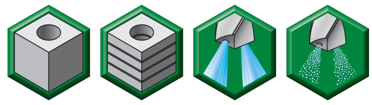
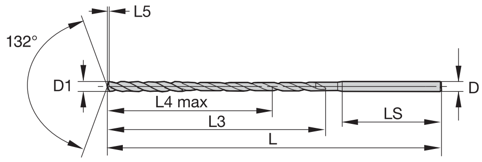
H	

● first choice
○ alternate choice

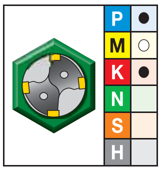
grade WU20PD TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L	pilot drill
3899700	TDD105Z06800	6,800	.2677	7	120	105	1,4	38	162	TDS501A06800
3899701	TDD105Z06909	6,909	.2720	7	121	105	1,4	38	162	TDS501A06909
3899702	TDD105Z07000	7,000	.2756	7	121	105	1,5	38	162	TDS501A07000
3900612	TDD105Z07145	7,145	.2813	8	135	118	1,5	40	181	TDS501A07145
3900633	TDD105Z07500	7,500	.2953	8	136	119	1,6	40	181	TDS501A07500
3899764	TDD106Z07500	7,500	.2953	8	174	157	1,6	40	221	TDS501A07500
3900634	TDD105Z07541	7,541	.2969	8	136	119	1,6	40	181	TDS501A07541
3900635	TDD105Z07938	7,938	.3125	8	138	120	1,7	40	181	TDS501A07938
3900636	TDD105Z08000	8,000	.3150	8	138	120	1,7	40	181	TDS501A08000
3900637	TDD105Z08334	8,334	.3281	9	153	134	1,8	42	200	TDS501A08334
3900638	TDD105Z08433	8,433	.3320	9	153	134	1,8	42	200	TDS501A08433
3900639	TDD105Z08500	8,500	.3346	9	153	134	1,8	42	200	TDS501A08500
3900640	TDD105Z08733	8,733	.3438	9	154	135	1,8	42	200	TDS501A08733
3900641	TDD105Z09000	9,000	.3543	9	155	135	1,9	42	200	TDS501A09000
3900642	TDD105Z09347	9,347	.3680	10	170	149	2,0	44	219	TDS501A09347
3900643	TDD105Z09500	9,500	.3740	10	170	149	2,0	44	219	TDS501A09500
3900644	TDD105Z09525	9,525	.3750	10	170	149	2,0	44	219	TDS501A09525
3900645	TDD105Z09750	9,750	.3839	10	171	150	2,1	44	219	TDS501A09750
3900647	TDD105Z10000	10,000	.3937	10	172	150	2,1	44	219	TDS501A10000
3900648	TDD105Z10200	10,200	.4016	11	186	163	2,2	46	238	TDS501A10200
3900649	TDD105Z10320	10,317	.4062	11	187	164	2,2	46	238	TDS501A10317
3900650	TDD105Z10500	10,500	.4134	11	187	164	2,2	46	238	TDS501A10500
3900651	TDD105Z10716	10,716	.4219	11	188	164	2,3	46	238	TDS501A10716
3900652	TDD105Z11000	11,000	.4331	11	203	178	2,3	46	238	TDS501A11000
3900653	TDD105Z11113	11,113	.4375	12	203	178	2,4	48	257	TDS501A11113
3900654	TDD105Z11500	11,500	.4528	12	204	179	2,4	48	257	TDS501A11500
3900656	TDD105Z12000	12,000	.4724	12	206	180	2,5	48	257	TDS501A12000
3900657	TDD105Z12304	12,304	.4844	13	221	194	2,6	50	276	TDS501A12304
3900658	TDD105Z12500	12,500	.4921	13	221	194	2,7	50	276	TDS501A12500
3900659	TDD105Z12700	12,700	.5000	13	222	194	2,7	50	276	TDS501A12700
3900660	TDD105Z13000	13,000	.5118	13	223	195	2,8	50	276	TDS501A13000





Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 20 x D • Z Shank



● first choice
○ alternate choice

grade WU20PD TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L	pilot drill
3899782	TDD106Z03000	3,000	.1181	3	68	60	0,6	30	101	TDS501A03000
3899803	TDD106Z03175	3,175	.1250	4	83	74	0,6	32	125	TDS501A03175
3899804	TDD106Z03500	3,500	.1378	4	86	77	0,7	32	125	TDS501A03500
3899805	TDD106Z03571	3,571	.1406	4	86	77	0,7	32	125	TDS501A03571
3899806	TDD106Z03800	3,800	.1496	4	88	79	0,8	32	125	TDS501A03800
3899807	TDD106Z03970	3,970	.1563	4	89	80	0,8	32	125	TDS501A03970
3899808	TDD106Z04000	4,000	.1575	4	90	80	0,8	32	125	TDS501A04000
3899809	TDD106Z04039	4,039	.1590	5	104	93	0,8	34	149	TDS501A04039
3899810	TDD106Z04300	4,300	.1693	5	106	95	0,9	34	149	TDS501A04300
3899811	TDD106Z04500	4,500	.1772	5	108	97	0,9	34	149	TDS501A04500
3899812	TDD106Z04623	4,623	.1820	5	109	97	1,0	34	149	TDS501A04623
3899813	TDD106Z04763	4,763	.1875	5	110	98	1,0	34	149	TDS501A04763
3899814	TDD106Z05000	5,000	.1969	5	112	100	1,0	34	149	TDS501A05000
3899815	TDD106Z05159	5,159	.2031	6	128	114	1,1	36	173	TDS501A05160
3899816	TDD106Z05410	5,410	.2130	6	129	116	1,1	36	173	TDS501A05410
3899818	TDD106Z05500	5,500	.2165	6	130	117	1,1	36	173	TDS501A05500
3899819	TDD106Z05558	5,558	.2188	6	130	117	1,2	36	173	TDS501A05558
3899820	TDD106Z05800	5,800	.2283	6	132	119	1,2	36	173	TDS501A05800
3899821	TDD106Z06000	6,000	.2362	6	134	120	1,2	36	173	TDS501A06000
3899822	TDD106Z06200	6,200	.2441	7	149	134	1,3	38	197	TDS501A06200
3899823	TDD106Z06350	6,350	.2500	7	151	136	1,3	38	197	TDS501A06350
3899824	TDD106Z06500	6,500	.2559	7	152	137	1,4	38	197	TDS501A06500
3899825	TDD106Z06528	6,528	.2570	7	152	137	1,4	38	197	TDS501A06528
3899826	TDD106Z06746	6,746	.2656	7	154	138	1,4	38	197	TDS501A06746

(continued)

(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 20 x D • Z Shank — continued)

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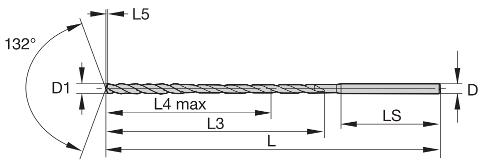
● first choice
○ alternate choice

grade WU20PD TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L	pilot drill
3899827	TDD106Z06800	6,800	.2677	7	154	139	1,4	38	197	TDS501A06800
3899828	TDD106Z06909	6,909	.2720	7	155	139	1,4	38	197	TDS501A06909
3899829	TDD106Z07000	7,000	.2756	7	156	140	1,5	38	197	TDS501A07000
3899763	TDD106Z07145	7,145	.2813	8	171	154	1,5	40	221	TDS501A07145
3899765	TDD106Z07541	7,541	.2969	8	174	157	1,6	40	221	TDS501A07541
3899766	TDD106Z07938	7,938	.3125	8	177	160	1,7	40	221	TDS501A07938
3899767	TDD106Z08000	8,000	.3150	8	178	160	1,7	40	221	TDS501A08000
3899768	TDD106Z08334	8,334	.3281	9	195	175	1,8	42	245	TDS501A08334
3899769	TDD106Z08433	8,433	.3320	9	195	176	1,8	42	245	TDS501A08433
3899770	TDD106Z08500	8,500	.3346	9	196	177	1,8	42	245	TDS501A08500
3899771	TDD106Z08733	8,733	.3438	9	198	178	1,8	42	245	TDS501A08733
3899772	TDD106Z09000	9,000	.3543	9	200	180	1,9	42	245	TDS501A09000
3899783	TDD106Z09347	9,347	.3680	10	217	195	2,0	44	269	TDS501A09347
3899784	TDD106Z09500	9,500	.3740	10	218	197	2,0	44	269	TDS501A09500
3899785	TDD106Z09525	9,525	.3750	10	218	197	2,0	44	269	TDS501A09525
3899786	TDD106Z09750	9,750	.3839	10	220	198	2,1	44	269	TDS501A09750
3899787	TDD106Z09921	9,921	.3906	10	221	199	2,1	44	269	TDS501A09921
3899788	TDD106Z10000	10,000	.3937	10	222	200	2,1	44	269	TDS501A10000
3899789	TDD106Z10200	10,200	.4016	11	237	214	2,2	46	293	TDS501A10200
3899790	TDD106Z10320	10,317	.4062	11	238	215	2,2	46	293	TDS501A10317
3899791	TDD106Z10500	10,500	.4134	11	240	217	2,2	46	293	TDS501A10500
3899792	TDD106Z10716	10,716	.4219	11	242	218	2,3	46	293	TDS501A10716
3899793	TDD106Z11000	11,000	.4331	11	258	233	2,3	46	317	TDS501A11000
3899794	TDD106Z11113	11,113	.4375	12	259	234	2,4	48	317	TDS501A11113
3899795	TDD106Z11500	11,500	.4528	12	262	237	2,4	48	317	TDS501A11500
3899797	TDD106Z12000	12,000	.4724	12	266	240	2,5	48	317	TDS501A12000
3899799	TDD106Z12500	12,500	.4921	13	284	257	2,7	50	341	TDS501A12500
3899800	TDD106Z12700	12,700	.5000	13	285	258	2,7	50	341	TDS501A12700
3899801	TDD106Z13000	13,000	.5118	13	288	260	2,8	50	341	TDS501A13000



Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 25 x D • Z Shank

P	●
M	○
K	●
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S	
H	

● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter								
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	pilot drill
3899708	TDD107Z03000	3,000	.1181	3	83	75	0,6	30	116	TDS501A03000
3899709	TDD107Z03175	3,175	.1250	4	99	90	0,6	32	145	TDS501A03175
3899710	TDD107Z03500	3,500	.1378	4	103	94	0,7	32	145	TDS501A03500
3899712	TDD107Z03800	3,800	.1496	4	107	98	0,8	32	145	TDS501A03800
3899733	TDD107Z03970	3,970	.1563	4	109	100	0,8	32	145	TDS501A03970
3899734	TDD107Z04000	4,000	.1575	4	110	100	0,8	32	145	TDS501A04000
3899735	TDD107Z04039	4,039	.1590	5	124	113	0,8	34	174	TDS501A04039
3899737	TDD107Z04500	4,500	.1772	5	130	119	0,9	34	174	TDS501A04500
3899739	TDD107Z04763	4,763	.1875	5	134	122	1,0	34	174	TDS501A04763
3899740	TDD107Z05000	5,000	.1969	5	137	125	1,0	34	174	TDS501A05000
3899743	TDD107Z05500	5,500	.2165	6	157	144	1,1	36	203	TDS501A05500
3899744	TDD107Z05558	5,558	.2188	6	158	145	1,2	36	203	TDS501A05558
3899745	TDD107Z05800	5,800	.2283	6	161	148	1,2	36	203	TDS501A05800
3899746	TDD107Z06000	6,000	.2362	6	164	150	1,2	36	203	TDS501A06000
3899748	TDD107Z06350	6,350	.2500	7	182	167	1,3	38	232	TDS501A06350
3899749	TDD107Z06500	6,500	.2559	7	184	169	1,4	38	232	TDS501A06500
3899750	TDD107Z06528	6,528	.2570	7	185	169	1,4	38	232	TDS501A06528
3899751	TDD107Z06746	6,746	.2656	7	188	172	1,4	38	232	TDS501A06746
3899753	TDD107Z06909	6,909	.2720	7	190	174	1,4	38	232	TDS501A06909
3899754	TDD107Z07000	7,000	.2756	7	191	175	1,5	38	232	TDS501A07000
3899567	TDD107Z07541	7,541	.2969	8	212	194	1,6	40	261	TDS501A07541
3899568	TDD107Z07938	7,938	.3125	8	217	199	1,7	40	261	TDS501A07938
3899569	TDD107Z08000	8,000	.3150	8	218	200	1,7	40	261	TDS501A08000
3899571	TDD107Z08433	8,433	.3320	9	237	218	1,8	42	290	TDS501A08433

(continued)

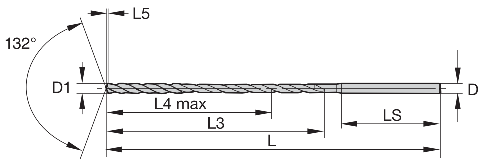
(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 25 x D • Z Shank — continued)

P	●
M	○
K	●
N	
S	
H	

● first choice
○ alternate choice

grade WU20PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L	pilot drill
3899572	**TDD107Z08500**	8,500	.3346	9	238	219	1,8	42	290	**TDS501A08500**
3899603	**TDD107Z08733**	8,733	.3438	9	241	222	1,8	42	290	**TDS501A08733**
3899604	**TDD107Z09000**	9,000	.3543	9	245	225	1,9	42	290	**TDS501A09000**
3899605	**TDD107Z09347**	9,347	.3680	10	263	242	2,0	44	319	**TDS501A09347**
3899606	**TDD107Z09500**	9,500	.3740	10	265	244	2,0	44	319	**TDS501A09500**
3899607	**TDD107Z09525**	9,525	.3750	10	266	244	2,0	44	319	**TDS501A09525**
3899610	**TDD107Z10000**	10,000	.3937	10	272	250	2,1	44	319	**TDS501A10000**
3899611	**TDD107Z10300**	10,200	.4016	11	288	265	2,2	46	348	**TDS501A10300**
3899612	**TDD107Z10320**	10,317	.4062	11	290	267	2,2	46	348	**TDS501A10317**
3899613	**TDD107Z10500**	10,500	.4134	11	292	269	2,2	46	348	**TDS501A10500**
3899614	**TDD107Z10716**	10,716	.4219	11	295	272	2,3	46	348	**TDS501A10716**
3899615	**TDD107Z11000**	11,000	.4331	11	313	288	2,3	46	377	**TDS501A11000**
3899616	**TDD107Z11113**	11,113	.4375	12	314	289	2,4	48	377	**TDS501A11113**
3899617	**TDD107Z11500**	11,500	.4528	12	319	294	2,4	48	377	**TDS501A11500**
3899619	**TDD107Z12000**	12,000	.4724	12	326	300	2,5	48	377	**TDS501A12000**
3899621	**TDD107Z12500**	12,500	.4921	13	346	319	2,7	50	406	**TDS501A12500**
3899622	**TDD107Z12700**	12,700	.5000	13	349	321	2,7	50	406	**TDS501A12700**
3899623	**TDD107Z13000**	13,000	.5118	13	353	325	2,8	50	406	**TDS501A13000**



Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 30 x D • Z Shank

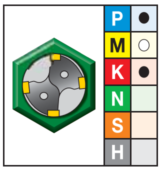
P	●
M	○
K	●
N	
S	
H	

● first choice
○ alternate choice

grade WU20PD TiAlN order #	catalogue #	D1 diameter mm	in	D	L3	L4 max	L5	LS	L	pilot drill
3899539	TDD108Z03000	3,000	.1181	3	98	90	0,6	30	131	TDS501A03000
3899540	TDD108Z03175	3,175	.1250	4	115	106	0,6	32	165	TDS501A03175
3899541	TDD108Z03500	3,500	.1378	4	121	112	0,7	32	165	TDS501A03500
3899542	TDD108Z03571	3,571	.1406	4	122	113	0,7	32	165	TDS501A03571
3899573	TDD108Z03800	3,800	.1496	4	126	117	0,8	32	165	TDS501A03800
3899574	TDD108Z03970	3,970	.1563	4	129	119	0,8	32	165	TDS501A03970
3899575	TDD108Z04000	4,000	.1575	4	130	120	0,8	32	165	TDS501A04000
3899576	TDD108Z04039	4,039	.1590	5	144	134	0,8	34	199	TDS501A04039
3899577	TDD108Z04300	4,300	.1693	5	149	138	0,9	34	199	TDS501A04300
3899578	TDD108Z04500	4,500	.1772	5	153	142	0,9	34	199	TDS501A04500
3899579	TDD108Z04623	4,623	.1820	5	155	144	1,0	34	199	TDS501A04623
3899580	TDD108Z04763	4,763	.1875	5	157	146	1,0	34	199	TDS501A04763
3899581	TDD108Z05000	5,000	.1969	5	162	150	1,0	34	199	TDS501A05000
3899582	TDD108Z05159	5,159	.2031	6	180	166	1,1	36	233	TDS501A05160
3899583	TDD108Z05410	5,410	.2130	6	183	170	1,1	36	233	TDS501A05410
3899584	TDD108Z05500	5,500	.2165	6	185	172	1,1	36	233	TDS501A05500
3899585	TDD108Z05558	5,558	.2188	6	186	172	1,2	36	233	TDS501A05558
3899586	TDD108Z05800	5,800	.2283	6	190	177	1,2	36	233	TDS501A05800
3899587	TDD108Z06000	6,000	.2362	6	194	180	1,2	36	233	TDS501A06000
3899588	TDD108Z06200	6,200	.2441	7	211	196	1,3	38	267	TDS501A06200
3899589	TDD108Z06350	6,350	.2500	7	214	199	1,3	38	267	TDS501A06350
3899590	TDD108Z06500	6,500	.2559	7	217	202	1,4	38	267	TDS501A06500
3899591	TDD108Z06528	6,528	.2570	7	217	202	1,4	38	267	TDS501A06528
3899592	TDD108Z06746	6,746	.2656	7	221	206	1,4	38	267	TDS501A06746

(continued)

(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 30 x D • Z Shank — continued)

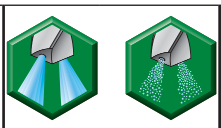


● first choice
○ alternate choice

grade WU20PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L	pilot drill
3899593	TDD108Z06800	6,800	.2677	7	222	207	1,4	38	267	TDS501A06800
3899594	TDD108Z06909	6,909	.2720	7	224	208	1,4	38	267	TDS501A06909
3899595	TDD108Z07000	7,000	.2756	7	226	210	1,5	38	267	TDS501A07000
3899600	TDD108Z07145	7,145	.2813	8	242	225	1,5	40	301	TDS501A07145
3899601	TDD108Z07500	7,500	.2953	8	249	232	1,6	40	301	TDS501A07500
3899653	TDD108Z07938	7,938	.3125	8	257	239	1,7	40	301	TDS501A07938
3899654	TDD108Z08000	8,000	.3150	8	258	240	1,7	40	301	TDS501A08000
3899655	TDD108Z08334	8,334	.3281	9	278	259	1,8	42	335	TDS501A08334
3899657	TDD108Z08500	8,500	.3346	9	281	262	1,8	42	335	TDS501A08500
3899658	TDD108Z08733	8,733	.3438	9	285	265	1,8	42	335	TDS501A08733
3899659	TDD108Z09000	9,000	.3543	9	290	270	1,9	42	335	TDS501A09000
3899661	TDD108Z09500	9,500	.3740	10	313	292	2,0	44	369	TDS501A09500
3899662	TDD108Z09525	9,525	.3750	10	313	292	2,0	44	369	TDS501A09525
3899663	TDD108Z09750	9,750	.3839	10	317	296	2,1	44	369	TDS501A09750
3899665	TDD108Z10000	10,000	.3937	10	322	300	2,1	44	369	TDS501A10000
3899666	TDD108Z10200	10,200	.4016	11	339	316	2,2	46	403	TDS501A10200
3899667	TDD108Z10320	10,317	.4062	11	342	318	2,2	46	403	TDS501A10317
3899668	TDD108Z10500	10,500	.4134	11	345	322	2,2	46	403	TDS501A10500
3899670	TDD108Z11000	11,000	.4331	11	368	343	2,3	46	437	TDS501A11000
3899671	TDD108Z11113	11,113	.4375	12	370	345	2,4	48	437	TDS501A11113
3899672	TDD108Z11500	11,500	.4528	12	377	352	2,4	48	437	TDS501A11500
3899674	TDD108Z12000	12,000	.4724	12	386	360	2,5	48	437	TDS501A12000
3899675	TDD108Z12304	12,304	.4844	13	405	378	2,6	50	471	TDS501A12304
3899676	TDD108Z12500	12,500	.4921	13	409	382	2,7	50	471	TDS501A12500
3899677	TDD108Z12700	12,700	.5000	13	412	385	2,7	50	471	TDS501A12700
3899678	TDD108Z13000	13,000	.5118	13	418	390	2,8	50	471	TDS501A13000

Series TDD • Deep-Hole SC Drills • Through Coolant Applications • Metric

													
		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter								
Material Group		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	90	–	130	mm/r	0,08–0,12	0,12–0,18	0,18–0,20	0,20–0,22	0,22–0,25	0,25–0,28	0,28–0,30	0,30–0,34
	2	80	–	115	mm/r	0,08–0,12	0,12–0,18	0,18–0,20	0,20–0,22	0,22–0,25	0,25–0,28	0,28–0,30	0,30–0,34
	3	70	–	110	mm/r	0,05–0,10	0,10–0,16	0,16–0,18	0,18–0,20	0,20–0,22	0,22–0,24	0,24–0,26	0,26–0,28
	4	65	–	95	mm/r	0,05–0,10	0,10–0,16	0,16–0,18	0,18–0,20	0,20–0,22	0,22–0,24	0,24–0,26	0,26–0,28
K	1	105	–	145	mm/r	0,10–0,15	0,15–0,20	0,20–0,25	0,25–0,28	0,28–0,30	0,30–0,33	0,33–0,36	0,36–0,38
	2	85	–	120	mm/r	0,10–0,15	0,15–0,20	0,20–0,25	0,25–0,28	0,28–0,30	0,30–0,33	0,33–0,36	0,36–0,38
	3	100	–	140	mm/r	0,10–0,15	0,15–0,20	0,20–0,25	0,25–0,28	0,28–0,30	0,30–0,33	0,33–0,36	0,36–0,38

Metric

tolerance

nominal size range	D1 tolerance	D1 tolerance	D tolerance h6
>3–6	0,000/-0,012	>3–6	0,000/-0,008
>6–10	0,000/-0,015	>6–10	0,000/-0,009
>10–13	0,000/-0,018	>10–13	0,000/-0,011

WIDIA™ TOP DRILL™ Deep-Hole Drills Customisation

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Diameters

- Intermediate sizes, even up to 16mm diameter, available as semi-standards.

Lengths

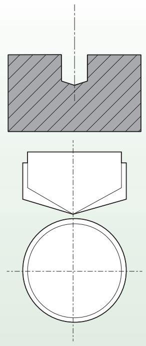
- Length variations, including longer versions up to 550mm depending on diameter, available as custom solutions.

Material-Specific

- For drilling non-ferrous materials, sharp and uncoated versions are recommended and available as custom solutions.

Consult the custom solutions department for specific applications.

WIDIA™

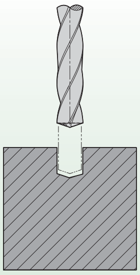


1) Pilot Drill Hole — IMPORTANT!

- The point angle of the pilot drill must be greater than one of the following deep-hole drills to protect its cutting corners.
- The diameter size of the pilot drill must be greater than one of the deep-hole drills to enable easy fit and protect margin lands. The required difference in diameter is covered by design with the different position of tolerance.
- Drill Ø = nominal Ø up to nominal +0,010mm.
- Depth of pilot hole: minimum 2 x D.
- Deeper pilot holes are preferable.

Recommendations:

- Use a conical (TDS*) or split-point drill to pilot (do not use a TDG, VariDrill™, or TDS 12 x D or any competitive drill).
- Check the pilot drill for wear, which can lead to premature wear on the TDD10* cutting edge and possibly catastrophic failure.
- TOP DRILL S™ for steel or cast iron (TDS4* series) and TOP DRILL S +™ for multiple applications (TDS501* series 3 x D and TD502* series 5 x D) with a 140° point angle are recommended.
- TDS503* series 8 x D and TDS504* series 12 x D is not recommended as the point angle is 132°!

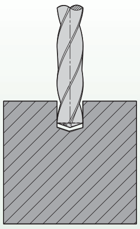


2) Feed TDD10* into Pilot Hole

- Max 500 RPM and recommended feed rate; no rapid traverse.
- Run anti-clockwise, especially in horizontal applications to protect the cutting edge, when entering the pilot hole.
- Depth: 1mm above the bottom of pilot hole.
- Feed TDD10* into pilot hole

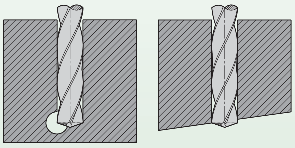
Recommendations:

- Reduce cutting speed to minimise imbalances in machine spindle/adaptor!



3) Drill Hole

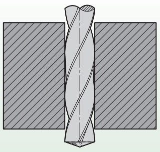
Cutting Parameters: Start recommended speed and feed rate at 1mm from the bottom of the pilot hole, clockwise.



Recommendations:

- DO NOT PECK OR DWELL up to 30 x D!
- With long-chipping steel materials, it may be necessary to increase feed rate by 10–20% to provide optimal chip control.
- For long-chipping aluminium materials, it may be necessary to decrease feed rate and increase speed.
- Reduce feed rate on angled exits and crossholes by 50–60%.

HP feed recommendations are usually higher than with competitive SC drills!



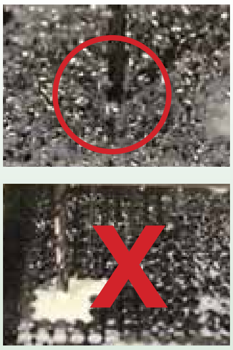
4) Drill Retraction

Cutting Parameters: 50–500 RPM and feed rate 2–6 m/min.

Recommendations:

To achieve the best tool performance, we recommend using the deep-hole drill with a hydraulic chuck.

Reduce cutting speed to minimise imbalances in machine spindle/adaptor!



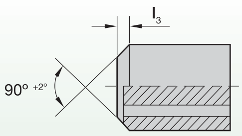
5) Vertical Applications

- If the pilot holes are close to each other, chips can fall into the neighboring hole.
- Do not enter a pilot hole that might contain chips with a deep hole drill to avoid chip jamming, wear, or breakage.
- If required holes are close to each other, use smart drilling strategies, make sure the pilot holes are getting properly cleaned, or switch to horizontal drilling.

Horizontal drilling process preferred for optimum chip evacuation.

6) Coolant

- For increased stability, the coolant channels of the TDD10* are smaller than on typical WIDIA™ drills.
- Steady supply of coolant delivered to the cutting edges necessary. If coolant supply is not steady or is unequal through both channels, check:
  - Coolant filtering system.
  - Sealing of adaptor/spindle.
  - Chips blocking the coolant hole on the drill shank.
- Make sure that the coolant supply reaches the cutting edge before drilling begins.
- Pressure by diameter: <5mm 40–50 bar maximum; >5mm 25 bar minimum.



MQL back end according to DIN 69090-3

7) Minimal Quantity Lubrication

- On MQL applications, make sure that the coolant is directly supplied from the chuck into the back end of the drill shank (without gap) to avoid leakage.
- Pressure should be between 1–10 bar depending on coolant hole size.
- Spray contains an amount of oil less than 50 ml/h.
- If required, the shank can be evenly optimised for MQL applications with enlarged 90° chamfer instead of 40°.

8) Shanks

- Other than normal SC Drills, TDD10* series have a “Z” shank, increasing with 1mm-steps.
- For drills with uneven shank size, use reduction sleeves to adapt the shank to the customer´s toolholder.
- The clamping force is better with increasing diameter.
- If required, DIN-shanks (even, 2mm steps) are available as custom solutions.

Achieve the best tool performance with hydraulic chucks.

	12mm hydraulic reducer sleeve		20mm hydraulic reducer sleeve		25mm hydraulic reducer sleeve		32mm hydraulic reducer sleeve		.500" hydraulic reducer sleeve		.750" hydraulic reducer sleeve	
D1	order number	catalogue number	order number	catalogue number	order number	catalogue number	order number	catalogue number	order number	catalogue number	order number	catalogue number
3	3026450	12MHC030M	3026648	20MHC030M	3026662	25MHC030M	–	–	2248993	50HC030M	2248995	75HC030M
4	3026451	12MHC040M	3026649	20MHC040M	3026663	25MHC040M	–	–	1606050	50HC040M	2248996	75HC040M
5	3026452	12MHC050M	3026650	20MHC050M	3026664	25MHC050M	–	–	2248994	50HC050M	2248997	75HC050M
6	3026643	12MHC060M	3026651	20MHC060M	3026665	25MHC060M	3026675	32MHC060M	1606061	50HC060M	1093271	75HC060M
7	3026644	12MHC070M	3026652	20MHC070M	3026666	25MHC070M	3026676	32MHC070M	–	–	–	–
8	3026645	12MHC080M	3026653	20MHC080M	3026667	25MHC080M	3026677	32MHC080M	1606062	50HC080M	1093272	75HC080M
9	3026646	12MHC090M	3026654	20MHC090M	3026668	25MHC090M	3026678	32MHC090M	–	–	–	–
10	3026647	12MHC100M	3026655	20MHC100M	3026669	25MHC100M	3026679	32MHC100M	1606064	50HC100M	1093273	75HC100M
11	–	–	3026656	20MHC110M	–	–	3026680	32MHC110M	–	–	–	–
12	–	–	3026657	20MHC120M	3026669	25MHC120M	3026681	32MHC120M	–	–	1093524	75HC120M
13	–	–	3026658	20MHC130M	–	–	3026682	32MHC130M	–	–	–	–
14	–	–	3026659	20MHC140M	3026671	25MHC140M	3026683	32MHC140M	–	–	1093525	75HC140M
15	–	–	3026660	20MHC150M	–	–	3026684	32MHC150M	–	–	–	–
16	–	–	3026661	20MHC160M	3026672	25MHC160M	3026685	32MHC160M	–	–	1093526	75HC160M

TOP DRILL G

TOP DRILL G is WIDIA's solution for difficult drilling applications. Designed specifically for non-ferrous materials, TDG can be used on challenging applications with tighter hole tolerance, inclined planes, intersecting holes, and cored holes. The design of these drills also makes them appropriate for drilling custom aluminium applications.

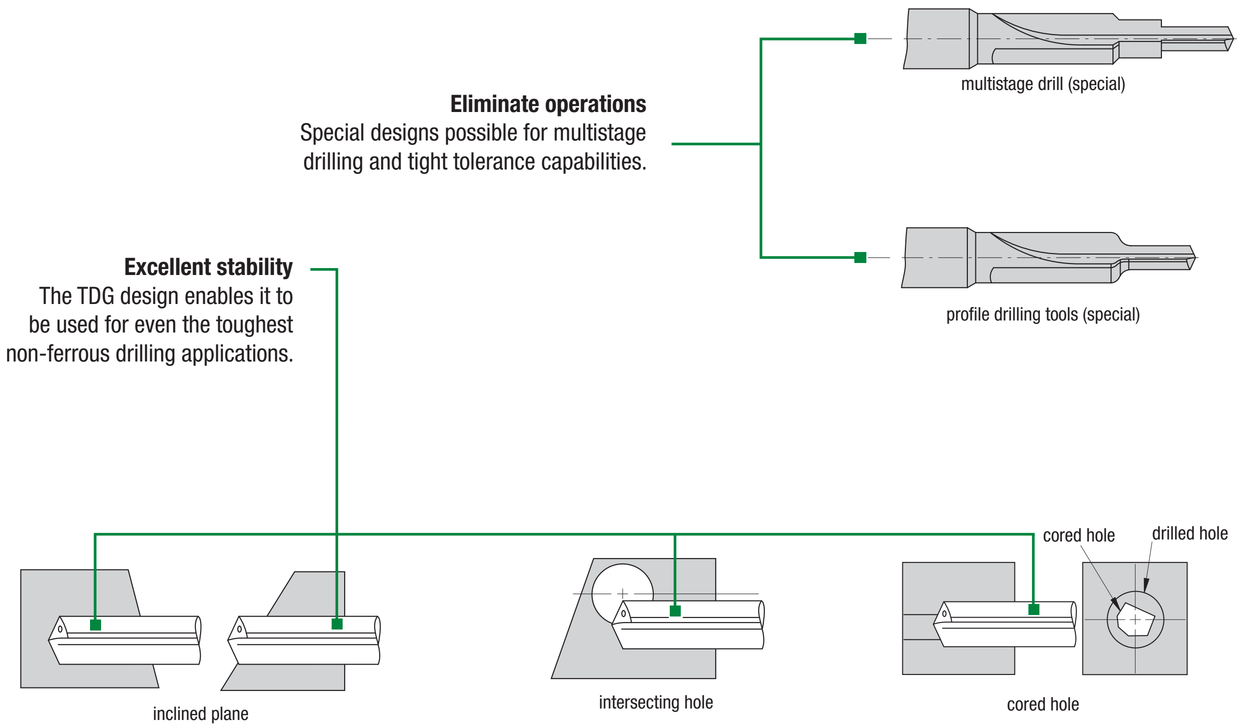
- Next generation of GGX WIDIA-Rübig™ series.
- Targeted for aluminium and non-ferrous materials.
- Can be used in challenging conditions.
- Good for multi-step drills.

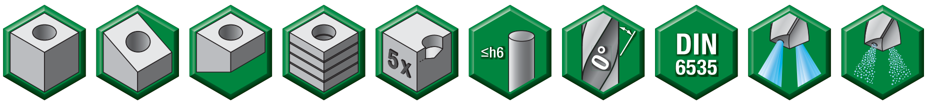
TOP DRILL G™ Design

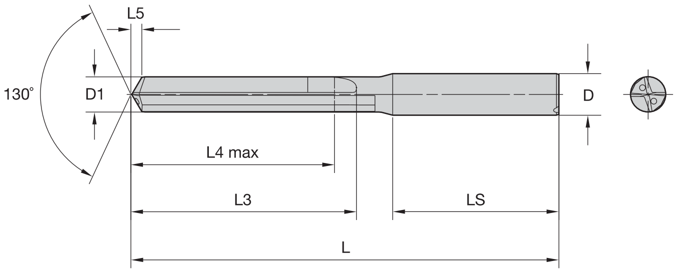
TDG is designed to handle the toughest non-ferrous drilling applications. The WN10HD™ grade is the latest in application-specific technology. This advanced grade, combined with the TDG's optimal concentricity and safe transmission of torque, gives it long tool life and extreme repeatability. The design of TDG is optimised to evacuate "sticky" chips that result from drilling non-ferrous materials. Easily evacuating these difficult-to-remove chips results in better hole quality due to less heat and friction while drilling.

WIDIA™ Advantage

- Lower cost-per-hole due to high MRR and long tool life.
- Consistent performance from internally controlled supply chain:
  Powder > Rod > Grinding > Coating
- Part of the complete WIDIA holemaking solution.
- Get more predictable results from local regrind services using OEM standards to recondition, ensuring value throughout the entire life of the drill.
- Broad range of standard lengths, diameters, and coolant options in one line. Includes extensive intermediate metric, inch, fraction, and wire sizes, including tap drill sizes.

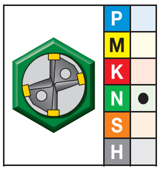






For information on L, L3, and L4 max, see page T143.

TDG532A • 5 x D



grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157950	**TDG532A03000**	3,000	.1181	66	23	28	0,7	36	6
4157951	**TDG532A03048**	3,048	.1200	66	23	28	0,7	36	6
4157952	**TDG532A03100**	3,100	.1220	66	23	28	0,7	36	6
4157973	**TDG532A03175**	3,175	.1250	66	23	28	0,7	36	6
4157974	**TDG532A03200**	3,200	.1260	66	23	28	0,7	36	6
4157975	**TDG532A03264**	3,264	.1285	66	23	28	0,8	36	6
4157976	**TDG532A03300**	3,300	.1299	66	23	28	0,8	36	6
4157977	**TDG532A03400**	3,400	.1339	66	23	28	0,8	36	6
4157978	**TDG532A03455**	3,455	.1360	66	23	28	0,8	36	6
4157979	**TDG532A03500**	3,500	.1378	66	23	28	0,8	36	6
4157980	**TDG532A03571**	3,571	.1406	66	23	28	0,8	36	6
4157981	**TDG532A03600**	3,600	.1417	66	23	28	0,8	36	6
4157982	**TDG532A03658**	3,658	.1440	66	23	28	0,9	36	6
4157983	**TDG532A03700**	3,700	.1457	66	23	28	0,9	36	6
4157984	**TDG532A03734**	3,734	.1470	66	23	28	0,9	36	6
4157985	**TDG532A03800**	3,800	.1496	74	29	36	0,9	36	6
4157986	**TDG532A03900**	3,900	.1535	74	29	36	0,9	36	6
4157987	**TDG532A03970**	3,970	.1563	74	29	36	0,9	36	6
4157988	**TDG532A04000**	4,000	.1575	74	29	36	0,9	36	6
4157989	**TDG532A04039**	4,039	.1590	74	29	36	0,9	36	6
4157990	**TDG532A04090**	4,090	.1610	74	29	36	1,0	36	6
4157991	**TDG532A04100**	4,100	.1614	74	29	36	1,0	36	6
4157992	**TDG532A04200**	4,200	.1654	74	29	36	1,0	36	6
4157993	**TDG532A04217**	4,217	.1660	74	29	36	1,0	36	6

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(TDG532A • 5 x D — continued)

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grade WN10HD

● first choice
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order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157994	TDG532A04300	4,300	.1693	74	29	36	1,0	36	6
4157995	TDG532A04366	4,366	.1719	74	29	36	1,0	36	6
4157996	TDG532A04400	4,400	.1732	74	29	36	1,0	36	6
4157997	TDG532A04500	4,500	.1772	74	29	36	1,0	36	6
4157998	TDG532A04600	4,600	.1811	74	29	36	1,1	36	6
4157999	TDG532A04623	4,623	.1820	74	29	36	1,1	36	6
4158000	TDG532A04700	4,700	.1850	74	29	36	1,1	36	6
4158001	TDG532A04763	4,763	.1875	82	35	44	1,1	36	6
4158002	TDG532A04800	4,800	.1890	82	35	44	1,1	36	6
4158003	TDG532A04852	4,852	.1910	82	35	44	1,1	36	6
4158004	TDG532A04900	4,900	.1929	82	35	44	1,1	36	6
4158005	TDG532A05000	5,000	.1969	82	35	44	1,2	36	6
4158006	TDG532A05100	5,100	.2008	82	35	44	1,2	36	6
4158007	TDG532A05106	5,106	.2010	82	35	44	1,2	36	6
4158008	TDG532A05159	5,159	.2031	82	35	44	1,2	36	6
4158009	TDG532A05200	5,200	.2047	82	35	44	1,2	36	6
4158010	TDG532A05300	5,300	.2087	82	35	44	1,2	36	6
4158011	TDG532A05400	5,400	.2126	82	35	44	1,3	36	6
4158012	TDG532A05410	5,410	.2130	82	35	44	1,3	36	6
4158013	TDG532A05500	5,500	.2165	82	35	44	1,3	36	6
4158014	TDG532A05558	5,558	.2188	82	35	44	1,3	36	6
4158015	TDG532A05600	5,600	.2205	82	35	44	1,3	36	6
4158016	TDG532A05616	5,616	.2211	82	35	44	1,3	36	6
4158017	TDG532A05700	5,700	.2244	82	35	44	1,3	36	6
4158018	TDG532A05800	5,800	.2283	82	35	44	1,4	36	6
4158019	TDG532A05900	5,900	.2323	82	35	44	1,4	36	6
4158020	TDG532A05954	5,954	.2344	82	35	44	1,4	36	6
4158021	TDG532A06000	6,000	.2362	82	35	44	1,4	36	6
4158022	TDG532A06100	6,100	.2402	91	43	53	1,4	36	8
4158023	TDG532A06200	6,200	.2441	91	43	53	1,4	36	8
4158024	TDG532A06300	6,300	.2480	91	43	53	1,5	36	8
4158025	TDG532A06350	6,350	.2500	91	43	53	1,5	36	8
4158026	TDG532A06400	6,400	.2520	91	43	53	1,5	36	8
4158027	TDG532A06500	6,500	.2559	91	43	53	1,5	36	8
4158028	TDG532A06528	6,528	.2570	91	43	53	1,5	36	8
4158029	TDG532A06600	6,600	.2598	91	43	53	1,5	36	8
4158030	TDG532A06630	6,630	.2610	91	43	53	1,5	36	8
4158031	TDG532A06700	6,700	.2638	91	43	53	1,6	36	8
4158032	TDG532A06746	6,746	.2656	91	43	53	1,6	36	8
4158033	TDG532A06800	6,800	.2677	91	43	53	1,6	36	8

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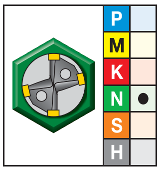
(TDG532A • 5 x D — continued)



grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158034	TDG532A06900	6,900	.2717	91	43	53	1,6	36	8
4158035	TDG532A07000	7,000	.2756	91	43	53	1,6	36	8
4158036	TDG532A07100	7,100	.2795	91	43	53	1,7	36	8
4158037	TDG532A07145	7,145	.2813	91	43	53	1,7	36	8
4158038	TDG532A07200	7,200	.2835	91	43	53	1,7	36	8
4158039	TDG532A07300	7,300	.2874	91	43	53	1,7	36	8
4158040	TDG532A07400	7,400	.2913	91	43	53	1,7	36	8
4158041	TDG532A07500	7,500	.2953	91	43	53	1,7	36	8
4158042	TDG532A07541	7,541	.2969	91	43	53	1,8	36	8
4158043	TDG532A07600	7,600	.2992	91	43	53	1,8	36	8
4158044	TDG532A07700	7,700	.3031	91	43	53	1,8	36	8
4158045	TDG532A07800	7,800	.3071	91	43	53	1,8	36	8
4158046	TDG532A07900	7,900	.3110	91	43	53	1,8	36	8
4158047	TDG532A07938	7,938	.3125	91	43	53	1,9	36	8
4158048	TDG532A08000	8,000	.3150	91	43	53	1,9	36	8
4158049	TDG532A08100	8,100	.3189	103	49	61	1,9	40	10
4158050	TDG532A08200	8,200	.3228	103	49	61	1,9	40	10
4158051	TDG532A08300	8,300	.3268	103	49	61	1,9	40	10
4158052	TDG532A08334	8,334	.3281	103	49	61	1,9	40	10
4158053	TDG532A08400	8,400	.3307	103	49	61	2,0	40	10
4158054	TDG532A08433	8,433	.3320	103	49	61	2,0	40	10
4158055	TDG532A08500	8,500	.3346	103	49	61	2,0	40	10
4158056	TDG532A08600	8,600	.3386	103	49	61	2,0	40	10
4158057	TDG532A08700	8,700	.3425	103	49	61	2,0	40	10
4158058	TDG532A08733	8,733	.3438	103	49	61	2,0	40	10
4158059	TDG532A08800	8,800	.3465	103	49	61	2,1	40	10
4158060	TDG532A08900	8,900	.3504	103	49	61	2,1	40	10
4158061	TDG532A09000	9,000	.3543	103	49	61	2,1	40	10
4158062	TDG532A09100	9,100	.3583	103	49	61	2,1	40	10
4158063	TDG532A09129	9,129	.3594	103	49	61	2,1	40	10
4158064	TDG532A09200	9,200	.3622	103	49	61	2,1	40	10
4158065	TDG532A09300	9,300	.3661	103	49	61	2,2	40	10
4158066	TDG532A09347	9,347	.3680	103	49	61	2,2	40	10
4158067	TDG532A09400	9,400	.3701	103	49	61	2,2	40	10
4158068	TDG532A09500	9,500	.3740	103	49	61	2,2	40	10
4158069	TDG532A09525	9,525	.3750	103	49	61	2,2	40	10
4158070	TDG532A09600	9,600	.3780	103	49	61	2,2	40	10
4158071	TDG532A09700	9,700	.3819	103	49	61	2,3	40	10
4158072	TDG532A09800	9,800	.3858	103	49	61	2,3	40	10
4158073	TDG532A09900	9,900	.3898	103	49	61	2,3	40	10

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(TDG532A • 5 x D — continued)

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grade WN10HD

● first choice
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order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158074	TDG532A09921	9,921	.3906	103	49	61	2,3	40	10
4158081	TDG532A10000	10,000	.3937	103	49	61	2,3	40	10
4158082	TDG532A10100	10,100	.3976	118	56	71	2,4	45	12
4158353	TDG532A10200	10,200	.4016	118	56	71	2,4	45	12
4158354	TDG532A10300	10,300	.4055	118	56	71	2,4	45	12
4158355	TDG532A10320	10,320	.4063	118	56	71	2,4	45	12
4158356	TDG532A10400	10,400	.4094	118	56	71	2,4	45	12
4158357	TDG532A10500	10,500	.4134	118	56	71	2,4	45	12
4158358	TDG532A10600	10,600	.4173	118	56	71	2,5	45	12
4158359	TDG532A10700	10,700	.4213	118	56	71	2,5	45	12
4158360	TDG532A10716	10,716	.4219	118	56	71	2,5	45	12
4158361	TDG532A10800	10,800	.4252	118	56	71	2,5	45	12
4158362	TDG532A10900	10,900	.4291	118	56	71	2,5	45	12
4158363	TDG532A11000	11,000	.4331	118	56	71	2,6	45	12
4158364	TDG532A11100	11,100	.4370	118	56	71	2,6	45	12
4158365	TDG532A11113	11,113	.4375	118	56	71	2,6	45	12
4158366	TDG532A11200	11,200	.4409	118	56	71	2,6	45	12
4158367	TDG532A11300	11,300	.4449	118	56	71	2,6	45	12
4158368	TDG532A11400	11,400	.4488	118	56	71	2,7	45	12
4158369	TDG532A11500	11,500	.4528	118	56	71	2,7	45	12
4158370	TDG532A11509	11,509	.4531	118	56	71	2,7	45	12
4158371	TDG532A11600	11,600	.4567	118	56	71	2,7	45	12
4158372	TDG532A11700	11,700	.4606	118	56	71	2,7	45	12
4158373	TDG532A11800	11,800	.4646	118	56	71	2,8	45	12
4158374	TDG532A11900	11,900	.4685	118	56	71	2,8	45	12
4158375	TDG532A11908	11,908	.4688	118	56	71	2,8	45	12
4158376	TDG532A12000	12,000	.4724	118	56	71	2,8	45	12
4158377	TDG532A12100	12,100	.4764	124	60	77	2,8	45	14
4158378	TDG532A12200	12,200	.4803	124	60	77	2,8	45	14
4158379	TDG532A12300	12,300	.4843	124	60	77	2,9	45	14
4158380	TDG532A12304	12,304	.4844	124	60	77	2,9	45	14
4158381	TDG532A12400	12,400	.4882	124	60	77	2,9	45	14
4158382	TDG532A12500	12,500	.4921	124	60	77	2,9	45	14
4158383	TDG532A12600	12,600	.4961	124	60	77	2,9	45	14
4158384	TDG532A12700	12,700	.5000	124	60	77	3,0	45	14
4158385	TDG532A12800	12,800	.5039	124	60	77	3,0	45	14
4158386	TDG532A12900	12,900	.5079	124	60	77	3,0	45	14
4158387	TDG532A13000	13,000	.5118	124	60	77	3,0	45	14
4158388	TDG532A13096	13,096	.5156	124	60	77	3,1	45	14
4158389	TDG532A13100	13,100	.5157	124	60	77	3,1	45	14

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(TDG532A • 5 x D — continued)

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grade WN10HD

● first choice
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order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158390	TDG532A13200	13,200	.5197	124	60	77	3,1	45	14
4158391	TDG532A13300	13,300	.5236	124	60	77	3,1	45	14
4158392	TDG532A13400	13,400	.5276	124	60	77	3,1	45	14
4158448	TDG532A13490	13,490	.5311	124	60	77	3,1	45	14
4158393	TDG532A13500	13,500	.5315	124	60	77	3,1	45	14
4158394	TDG532A13600	13,600	.5354	124	60	77	3,2	45	14
4158395	TDG532A13700	13,700	.5394	124	60	77	3,2	45	14
4158396	TDG532A13800	13,800	.5433	124	60	77	3,2	45	14
4158397	TDG532A13891	13,891	.5469	124	60	77	3,2	45	14
4158398	TDG532A13900	13,900	.5472	124	60	77	3,2	45	14
4158399	TDG532A14000	14,000	.5512	124	60	77	3,3	45	14
4158400	TDG532A14100	14,100	.5551	133	63	83	3,3	48	16
4158401	TDG532A14200	14,200	.5591	133	63	83	3,3	48	16
4158402	TDG532A14288	14,288	.5625	133	63	83	3,3	48	16
4158403	TDG532A14300	14,300	.5630	133	63	83	3,3	48	16
4158404	TDG532A14400	14,400	.5669	133	63	83	3,4	48	16
4158405	TDG532A14500	14,500	.5709	133	63	83	3,4	48	16
4158406	TDG532A14600	14,600	.5748	133	63	83	3,4	48	16
4158407	TDG532A14684	14,684	.5781	133	63	83	3,4	48	16
4158408	TDG532A14700	14,700	.5787	133	63	83	3,4	48	16
4158409	TDG532A14800	14,800	.5827	133	63	83	3,5	48	16
4158410	TDG532A14900	14,900	.5866	133	63	83	3,5	48	16
4158411	TDG532A15000	15,000	.5906	133	63	83	3,5	48	16
4158412	TDG532A15083	15,083	.5938	133	63	83	3,5	48	16
4158413	TDG532A15100	15,100	.5945	133	63	83	3,5	48	16
4158414	TDG532A15200	15,200	.5984	133	63	83	3,5	48	16
4158415	TDG532A15300	15,300	.6024	133	63	83	3,6	48	16
4158416	TDG532A15400	15,400	.6063	133	63	83	3,6	48	16
4158417	TDG532A15479	15,479	.6094	133	63	83	3,6	48	16
4158418	TDG532A15500	15,500	.6102	133	63	83	3,6	48	16
4158419	TDG532A15600	15,600	.6142	133	63	83	3,6	48	16
4158420	TDG532A15700	15,700	.6181	133	63	83	3,7	48	16
4158421	TDG532A15800	15,800	.6220	133	63	83	3,7	48	16
4158422	TDG532A15875	15,875	.6250	133	63	83	3,7	48	16
4158423	TDG532A15900	15,900	.6260	133	63	83	3,7	48	16
4158424	TDG532A16000	16,000	.6299	133	63	83	3,7	48	16
4158425	TDG532A16100	16,100	.6339	143	71	93	3,8	48	18
4158426	TDG532A16200	16,200	.6378	143	71	93	3,8	48	18
4158427	TDG532A16271	16,271	.6406	143	71	93	3,8	48	18
4158428	TDG532A16300	16,300	.6417	143	71	93	3,8	48	18

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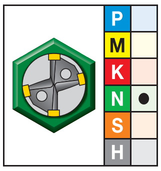
(TDG532A • 5 x D — continued)



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● first choice
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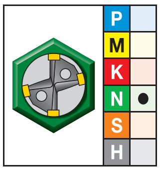
order #	catalogue #	mm	in	L	L4 max	L3	L5	LS	D
4158429	TDG532A16400	16,400	.6457	143	71	93	3,8	48	18
4158430	TDG532A16500	16,500	.6496	143	71	93	3,8	48	18
4158431	TDG532A16600	16,600	.6535	143	71	93	3,9	48	18
4158432	TDG532A16670	16,670	.6563	143	71	93	3,9	48	18
4158433	TDG532A16700	16,700	.6575	143	71	93	3,9	48	18
4158434	TDG532A16800	16,800	.6614	143	71	93	3,9	48	18
4158435	TDG532A16900	16,900	.6654	143	71	93	3,9	48	18
4158436	TDG532A17000	17,000	.6693	143	71	93	4,0	48	18
4158437	TDG532A17100	17,100	.6732	143	71	93	4,0	48	18
4158438	TDG532A17200	17,200	.6772	143	71	93	4,0	48	18
4158439	TDG532A17300	17,300	.6811	143	71	93	4,0	48	18
4158440	TDG532A17400	17,400	.6850	143	71	93	4,1	48	18
4158441	TDG532A17463	17,463	.6875	143	71	93	4,1	48	18
4158442	TDG532A17500	17,500	.6890	143	71	93	4,1	48	18
4158443	TDG532A17600	17,600	.6929	143	71	93	4,1	48	18
4158444	TDG532A17700	17,700	.6969	143	71	93	4,1	48	18
4158445	TDG532A17800	17,800	.7008	143	71	93	4,2	48	18
4158446	TDG532A17859	17,859	.7031	143	71	93	4,2	48	18
4158447	TDG532A17900	17,900	.7047	143	71	93	4,2	48	18
4158555	TDG532A18000	18,000	.7087	143	71	93	4,2	48	18
4158557	TDG532A18100	18,100	.7126	153	77	101	4,2	50	20
4158559	TDG532A18200	18,200	.7165	153	77	101	4,2	50	20
4158561	TDG532A18258	18,258	.7188	153	77	101	4,3	50	20
4158573	TDG532A18300	18,300	.7205	153	77	101	4,3	50	20
4158575	TDG532A18400	18,400	.7244	153	77	101	4,3	50	20
4158577	TDG532A18500	18,500	.7283	153	77	101	4,3	50	20
4158579	TDG532A18600	18,600	.7323	153	77	101	4,3	50	20
4158581	TDG532A18654	18,654	.7344	153	77	101	4,3	50	20
4158584	TDG532A18700	18,700	.7362	153	77	101	4,4	50	20
4158585	TDG532A18800	18,800	.7402	153	77	101	4,4	50	20
4158587	TDG532A18900	18,900	.7441	153	77	101	4,4	50	20
4158589	TDG532A19000	19,000	.7480	153	77	101	4,4	50	20
4158591	TDG532A19050	19,050	.7500	153	77	101	4,4	50	20
4158603	TDG532A19100	19,100	.7520	153	77	101	4,5	50	20
4158605	TDG532A19200	19,200	.7559	153	77	101	4,5	50	20
4158607	TDG532A19300	19,300	.7598	153	77	101	4,5	50	20
4158609	TDG532A19400	19,400	.7638	153	77	101	4,5	50	20
4158611	TDG532A19500	19,500	.7677	153	77	101	4,5	50	20
4158613	TDG532A19600	19,600	.7717	153	77	101	4,6	50	20
4158616	TDG532A19700	19,700	.7756	153	77	101	4,6	50	20

(continued)

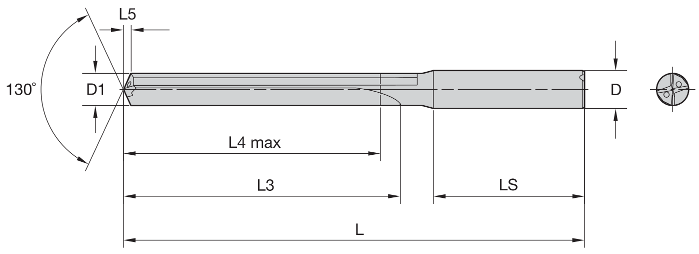
(TDG532A • 5 x D — continued)



grade WN10HD

● first choice
○ alternate choice

		D1 diameter							
order #	**catalogue #**	**mm**	**in**	**L**	**L4 max**	**L3**	**L5**	**LS**	**D**
4158618	**TDG532A19800**	19,800	.7795	153	77	101	4,6	50	20
4158620	**TDG532A19900**	19,900	.7835	153	77	101	4,6	50	20
4158622	**TDG532A20000**	20,000	.7874	153	77	101	4,7	50	20
4158634	**TDG532A21000**	21,000	.8268	167	85	114	4,9	50	20
4158636	**TDG532A22000**	22,000	.8661	167	85	114	5,1	50	20
4158637	**TDG532A23000**	23,000	.9055	184	98	126	5,4	56	25



For information on L, L3, and L4 max, see page T143.

■ TDG533A • 8 x D

P	M	K	N	S	H
			●		

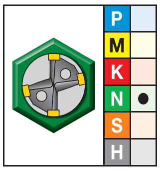
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158475	TDG533A03000	3,000	.1181	78	33	40	0,7	36	6
4158476	TDG533A03048	3,048	.1200	78	33	40	0,7	36	6
4158477	TDG533A03100	3,100	.1220	78	33	40	0,7	36	6
4158478	TDG533A03175	3,175	.1250	78	33	40	0,7	36	6
4158479	TDG533A03200	3,200	.1260	78	33	40	0,7	36	6
4158480	TDG533A03264	3,264	.1285	78	33	40	0,8	36	6
4158481	TDG533A03300	3,300	.1299	78	33	40	0,8	36	6
4158482	TDG533A03400	3,400	.1339	78	33	40	0,8	36	6
4158553	TDG533A03455	3,455	.1360	78	33	40	0,8	36	6
4158554	TDG533A03500	3,500	.1378	78	33	40	0,8	36	6
4158556	TDG533A03571	3,571	.1406	78	33	40	0,8	36	6
4158558	TDG533A03600	3,600	.1417	78	33	40	0,8	36	6
4158560	TDG533A03658	3,658	.1440	78	33	40	0,9	36	6
4158562	TDG533A03700	3,700	.1457	78	33	40	0,9	36	6
4158574	TDG533A03734	3,734	.1470	78	33	40	0,9	36	6
4158576	TDG533A03800	3,800	.1496	87	41	49	0,9	36	6
4158578	TDG533A03900	3,900	.1535	87	41	49	0,9	36	6
4158580	TDG533A03970	3,970	.1563	87	41	49	0,9	36	6
4158582	TDG533A04000	4,000	.1575	87	41	49	0,9	36	6
4158583	TDG533A04039	4,039	.1590	87	41	49	0,9	36	6
4158586	TDG533A04090	4,090	.1610	87	41	49	1,0	36	6
4158588	TDG533A04100	4,100	.1614	87	41	49	1,0	36	6
4158590	TDG533A04200	4,200	.1654	87	41	49	1,0	36	6
4158592	TDG533A04217	4,217	.1660	87	41	49	1,0	36	6

(continued)

(TDG533A • 8 x D — continued)



grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158604	**TDG533A04300**	4,300	.1693	87	41	49	1,0	36	6
4158606	**TDG533A04366**	4,366	.1719	87	41	49	1,0	36	6
4158608	**TDG533A04400**	4,400	.1732	87	41	49	1,0	36	6
4158610	**TDG533A04500**	4,500	.1772	87	41	49	1,0	36	6
4158612	**TDG533A04600**	4,600	.1811	87	41	49	1,1	36	6
4158614	**TDG533A04623**	4,623	.1820	87	41	49	1,1	36	6
4158615	**TDG533A04700**	4,700	.1850	87	41	49	1,1	36	6
4158617	**TDG533A04763**	4,763	.1875	94	48	56	1,1	36	6
4158619	**TDG533A04800**	4,800	.1890	94	48	56	1,1	36	6
4158621	**TDG533A04852**	4,852	.1910	94	48	56	1,1	36	6
4158633	**TDG533A04900**	4,900	.1929	94	48	56	1,1	36	6
4158635	**TDG533A05000**	5,000	.1969	94	48	56	1,2	36	6
4158638	**TDG533A05100**	5,100	.2008	94	48	56	1,2	36	6
4158639	**TDG533A05106**	5,106	.2010	94	48	56	1,2	36	6
4158640	**TDG533A05159**	5,159	.2031	94	48	56	1,2	36	6
4158641	**TDG533A05200**	5,200	.2047	94	48	56	1,2	36	6
4158642	**TDG533A05300**	5,300	.2087	94	48	56	1,2	36	6
4158653	**TDG533A05400**	5,400	.2126	94	48	56	1,3	36	6
4158654	**TDG533A05410**	5,410	.2130	94	48	56	1,3	36	6
4158655	**TDG533A05500**	5,500	.2165	94	48	56	1,3	36	6
4158656	**TDG533A05558**	5,558	.2188	94	48	56	1,3	36	6
4158657	**TDG533A05600**	5,600	.2205	94	48	56	1,3	36	6
4158658	**TDG533A05616**	5,616	.2211	94	48	56	1,3	36	6
4158659	**TDG533A05700**	5,700	.2244	94	48	56	1,3	36	6
4158660	**TDG533A05800**	5,800	.2283	94	48	56	1,4	36	6
4158661	**TDG533A05900**	5,900	.2323	94	48	56	1,4	36	6
4158662	**TDG533A05954**	5,954	.2344	94	48	56	1,4	36	6
4158673	**TDG533A06000**	6,000	.2362	94	48	56	1,4	36	6
4158674	**TDG533A06100**	6,100	.2402	105	57	67	1,4	36	8
4158675	**TDG533A06200**	6,200	.2441	105	57	67	1,4	36	8
4158676	**TDG533A06300**	6,300	.2480	105	57	67	1,5	36	8
4158677	**TDG533A06350**	6,350	.2500	105	57	67	1,5	36	8
4158678	**TDG533A06400**	6,400	.2520	105	57	67	1,5	36	8
4158679	**TDG533A06500**	6,500	.2559	105	57	67	1,5	36	8
4158680	**TDG533A06528**	6,528	.2570	105	57	67	1,5	36	8
4158681	**TDG533A06600**	6,600	.2598	105	57	67	1,5	36	8
4158682	**TDG533A06630**	6,630	.2610	105	57	67	1,5	36	8
4158693	**TDG533A06700**	6,700	.2638	105	57	67	1,6	36	8
4158694	**TDG533A06746**	6,746	.2656	105	57	67	1,6	36	8
4158695	**TDG533A06800**	6,800	.2677	105	57	67	1,6	36	8

(continued)

(TDG533A • 8 x D — continued)

P	M	K	N	S	H
			●		

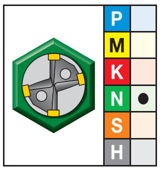
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158696	**TDG533A06900**	6,900	.2717	105	57	67	1,6	36	8
4158697	**TDG533A07000**	7,000	.2756	105	57	67	1,6	36	8
4158698	**TDG533A07100**	7,100	.2795	110	61	72	1,7	36	8
4158699	**TDG533A07145**	7,145	.2813	110	61	72	1,7	36	8
4158700	**TDG533A07200**	7,200	.2835	110	61	72	1,7	36	8
4158701	**TDG533A07300**	7,300	.2874	110	61	72	1,7	36	8
4158702	**TDG533A07400**	7,400	.2913	110	61	72	1,7	36	8
4158713	**TDG533A07500**	7,500	.2953	110	61	72	1,7	36	8
4158714	**TDG533A07541**	7,541	.2969	110	61	72	1,8	36	8
4158715	**TDG533A07600**	7,600	.2992	110	61	72	1,8	36	8
4158716	**TDG533A07700**	7,700	.3031	110	61	72	1,8	36	8
4158717	**TDG533A07800**	7,800	.3071	110	61	72	1,8	36	8
4158718	**TDG533A07900**	7,900	.3110	110	61	72	1,8	36	8
4158719	**TDG533A07938**	7,938	.3125	110	61	72	1,9	36	8
4158720	**TDG533A08000**	8,000	.3150	110	61	72	1,9	36	8
4158721	**TDG533A08100**	8,100	.3189	122	68	80	1,9	40	10
4158722	**TDG533A08200**	8,200	.3228	122	68	80	1,9	40	10
4158733	**TDG533A08300**	8,300	.3268	122	68	80	1,9	40	10
4158734	**TDG533A08334**	8,334	.3281	122	68	80	1,9	40	10
4158735	**TDG533A08400**	8,400	.3307	122	68	80	2,0	40	10
4158736	**TDG533A08433**	8,433	.3320	122	68	80	2,0	40	10
4158737	**TDG533A08500**	8,500	.3346	122	68	80	2,0	40	10
4158738	**TDG533A08600**	8,600	.3386	122	68	80	2,0	40	10
4158739	**TDG533A08700**	8,700	.3425	122	68	80	2,0	40	10
4158740	**TDG533A08733**	8,733	.3438	122	68	80	2,0	40	10
4158741	**TDG533A08800**	8,800	.3465	122	68	80	2,1	40	10
4158742	**TDG533A08900**	8,900	.3504	122	68	80	2,1	40	10
4158743	**TDG533A09000**	9,000	.3543	122	68	80	2,1	40	10
4158744	**TDG533A09100**	9,100	.3583	122	68	80	2,1	40	10
4158745	**TDG533A09129**	9,129	.3594	122	68	80	2,1	40	10
4158746	**TDG533A09200**	9,200	.3622	122	68	80	2,1	40	10
4158747	**TDG533A09300**	9,300	.3661	122	68	80	2,2	40	10
4158748	**TDG533A09347**	9,347	.3680	122	68	80	2,2	40	10
4158749	**TDG533A09400**	9,400	.3701	122	68	80	2,2	40	10
4158750	**TDG533A09500**	9,500	.3740	122	68	80	2,2	40	10
4158751	**TDG533A09525**	9,525	.3750	122	68	80	2,2	40	10
4158752	**TDG533A09600**	9,600	.3780	122	68	80	2,2	40	10
4158753	**TDG533A09700**	9,700	.3819	122	68	80	2,3	40	10
4158754	**TDG533A09800**	9,800	.3858	122	68	80	2,3	40	10
4158755	**TDG533A09900**	9,900	.3898	122	68	80	2,3	40	10

(continued)

(TDG533A • 8 x D — continued)



grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158756	**TDG533A09921**	9,921	.3906	122	68	80	2,3	40	10
4158520	**TDG533A10000**	10,000	.3937	122	68	80	2,3	40	10
4158521	**TDG533A10100**	10,100	.3976	141	79	94	2,4	45	12
4158522	**TDG533A10200**	10,200	.4016	141	79	94	2,4	45	12
4158533	**TDG533A10300**	10,300	.4055	141	79	94	2,4	45	12
4158534	**TDG533A10320**	10,320	.4063	141	79	94	2,4	45	12
4158535	**TDG533A10400**	10,400	.4094	141	79	94	2,4	45	12
4158536	**TDG533A10500**	10,500	.4134	141	79	94	2,4	45	12
4158537	**TDG533A10600**	10,600	.4173	141	79	94	2,5	45	12
4158538	**TDG533A10700**	10,700	.4213	141	79	94	2,5	45	12
4158539	**TDG533A10716**	10,716	.4219	141	79	94	2,5	45	12
4158540	**TDG533A10800**	10,800	.4252	141	79	94	2,5	45	12
4158541	**TDG533A10900**	10,900	.4291	141	79	94	2,5	45	12
4158542	**TDG533A11000**	11,000	.4331	141	79	94	2,6	45	12
4158543	**TDG533A11100**	11,100	.4370	141	79	94	2,6	45	12
4158544	**TDG533A11113**	11,113	.4375	141	79	94	2,6	45	12
4158545	**TDG533A11200**	11,200	.4409	141	79	94	2,6	45	12
4158546	**TDG533A11300**	11,300	.4449	141	79	94	2,6	45	12
4158547	**TDG533A11400**	11,400	.4488	141	79	94	2,7	45	12
4158548	**TDG533A11500**	11,500	.4528	141	79	94	2,7	45	12
4158549	**TDG533A11509**	11,509	.4531	141	79	94	2,7	45	12
4158550	**TDG533A11600**	11,600	.4567	141	79	94	2,7	45	12
4158551	**TDG533A11700**	11,700	.4606	141	79	94	2,7	45	12
4158552	**TDG533A11800**	11,800	.4646	141	79	94	2,8	45	12
4158563	**TDG533A11900**	11,900	.4685	141	79	94	2,8	45	12
4158564	**TDG533A11908**	11,908	.4688	141	79	94	2,8	45	12
4158565	**TDG533A12000**	12,000	.4724	141	79	94	2,8	45	12
4158566	**TDG533A12100**	12,100	.4764	155	91	108	2,8	45	14
4158567	**TDG533A12200**	12,200	.4803	155	91	108	2,8	45	14
4158568	**TDG533A12300**	12,300	.4843	155	91	108	2,9	45	14
4158569	**TDG533A12304**	12,304	.4844	155	91	108	2,9	45	14
4158570	**TDG533A12400**	12,400	.4882	155	91	108	2,9	45	14
4158571	**TDG533A12500**	12,500	.4921	155	91	108	2,9	45	14
4158572	**TDG533A12600**	12,600	.4961	155	91	108	2,9	45	14
4158593	**TDG533A12700**	12,700	.5000	155	91	108	3,0	45	14
4158594	**TDG533A12800**	12,800	.5039	155	91	108	3,0	45	14
4158595	**TDG533A12900**	12,900	.5079	155	91	108	3,0	45	14
4158596	**TDG533A13000**	13,000	.5118	155	91	108	3,0	45	14
4158597	**TDG533A13096**	13,096	.5156	155	91	108	3,1	45	14
4158598	**TDG533A13100**	13,100	.5157	155	91	108	3,1	45	14

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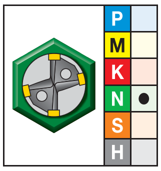
(TDG533A • 8 x D — continued)



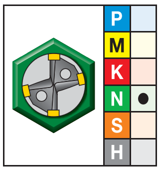
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158599	**TDG533A13200**	13,200	.5197	155	91	108	3,1	45	14
4158600	**TDG533A13300**	13,300	.5236	155	91	108	3,1	45	14
4158601	**TDG533A13400**	13,400	.5276	155	91	108	3,1	45	14
4158727	**TDG533A13490**	13,490	.5311	155	91	108	3,1	45	14
4158602	**TDG533A13500**	13,500	.5315	155	91	108	3,1	45	14
4158623	**TDG533A13600**	13,600	.5354	155	91	108	3,2	45	14
4158624	**TDG533A13700**	13,700	.5394	155	91	108	3,2	45	14
4158625	**TDG533A13800**	13,800	.5433	155	91	108	3,2	45	14
4158626	**TDG533A13891**	13,891	.5469	155	91	108	3,2	45	14
4158627	**TDG533A13900**	13,900	.5472	155	91	108	3,2	45	14
4158628	**TDG533A14000**	14,000	.5512	155	91	108	3,3	45	14
4158629	**TDG533A14100**	14,100	.5551	171	101	121	3,3	48	16
4158630	**TDG533A14200**	14,200	.5591	171	101	121	3,3	48	16
4158631	**TDG533A14288**	14,288	.5625	171	101	121	3,3	48	16
4158632	**TDG533A14300**	14,300	.5630	171	101	121	3,3	48	16
4158643	**TDG533A14400**	14,400	.5669	171	101	121	3,4	48	16
4158644	**TDG533A14500**	14,500	.5709	171	101	121	3,4	48	16
4158645	**TDG533A14600**	14,600	.5748	171	101	121	3,4	48	16
4158646	**TDG533A14684**	14,684	.5781	171	101	121	3,4	48	16
4158647	**TDG533A14700**	14,700	.5787	171	101	121	3,4	48	16
4158648	**TDG533A14800**	14,800	.5827	171	101	121	3,5	48	16
4158649	**TDG533A14900**	14,900	.5866	171	101	121	3,5	48	16
4158650	**TDG533A15000**	15,000	.5906	171	101	121	3,5	48	16
4158651	**TDG533A15083**	15,083	.5938	171	101	121	3,5	48	16
4158652	**TDG533A15100**	15,100	.5945	171	101	121	3,5	48	16
4158663	**TDG533A15200**	15,200	.5984	171	101	121	3,5	48	16
4158664	**TDG533A15300**	15,300	.6024	171	101	121	3,6	48	16
4158665	**TDG533A15400**	15,400	.6063	171	101	121	3,6	48	16
4158666	**TDG533A15479**	15,479	.6094	171	101	121	3,6	48	16
4158667	**TDG533A15500**	15,500	.6102	171	101	121	3,6	48	16
4158668	**TDG533A15600**	15,600	.6142	171	101	121	3,6	48	16
4158669	**TDG533A15700**	15,700	.6181	171	101	121	3,7	48	16
4158670	**TDG533A15800**	15,800	.6220	171	101	121	3,7	48	16
4158671	**TDG533A15875**	15,875	.6250	171	101	121	3,7	48	16
4158672	**TDG533A15900**	15,900	.6260	171	101	121	3,7	48	16
4158683	**TDG533A16000**	16,000	.6299	171	101	121	3,7	48	16
4158684	**TDG533A16100**	16,100	.6339	185	113	135	3,8	48	18
4158685	**TDG533A16200**	16,200	.6378	185	113	135	3,8	48	18
4158686	**TDG533A16271**	16,271	.6406	185	113	135	3,8	48	18
4158687	**TDG533A16300**	16,300	.6417	185	113	135	3,8	48	18

(continued)

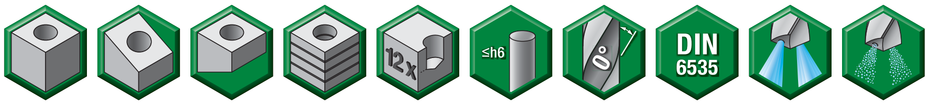
(TDG533A • 8 x D — continued)

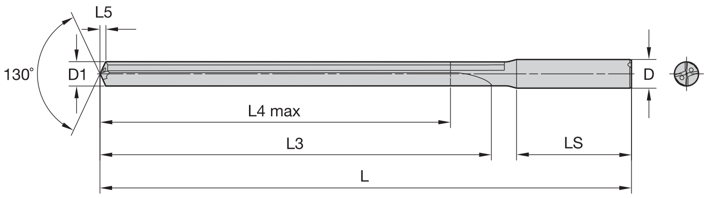


grade WN10HD

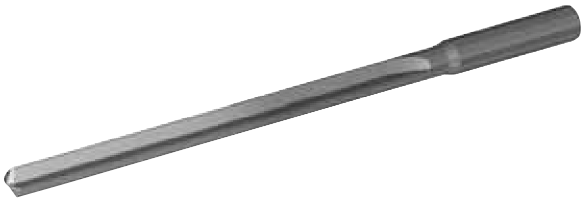
● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158688	TDG533A16400	16,400	.6457	185	113	135	3,8	48	18
4158689	TDG533A16500	16,500	.6496	185	113	135	3,8	48	18
4158690	TDG533A16600	16,600	.6535	185	113	135	3,9	48	18
4158691	TDG533A16670	16,670	.6563	185	113	135	3,9	48	18
4158692	TDG533A16700	16,700	.6575	185	113	135	3,9	48	18
4158703	TDG533A16800	16,800	.6614	185	113	135	3,9	48	18
4158704	TDG533A16900	16,900	.6654	185	113	135	3,9	48	18
4158705	TDG533A17000	17,000	.6693	185	113	135	4,0	48	18
4158706	TDG533A17100	17,100	.6732	185	113	135	4,0	48	18
4158707	TDG533A17200	17,200	.6772	185	113	135	4,0	48	18
4158708	TDG533A17300	17,300	.6811	185	113	135	4,0	48	18
4158709	TDG533A17400	17,400	.6850	185	113	135	4,1	48	18
4158710	TDG533A17463	17,463	.6875	185	113	135	4,1	48	18
4158711	TDG533A17500	17,500	.6890	185	113	135	4,1	48	18
4158712	TDG533A17600	17,600	.6929	185	113	135	4,1	48	18
4158723	TDG533A17700	17,700	.6969	185	113	135	4,1	48	18
4158724	TDG533A17800	17,800	.7008	185	113	135	4,2	48	18
4158725	TDG533A17859	17,859	.7031	185	113	135	4,2	48	18
4158726	TDG533A17900	17,900	.7047	185	113	135	4,2	48	18
4157333	TDG533A18000	18,000	.7087	185	113	135	4,2	48	18
4157334	TDG533A18100	18,100	.7126	200	124	148	4,2	50	20
4157335	TDG533A18200	18,200	.7165	200	124	148	4,2	50	20
4157336	TDG533A18258	18,258	.7188	200	124	148	4,3	50	20
4157337	TDG533A18300	18,300	.7205	200	124	148	4,3	50	20
4157338	TDG533A18400	18,400	.7244	200	124	148	4,3	50	20
4157339	TDG533A18500	18,500	.7283	200	124	148	4,3	50	20
4157340	TDG533A18600	18,600	.7323	200	124	148	4,3	50	20
4157341	TDG533A18654	18,654	.7344	200	124	148	4,3	50	20
4157342	TDG533A18700	18,700	.7362	200	124	148	4,4	50	20
4157343	TDG533A18800	18,800	.7402	200	124	148	4,4	50	20
4157344	TDG533A18900	18,900	.7441	200	124	148	4,4	50	20
4157345	TDG533A19000	19,000	.7480	200	124	148	4,4	50	20
4157346	TDG533A19050	19,050	.7500	200	124	148	4,4	50	20
4157347	TDG533A19100	19,100	.7520	200	124	148	4,5	50	20
4157348	TDG533A19200	19,200	.7559	200	124	148	4,5	50	20
4157349	TDG533A19300	19,300	.7598	200	124	148	4,5	50	20
4157350	TDG533A19400	19,400	.7638	200	124	148	4,5	50	20
4157351	TDG533A19500	19,500	.7677	200	124	148	4,5	50	20
4157352	TDG533A19600	19,600	.7717	200	124	148	4,6	50	20
4157353	TDG533A19700	19,700	.7756	200	124	148	4,6	50	20
4157354	TDG533A19800	19,800	.7795	200	124	148	4,6	50	20
4157355	TDG533A19900	19,900	.7835	200	124	148	4,6	50	20
4157356	TDG533A20000	20,000	.7874	200	124	148	4,7	50	20

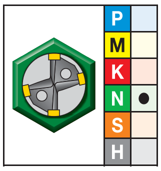




For information on L, L3, and L4 max, see page T143.



■ TDG534A • 12 x D



grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157357	**TDG534A03000**	3,000	.1181	93	44	55	0,7	36	6
4157358	**TDG534A03048**	3,048	.1200	93	44	55	0,7	36	6
4157359	**TDG534A03100**	3,100	.1220	93	44	55	0,7	36	6
4157360	**TDG534A03175**	3,175	.1250	93	44	55	0,7	36	6
4157361	**TDG534A03200**	3,200	.1260	93	43	55	0,7	36	6
4157362	**TDG534A03264**	3,264	.1285	93	44	55	0,8	36	6
4157363	**TDG534A03300**	3,300	.1299	93	44	55	0,8	36	6
4157364	**TDG534A03400**	3,400	.1339	93	44	55	0,8	36	6
4157365	**TDG534A03455**	3,455	.1360	93	44	55	0,8	36	6
4157366	**TDG534A03500**	3,500	.1378	93	44	55	0,8	36	6
4157367	**TDG534A03571**	3,571	.1406	93	45	55	0,8	36	6
4157368	**TDG534A03600**	3,600	.1417	93	45	55	0,8	36	6
4157369	**TDG534A03658**	3,658	.1440	93	45	55	0,9	36	6
4157370	**TDG534A03700**	3,700	.1457	93	45	55	0,9	36	6
4157371	**TDG534A03734**	3,734	.1470	93	45	55	0,9	36	6
4157372	**TDG534A03800**	3,800	.1496	107	55	69	0,9	36	6
4157373	**TDG534A03900**	3,900	.1535	107	56	69	0,9	36	6
4157374	**TDG534A03970**	3,970	.1563	107	56	69	0,9	36	6
4157375	**TDG534A04000**	4,000	.1575	107	56	69	0,9	36	6
4157376	**TDG534A04039**	4,039	.1590	107	56	69	0,9	36	6
4157377	**TDG534A04090**	4,090	.1610	107	55	69	1,0	36	6
4157378	**TDG534A04100**	4,100	.1614	107	55	69	1,0	36	6
4157379	**TDG534A04200**	4,200	.1654	107	56	69	1,0	36	6
4157380	**TDG534A04217**	4,217	.1660	107	56	69	1,0	36	6

(continued)

(TDG534A • 12 x D — continued)

grade WN10HD

● first choice
○ alternate choice

		D1 diameter							
order #	catalogue #	mm	in	L	L4 max	L3	L5	LS	D
4157381	TDG534A04300	4,300	.1693	107	56	69	1,0	36	6
4157382	TDG534A04366	4,366	.1719	107	56	69	1,0	36	6
4157383	TDG534A04400	4,400	.1732	107	56	69	1,0	36	6
4157384	TDG534A04500	4,500	.1772	107	56	69	1,0	36	6
4157385	TDG534A04600	4,600	.1811	107	57	69	1,1	36	6
4157386	TDG534A04623	4,623	.1820	107	57	69	1,1	36	6
4157387	TDG534A04700	4,700	.1850	107	57	69	1,1	36	6
4157388	TDG534A04763	4,763	.1875	125	69	87	1,1	36	6
4157389	TDG534A04800	4,800	.1890	125	69	87	1,1	36	6
4157390	TDG534A04852	4,852	.1910	125	69	87	1,1	36	6
4157391	TDG534A04900	4,900	.1929	125	69	87	1,1	36	6
4157392	TDG534A05000	5,000	.1969	125	70	87	1,2	36	6
4157393	TDG534A05100	5,100	.2008	125	70	87	1,2	36	6
4157394	TDG534A05106	5,106	.2010	125	70	87	1,2	36	6
4157395	TDG534A05159	5,159	.2031	125	70	87	1,2	36	6
4157396	TDG534A05200	5,200	.2047	125	70	87	1,2	36	6
4157397	TDG534A05300	5,300	.2087	125	71	87	1,2	36	6
4157398	TDG534A05400	5,400	.2126	125	71	87	1,3	36	6
4157399	TDG534A05410	5,410	.2130	125	71	87	1,3	36	6
4157400	TDG534A05500	5,500	.2165	125	71	87	1,3	36	6
4157401	TDG534A05558	5,558	.2188	125	71	87	1,3	36	6
4157402	TDG534A05600	5,600	.2205	125	72	87	1,3	36	6
4157403	TDG534A05616	5,616	.2211	125	72	87	1,3	36	6
4157404	TDG534A05700	5,700	.2244	125	72	87	1,3	36	6
4157405	TDG534A05800	5,800	.2283	125	71	87	1,4	36	6
4157406	TDG534A05900	5,900	.2323	125	71	87	1,4	36	6
4157407	TDG534A05954	5,954	.2344	125	72	87	1,4	36	6
4157408	TDG534A06000	6,000	.2362	125	72	87	1,4	36	6
4157409	TDG534A06100	6,100	.2402	139	82	101	1,4	36	8
4157410	TDG534A06200	6,200	.2441	139	82	101	1,4	36	8
4157411	TDG534A06300	6,300	.2480	139	83	101	1,5	36	8
4157412	TDG534A06350	6,350	.2500	139	83	101	1,5	36	8
4157413	TDG534A06400	6,400	.2520	139	83	101	1,5	36	8
4157414	TDG534A06500	6,500	.2559	139	83	101	1,5	36	8
4157415	TDG534A06528	6,528	.2570	139	83	101	1,5	36	8
4157416	TDG534A06600	6,600	.2598	139	84	101	1,5	36	8
4157417	TDG534A06630	6,630	.2610	139	84	101	1,5	36	8
4157418	TDG534A06700	6,700	.2638	139	84	101	1,6	36	8
4157419	TDG534A06746	6,746	.2656	139	83	101	1,6	36	8
4157420	TDG534A06800	6,800	.2677	139	83	101	1,6	36	8

(continued)

(TDG534A • 12 x D — continued)

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grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157421	TDG534A06900	6,900	.2717	139	83	101	1,6	36	8
4157422	TDG534A07000	7,000	.2756	139	84	101	1,6	36	8
4157423	TDG534A07100	7,100	.2795	153	94	115	1,7	36	8
4157424	TDG534A07145	7,145	.2813	153	94	115	1,7	36	8
4157425	TDG534A07200	7,200	.2835	153	94	115	1,7	36	8
4157426	TDG534A07300	7,300	.2874	153	95	115	1,7	36	8
4157427	TDG534A07400	7,400	.2913	153	95	115	1,7	36	8
4157428	TDG534A07500	7,500	.2953	153	95	115	1,7	36	8
4157429	TDG534A07541	7,541	.2969	153	95	115	1,8	36	8
4157430	TDG534A07600	7,600	.2992	153	96	115	1,8	36	8
4157431	TDG534A07700	7,700	.3031	153	96	115	1,8	36	8
4157432	TDG534A07800	7,800	.3071	153	95	115	1,8	36	8
4157433	TDG534A07900	7,900	.3110	153	95	115	1,8	36	8
4157434	TDG534A07938	7,938	.3125	153	96	115	1,9	36	8
4157435	TDG534A08000	8,000	.3150	153	96	115	1,9	36	8
4157436	TDG534A08100	8,100	.3189	185	116	143	1,9	40	10
4157437	TDG534A08200	8,200	.3228	185	116	143	1,9	40	10
4157438	TDG534A08300	8,300	.3268	185	117	143	1,9	40	10
4157439	TDG534A08334	8,334	.3281	185	117	143	1,9	40	10
4157440	TDG534A08400	8,400	.3307	185	117	143	2,0	40	10
4157441	TDG534A08433	8,433	.3320	185	117	143	2,0	40	10
4157442	TDG534A08500	8,500	.3346	185	117	143	2,0	40	10
4157443	TDG534A08600	8,600	.3386	185	118	143	2,0	40	10
4157444	TDG534A08700	8,700	.3425	185	118	143	2,0	40	10
4157445	TDG534A08733	8,733	.3438	185	117	143	2,0	40	10
4157446	TDG534A08800	8,800	.3465	185	117	143	2,1	40	10
4157447	TDG534A08900	8,900	.3504	185	117	143	2,1	40	10
4157448	TDG534A09000	9,000	.3543	185	118	143	2,1	40	10
4157449	TDG534A09100	9,100	.3583	185	118	143	2,1	40	10
4157450	TDG534A09129	9,129	.3594	185	118	143	2,1	40	10
4157451	TDG534A09200	9,200	.3622	185	118	143	2,1	40	10
4157452	TDG534A09300	9,300	.3661	185	119	143	2,2	40	10
4157453	TDG534A09347	9,347	.3680	185	119	143	2,2	40	10
4157454	TDG534A09400	9,400	.3701	185	119	143	2,2	40	10
4157455	TDG534A09500	9,500	.3740	185	119	143	2,2	40	10
4157456	TDG534A09525	9,525	.3750	185	119	143	2,2	40	10
4157457	TDG534A09600	9,600	.3780	185	120	143	2,2	40	10
4157458	TDG534A09700	9,700	.3819	185	120	143	2,3	40	10
4157459	TDG534A09800	9,800	.3858	185	119	143	2,3	40	10
4157460	TDG534A09900	9,900	.3898	185	119	143	2,3	40	10

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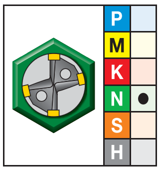
(TDG534A • 12 x D — continued)



grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157461	**TDG534A09921**	9,921	.3906	185	120	143	2,3	40	10
4157476	**TDG534A10000**	10,000	.3937	185	120	143	2,3	40	10
4157555	**TDG534A10100**	10,100	.3976	218	140	171	2,4	45	12
4157556	**TDG534A10200**	10,200	.4016	218	140	171	2,4	45	12
4157557	**TDG534A10300**	10,300	.4055	218	141	171	2,4	45	12
4157558	**TDG534A10320**	10,320	.4063	218	141	171	2,4	45	12
4157559	**TDG534A10400**	10,400	.4094	218	141	171	2,4	45	12
4157560	**TDG534A10500**	10,500	.4134	218	141	171	2,4	45	12
4157561	**TDG534A10600**	10,600	.4173	218	142	171	2,5	45	12
4157562	**TDG534A10700**	10,700	.4213	218	142	171	2,5	45	12
4157583	**TDG534A10716**	10,716	.4219	218	142	171	2,5	45	12
4157584	**TDG534A10800**	10,800	.4252	218	141	171	2,5	45	12
4157585	**TDG534A10900**	10,900	.4291	218	141	171	2,5	45	12
4157586	**TDG534A11000**	11,000	.4331	218	142	171	2,6	45	12
4157587	**TDG534A11100**	11,100	.4370	218	142	171	2,6	45	12
4157588	**TDG534A11113**	11,113	.4375	218	142	171	2,6	45	12
4157589	**TDG534A11200**	11,200	.4409	218	142	171	2,6	45	12
4157590	**TDG534A11300**	11,300	.4449	218	143	171	2,6	45	12
4157591	**TDG534A11400**	11,400	.4488	218	143	171	2,7	45	12
4157592	**TDG534A11500**	11,500	.4528	218	143	171	2,7	45	12
4157593	**TDG534A11509**	11,509	.4531	218	143	171	2,7	45	12
4157594	**TDG534A11600**	11,600	.4567	218	144	171	2,7	45	12
4157595	**TDG534A11700**	11,700	.4606	218	144	171	2,7	45	12
4157596	**TDG534A11800**	11,800	.4646	218	143	171	2,8	45	12
4157597	**TDG534A11900**	11,900	.4685	218	143	171	2,8	45	12
4157598	**TDG534A11908**	11,908	.4688	218	143	171	2,8	45	12
4157599	**TDG534A12000**	12,000	.4724	218	144	171	2,8	45	12
4157600	**TDG534A12100**	12,100	.4764	246	164	199	2,8	45	14
4157601	**TDG534A12200**	12,200	.4803	246	164	199	2,8	45	14
4157602	**TDG534A12300**	12,300	.4843	246	165	199	2,9	45	14
4157603	**TDG534A12304**	12,304	.4844	246	165	199	2,9	45	14
4157604	**TDG534A12400**	12,400	.4882	246	165	199	2,9	45	14
4157605	**TDG534A12500**	12,500	.4921	246	165	199	2,9	45	14
4157606	**TDG534A12600**	12,600	.4961	246	165	199	2,9	45	14
4157607	**TDG534A12700**	12,700	.5000	246	166	199	3,0	45	14
4157608	**TDG534A12800**	12,800	.5039	246	166	199	3,0	45	14
4157609	**TDG534A12900**	12,900	.5079	246	165	199	3,0	45	14
4157610	**TDG534A13000**	13,000	.5118	246	166	199	3,0	45	14
4157611	**TDG534A13096**	13,096	.5156	246	166	199	3,1	45	14
4157612	**TDG534A13100**	13,100	.5157	246	166	199	3,1	45	14

(continued)

(TDG534A • 12 x D — continued)

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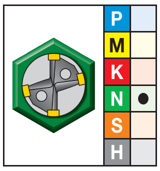
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157613	TDG534A13200	13,200	.5197	246	166	199	3,1	45	14
4157614	TDG534A13300	13,300	.5236	246	167	199	3,1	45	14
4157615	TDG534A13400	13,400	.5276	246	167	199	3,1	45	14
4157671	TDG534A13490	13,490	.5311	246	167	199	3,1	45	14
4157616	TDG534A13500	13,500	.5315	246	167	199	3,1	45	14
4157617	TDG534A13600	13,600	.5354	246	167	199	3,2	45	14
4157618	TDG534A13700	13,700	.5394	246	168	199	3,2	45	14
4157619	TDG534A13800	13,800	.5433	246	168	199	3,2	45	14
4157620	TDG534A13891	13,891	.5469	246	167	199	3,2	45	14
4157621	TDG534A13900	13,900	.5472	246	167	199	3,2	45	14
4157622	TDG534A14000	14,000	.5512	246	168	199	3,3	45	14
4157623	TDG534A14100	14,100	.5551	277	188	227	3,3	48	16
4157624	TDG534A14200	14,200	.5591	277	188	227	3,3	48	16
4157625	TDG534A14288	14,288	.5625	277	188	227	3,3	48	16
4157626	TDG534A14300	14,300	.5630	277	188	227	3,3	48	16
4157627	TDG534A14400	14,400	.5669	277	189	227	3,4	48	16
4157628	TDG534A14500	14,500	.5709	277	189	227	3,4	48	16
4157629	TDG534A14600	14,600	.5748	277	189	227	3,4	48	16
4157630	TDG534A14684	14,684	.5781	277	190	227	3,4	48	16
4157631	TDG534A14700	14,700	.5787	277	190	227	3,4	48	16
4157632	TDG534A14800	14,800	.5827	277	190	227	3,5	48	16
4157633	TDG534A14900	14,900	.5866	277	190	227	3,5	48	16
4157634	TDG534A15000	15,000	.5906	277	190	227	3,5	48	16
4157635	TDG534A15083	15,083	.5938	277	190	227	3,5	48	16
4157636	TDG534A15100	15,100	.5945	277	190	227	3,5	48	16
4157637	TDG534A15200	15,200	.5984	277	190	227	3,5	48	16
4157638	TDG534A15300	15,300	.6024	277	191	227	3,6	48	16
4157639	TDG534A15400	15,400	.6063	277	191	227	3,6	48	16
4157640	TDG534A15479	15,479	.6094	277	191	227	3,6	48	16
4157641	TDG534A15500	15,500	.6102	277	191	227	3,6	48	16
4157642	TDG534A15600	15,600	.6142	277	191	227	3,6	48	16
4157643	TDG534A15700	15,700	.6181	277	192	227	3,7	48	16
4157644	TDG534A15800	15,800	.6220	277	192	227	3,7	48	16
4157645	TDG534A15875	15,875	.6250	277	192	227	3,7	48	16
4157646	TDG534A15900	15,900	.6260	277	192	227	3,7	48	16
4157647	TDG534A16000	16,000	.6299	277	192	227	3,7	48	16
4157648	TDG534A16100	16,100	.6339	305	212	255	3,8	48	18
4157649	TDG534A16200	16,200	.6378	305	212	255	3,8	48	18
4157650	TDG534A16271	16,271	.6406	305	212	255	3,8	48	18
4157651	TDG534A16300	16,300	.6417	305	212	255	3,8	48	18

(continued)

(TDG534A • 12 x D — continued)



grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157652	TDG534A16400	16,400	.6457	305	213	255	3,8	48	18
4157653	TDG534A16500	16,500	.6496	305	213	255	3,8	48	18
4157654	TDG534A16600	16,600	.6535	305	213	255	3,9	48	18
4157655	TDG534A16670	16,670	.6563	305	214	255	3,9	48	18
4157656	TDG534A16700	16,700	.6575	305	214	255	3,9	48	18
4157657	TDG534A16800	16,800	.6614	305	214	255	3,9	48	18
4157658	TDG534A16900	16,900	.6654	305	214	255	3,9	48	18
4157659	TDG534A17000	17,000	.6693	305	214	255	4,0	48	18
4157660	TDG534A17100	17,100	.6732	305	214	255	4,0	48	18
4157661	TDG534A17200	17,200	.6772	305	214	255	4,0	48	18
4157662	TDG534A17300	17,300	.6811	305	214	255	4,0	48	18
4157663	TDG534A17400	17,400	.6850	305	215	255	4,1	48	18
4157664	TDG534A17463	17,463	.6875	305	215	255	4,1	48	18
4157665	TDG534A17500	17,500	.6890	305	215	255	4,1	48	18
4157666	TDG534A17600	17,600	.6929	305	215	255	4,1	48	18
4157667	TDG534A17700	17,700	.6969	305	216	255	4,1	48	18
4157668	TDG534A17800	17,800	.7008	305	216	255	4,2	48	18
4157669	TDG534A17859	17,859	.7031	305	216	255	4,2	48	18
4157670	TDG534A17900	17,900	.7047	305	216	255	4,2	48	18
4156877	TDG534A18000	18,000	.7087	305	216	255	4,2	48	18
4156878	TDG534A18100	18,100	.7126	334	237	282	4,2	50	20
4156879	TDG534A18200	18,200	.7165	334	236	282	4,2	50	20
4156880	TDG534A18258	18,258	.7188	334	236	282	4,3	50	20
4156881	TDG534A18300	18,300	.7205	334	236	282	4,3	50	20
4156882	TDG534A18400	18,400	.7244	334	237	282	4,3	50	20
4156973	TDG534A18500	18,500	.7283	334	237	282	4,3	50	20
4156974	TDG534A18600	18,600	.7323	334	237	282	4,3	50	20
4156975	TDG534A18654	18,654	.7344	334	237	282	4,3	50	20
4156976	TDG534A18700	18,700	.7362	334	237	282	4,4	50	20
4156977	TDG534A18800	18,800	.7402	334	238	282	4,4	50	20
4156978	TDG534A18900	18,900	.7441	334	238	282	4,4	50	20
4156979	TDG534A19000	19,000	.7480	334	238	282	4,4	50	20
4156980	TDG534A19050	19,050	.7500	334	239	282	4,4	50	20
4156981	TDG534A19100	19,100	.7520	334	239	282	4,5	50	20
4156982	TDG534A19200	19,200	.7559	334	238	282	4,5	50	20
4156983	TDG534A19300	19,300	.7598	334	238	282	4,5	50	20
4156984	TDG534A19400	19,400	.7638	334	239	282	4,5	50	20
4156985	TDG534A19500	19,500	.7677	334	239	282	4,5	50	20
4156986	TDG534A19600	19,600	.7717	334	239	282	4,6	50	20
4156987	TDG534A19700	19,700	.7756	334	239	282	4,6	50	20
4156988	TDG534A19800	19,800	.7795	334	240	282	4,6	50	20
4156989	TDG534A19900	19,900	.7835	334	240	282	4,6	50	20
4156990	TDG534A20000	20,000	.7874	334	240	282	4,7	50	20

TOP DRILL G • TDG532/TDG533/TDG534 • WN10HD™ • Through Coolant • Metric

Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter								
		min	–	min	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
N	21	100	–	450	mm/r	0,16–0,25	0,19–0,29	0,23–0,35	0,27–0,42	0,31–0,50	0,36–0,57	0,44–0,69	0,52–0,82
	22, 23, 24	100	–	300	mm/r	0,15–0,23	0,17–0,28	0,21–0,34	0,25–0,39	0,30–0,46	0,34–0,54	0,42–0,67	0,52–0,82
	26	100	–	250	mm/r	0,16–0,28	0,15–0,32	0,19–0,36	0,23–0,40	0,25–0,44	0,28–0,48	0,32–0,56	0,35–0,63

	Metric tolerance	
nominal size range	D1 tolerance m7	D tolerance h6
>3–6	0,004/0,016	0,000/-0,008
>6–10	0,006/0,021	0,000/-0,009
>10–18	0,007/0,025	0,000/-0,011
>18–25,4	0,008/0,029	0,000/-0,013

WIDIA™ Solid Carbide Drills — Reconditioning

Anyone can regrind your tools — only we can recondition them.

WIDIA Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

How Does WIDIA Do It?

- Reconditioned tooling undergoes the same process as new tools — the same drill point (WIDIA proprietary geometry) and coating are applied back on the tool.
- Tooling is returned to like-new condition, with WIDIA proprietary geometry providing a longer tooling lifecycle and increased performance.
- With current lead-time less than 10 days, customers get tools back quickly — lowering cost-per-tool usage.

Protect your investment by using the WIDIA™ Reconditioning Programme.

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

To use WIDIA tool reconditioning services, contact your authorised WIDIA distributor to get started.

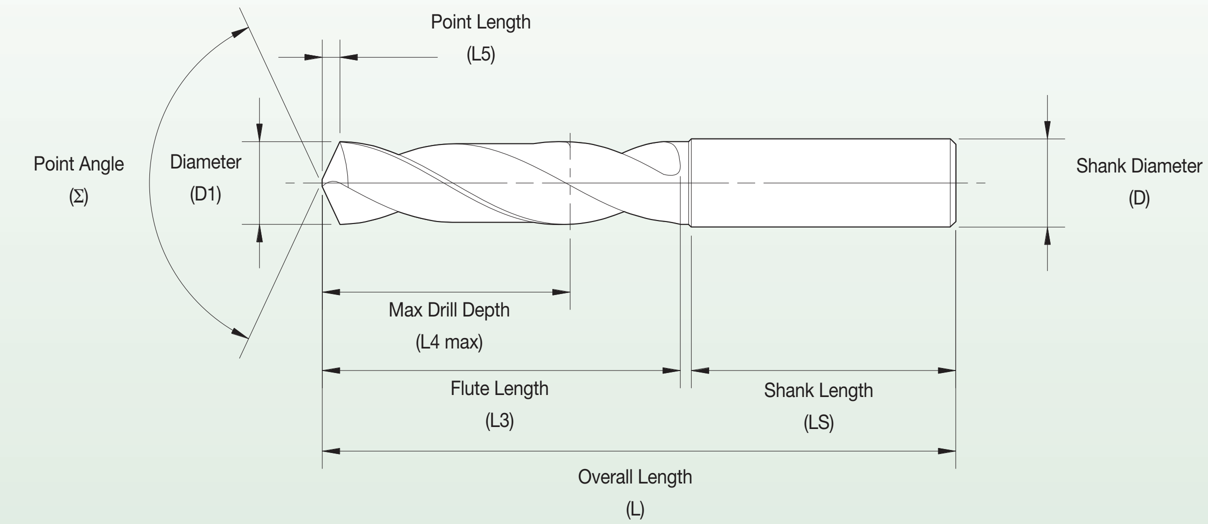
WIDIA Solid Carbide Drills Reconditioning Product Lines.

- VariDrill™
- TOP DRILL S™ for Steel
- TOP DRILL S™ for Cast Iron
- TOP DRILL S+™
- TOP DRILL G™

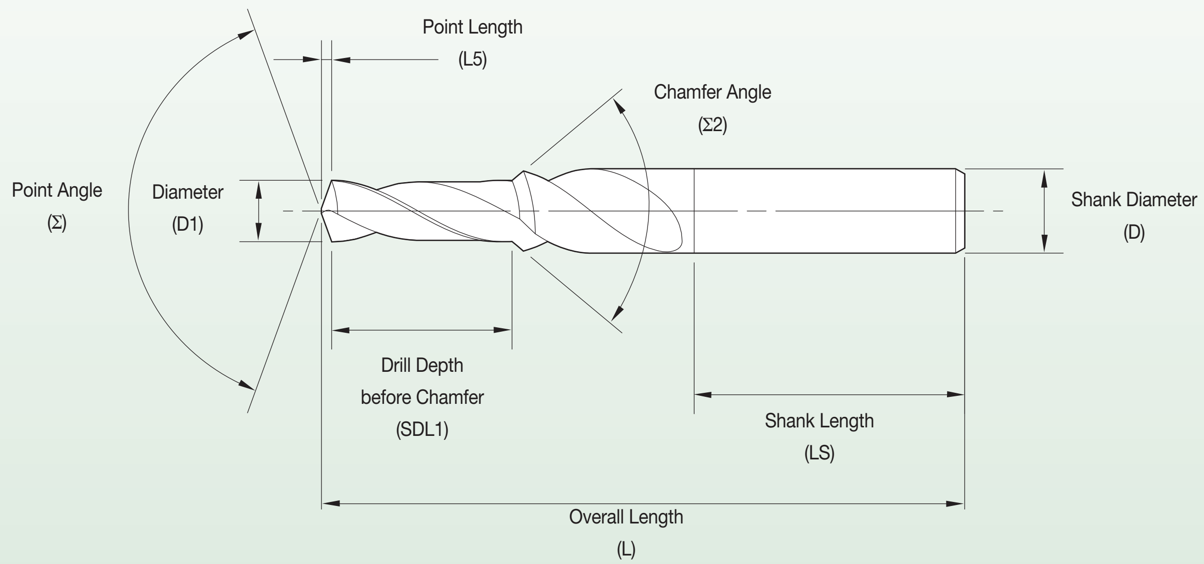
WIDIA™

The Anatomy of a Drill

Use this diagram when describing features of a solid carbide drill.

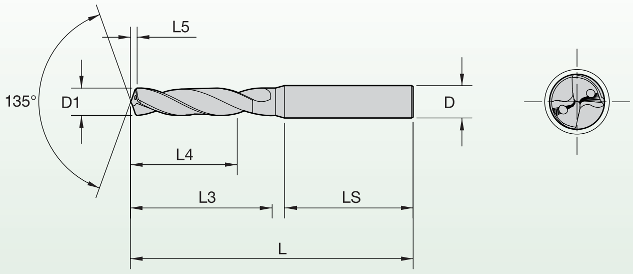


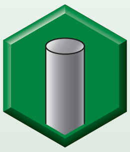
Use this diagram when describing features of a solid carbide step drill.



Shank Designs to DIN 6535

Form HE,
2° angle
Design F





Form HA,
straight
design A

Dimensions for WIDIA™ High-Performance Solid Carbide Drills

mm Ø		DIN 6535		SHORT* ~3 x D			LONG* ~5 x D			EXTRA LONG** ~8 x D		
D1 min	D1 max	D	LS	L	L3	L4 max	L	L3	L4 max	L	L3	L4 max
1,000	1,400	4	28	58	7	5	58	9	6	58	12	10
1,401	1,900	4	28	58	9	6	58	12	9	58	18	15
1,901	2,300	4	28	58	13	9	58	18	14	66	26	22
2,301	2,999	4	28	58	17	12	58	22	17	66	30	25
3,000	3,750	6	36	62	20	14	66	28	23	78	40	33
3,751	4,750	6	36	66	24	17	74	36	29	87	49	41
4,751	6,000	6	36	66	28	20	82	44	35	94	56	48
6,001	7,000	8	36	79	34	24	91	53	43	105	67	57
7,001	8,000	8	36	79	41	29	91	53	43	110	72	61
8,001	10,000	10	40	89	47	35	103	61	49	122	80	68
10,001	12,000	12	45	102	55	40	118	71	56	141	94	79
12,001	14,000	14	45	107	60	43	124	77	60	155	108	91
14,001	16,000	16	48	115	65	45	133	83	63	171	121	101
16,001	18,000	18	48	123	73	51	143	93	71	185	135	113
18,001	20,000	20	50	131	79	55	153	101	77	200	148	124
20,001	22,000	20	50	141	86	60	167	112	85	217	162	136
22,001	25,000	25	56	153	95	65	184	126	98	238	180	150

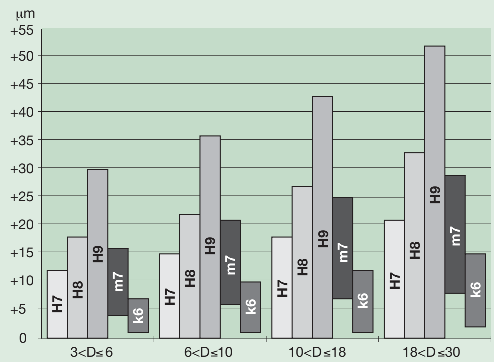
** D1<20mm to DIN 6537K*
D1>20mm to factory standard
*** To factory standard*

NOTE: Solid Carbide Drills from WIDIA in short and regular lengths conform to DIN 6537.
Drills with long lengths conform to WIDIA factory standard.
Solid Carbide Drills with diameter D1>20mm (not DIN 6537) are also standardised to factory standard.

Tolerances of Drills and Holes

High-performance solid carbide drills with tolerances of m7 create holes with tolerances of H9. H8 can be achieved in very good conditions. The drill should be used for holes in H8, and in favourable conditions, H7 can be achieved. Solid carbide drills with H7 create holes in K9–K11. Other drilling tolerances require special solid carbide drill versions.

Tolerances of diameter D1 on:
Spiral Flute
TDG Drill

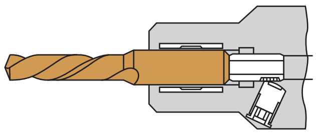


Toolholding Systems

As with any drilling system, components of the entire system contribute to the quality of the machined hole, not just the drill itself.
For maximum efficiency and accuracy, the following toolholding systems are your best choices:

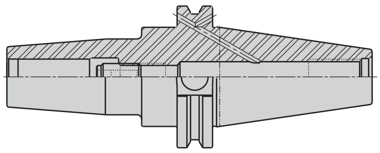
First Choice

Hydraulic chucks



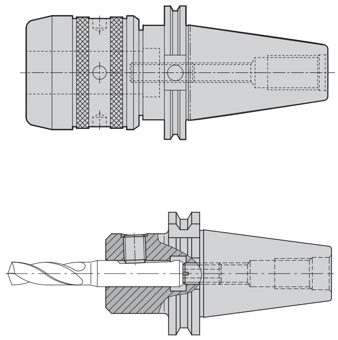
Second Choice

Shrink Fit

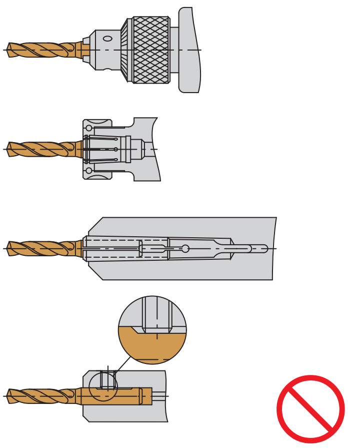


Third Choice

High-performance milling chucks
with reduction sleeves



Not Recommended

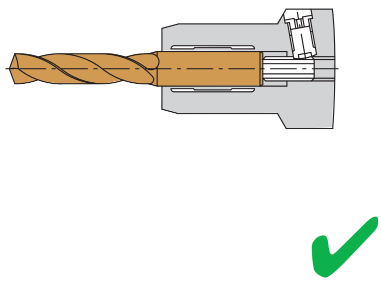


Clamping Chuck

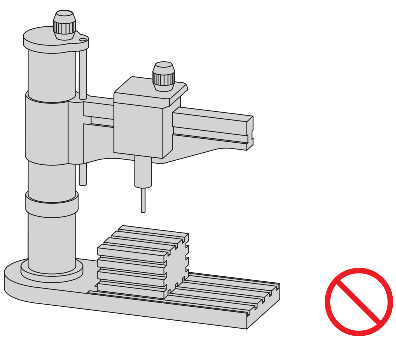
Use of all-purpose drilling chuck collets, clamping sleeves, and Weldon® clamping chucks should be avoided because they do not absorb cutting forces reliably and provide insufficient precision of concentricity.

Highly Recommended

Hydraulic chucks ensure a secure torque transmission with excellent concentricity.



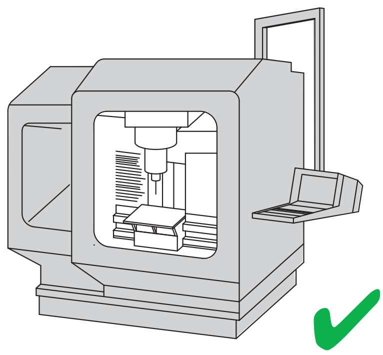
Not Recommended



Machine

Solid carbide drills have a much higher rigidity than conventional high-speed steel drills. This enables the machining of close-tolerance holes with a position accuracy of ±0.025mm. However, it also means that drills require rigid machine tools with good spindles.

Rigid Machine Tool Recommended



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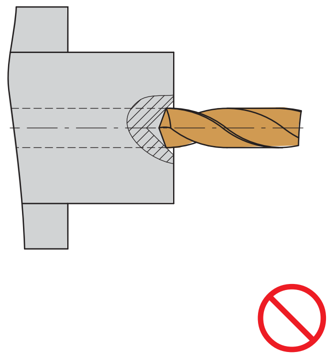
(continued)

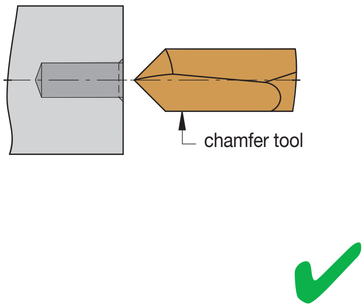
Wrong



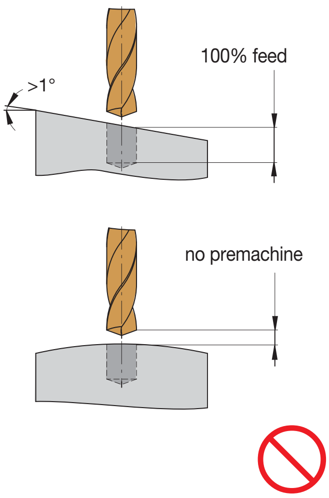
Drilling and Chamfering

Drill into the solid first, then chamfer.

Correct



Wrong



Drilling on Inclined or Rounded Surfaces

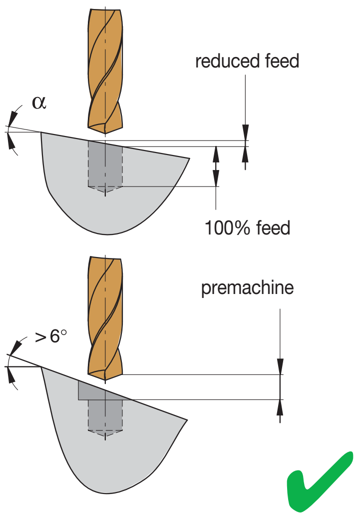
When drilling on inclined or curved surfaces, use a lower feed than the standard value. The reduction of feed required is dependent on the inclination angle of the workpiece surface and the drill type (see table).

reduced feed (% of standard value)

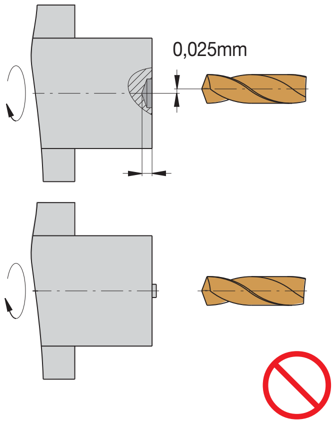
inclination α	3 x D	5 x D Long	<5 x D
1°	100%	80%	premachine
2°	80–50%	80–50%	premachine
3°	65%	50%	premachine
4°	50%	premachine	premachine
6°	30%	premachine	premachine

Premachining is usually done with an end mill operation.

Correct



Wrong



Drilling on Turning Machines

When drilling on turning machines, the drill must be on centre. The tolerance range of the centre position should not exceed ±0.025mm. On bar-turning lathes, do not drill into centre stub or bur. Cut-off tools must be mounted precisely to eliminate centre stub or bur. Do not drill into pre-existing holes.

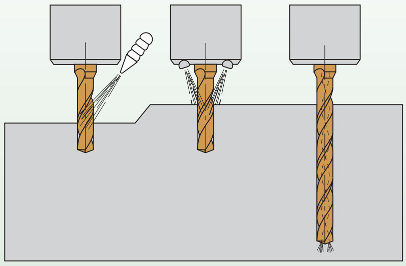
Hole Depths Greater than 3 x D

Hole depths that are deeper than three times the drill diameter may require a speed reduction. A 15% lower speed is suggested.

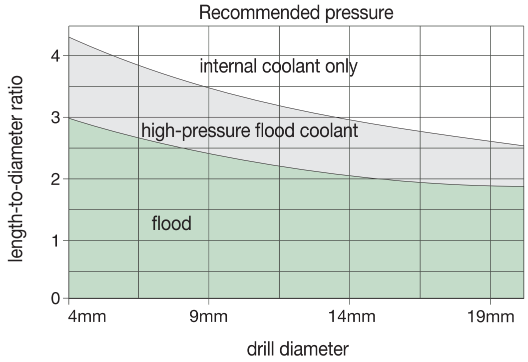
Coolant

- To optimise their performance, drills must be adequately cooled. With the proper coolant flow, better tool life and higher maximum effective cutting speeds can be achieved.
- If not properly cooled, the drill will heat up rapidly. This causes the drill diameter to expand, which in turn may cause the drill to seize inside the hole.
- Solid carbide drills with internal coolant channels require deeper drilling depths to be effective. The higher the coolant pressure, the better the drilling results. Drill life and hole quality improve with ample coolant flow.
- When using drills without internal coolant flow, try to get at least one coolant jet as parallel to the drill as possible.
- For short-hole applications, drills without internal coolant may often provide better tool life. The tool is more solid, and it does not suffer from thermal shock at the cutting edge.
- It is important to use high coolant concentration to provide lubricity, which will aid in tool life, chip evacuation, and finer surface finishes.
- High-pressure coolant, either through the tool or through a line adjacent and parallel to the tool, should always be considered for increased tool life and production.
- Do not use multi-coolant lines. Use one line with 100% of the flow capacity to evacuate the chips from the hole.

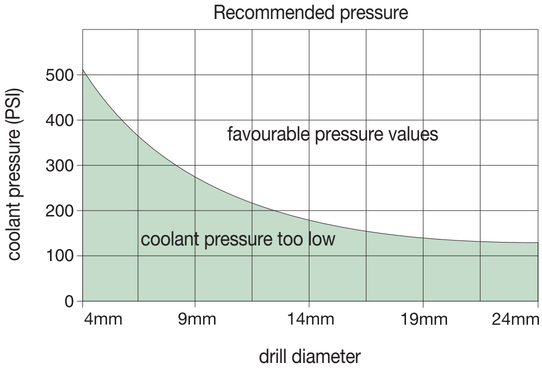
Coolant requirement for carbide drills



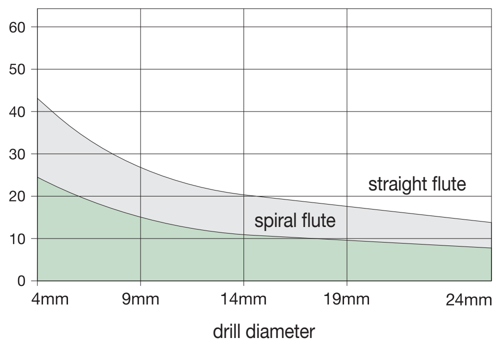
Recommended pressure



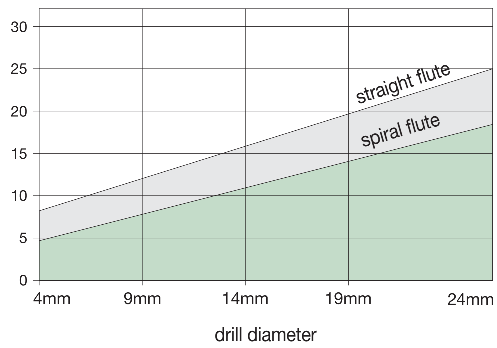
Recommended pressure



Recommended coolant flow volume V [l/min]

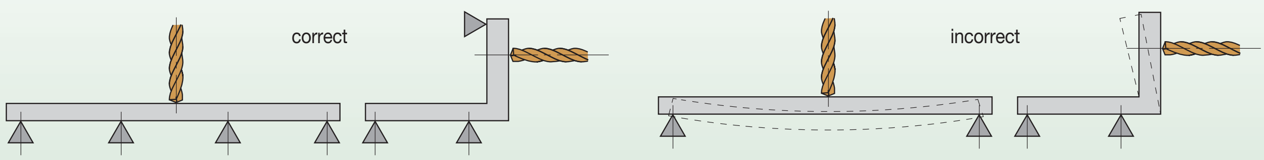


Recommended coolant pressure p [bar]

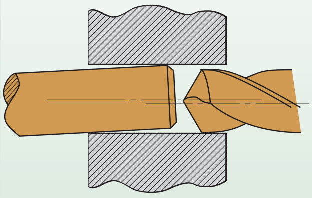
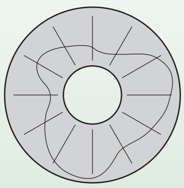
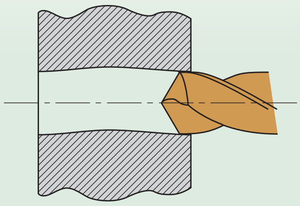


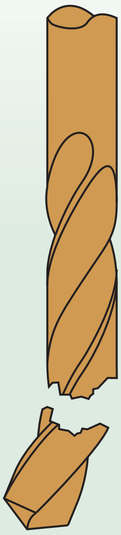
Workpiece Rigidity

Because solid carbide drills have much higher penetration rates, it is important that the workpiece has adequate support.

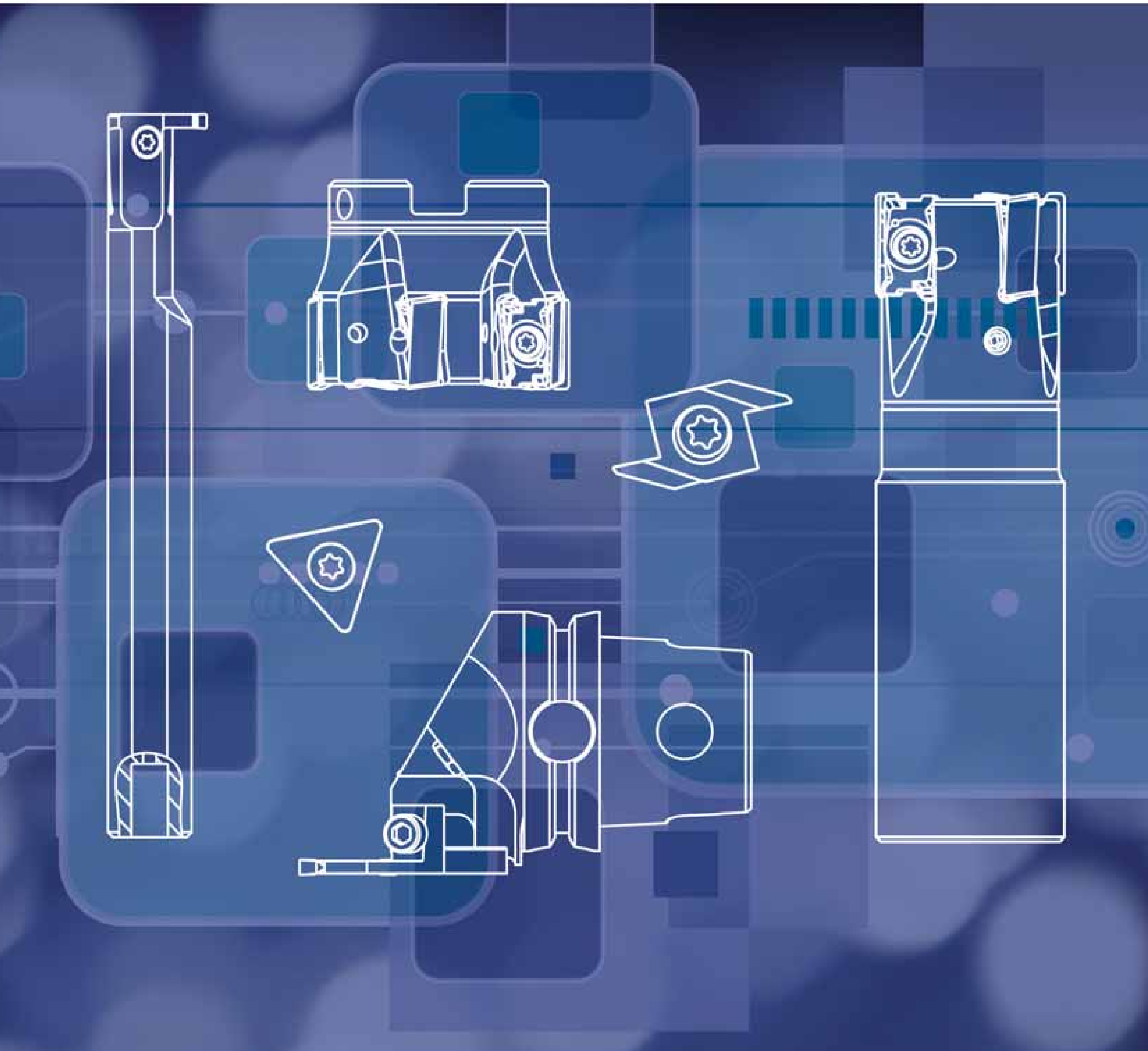


problem	source	solution
heavy wear on the cutting corners 	**insufficient coolant**	• Check cooling lubricant. In the case of internal coolant supply, increase coolant pressure. In the case of external coolant supply, adjust positioning of coolant jet. Cool from both sides.
	workpiece movement	• Stabilise workpiece chucking and check stability of machine tool.
	wrong drill	• Check drill type, drilling depth, cooling system, and workpiece material.
	cutting conditions	• Reduce cutting speed; increase feed.
splintering on the chisel edge 	**clamping chuck**	• Check clamping accuracy. Use hydraulic clamping chuck or high-precision chucking system.
	cutting conditions	• Decrease feed; increase speed.
built-up edge 	**insufficient coolant**	• Check cooling lubricant. In the case of internal coolant supply, increase coolant pressure. In the case of external coolant supply, adjust positioning of coolant jet. Cool from both sides.
	cutting conditions	• Increase speed 20–30%.
splintering on the cutting edges 	**clamping chuck**	• Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	cutting conditions caused by built-up edge	• Check cutting values, and possibly increase cutting speed.
		• Examine regularly for built-up edge.
thermal checking/comb cracking 	**cutting conditions**	• Adapt coolant and cutting conditions to reduce thermal shock.

problem	source	solution
hole too big 	**cutting conditions**	• Check cutting values, increase cutting speed, or reduce feed.
	clamping chuck	• Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	wrong drill	• Check drill diameter. Please note that drills are ground to a positive tolerance. Check concentric running.
hole too small 	**insufficient coolant**	• Check cooling lubricant. In the case of internal coolant supply, increase coolant pressure. In the case of external coolant supply, adjust positioning of coolant jet. Cool from both sides.
	cutting conditions	• Decrease feed; increase speed.
	wrong drill	• Check cutting-edge diameter.
hole not cylindrical 	**clamping chuck**	• Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	workpiece movement	• Stabilise workpiece chucking and check stability of machine tool.
	wrong drill	• Check drill type and drilling depth. Use longer drills.
	cutting conditions	• Reduce feed at entry.

problem	source	solution
drill breakage 	**clamping chuck**	• Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	workpiece movement	• Stabilise workpiece chucking and check stability of machine tool.
	wrong drill	• Check drill type, drilling depth, cooling system, and workpiece material.
	insufficient coolant	• Check cooling lubricant. In the case of internal coolant supply, increase coolant pressure. In the case of external coolant supply, adjust positioning of coolant jet. Cool from both sides.
	cutting conditions	• Check cutting values, and possibly reduce feed.
	clamping chuck	• Check torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
splintering on the cutting corners 	**workpiece movement**	• Stabilise workpiece chucking and check stability of machine tool.
	wrong drill	• Check drill type, drilling depth, cooling system, and workpiece material. Possibly use longer drill.
	insufficient coolant	• Check cooling lubricant. In the case of internal coolant supply, increase coolant pressure. In the case of external coolant supply, adjust positioning of coolant jet. Cool from both sides.
	cutting conditions	• Check cutting values, and possibly reduce feed.

WIDIA™



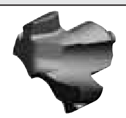
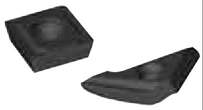
01

THE DIGITAL SOURCE FOR DELIVERING
SMART MACHINING SOLUTIONS

widia.com/novo

NOVO™

Holemaking • Modular Drills

modular drills with internal coolant channel		grade/series	standard* ● first choice ○ alternate choice P	M	K	N	S	H	hole tolerance	standard range: diameter range D1 mm min–max	D1 inch min–max	drilling depth L/D1
TOP DRILL M1™ with front clamping mechanism												
	TOP DRILL M1 inserts	WU25PD**	●	○	●				IT9–IT11	7,94–25,99	.3125–1.1023	–
	chamfering inserts	TopSTEP SH– WP20PH	●	◑	◑	●	○		–	12,50–36,01	.4921–1.4177	–
		TopSTEP VG– WP20PH	●	◑	◑	○	◑		–			
	TOP DRILL M1 bodies	–							–	7,94≤Ø<9,50	.3125≤Ø<.3740	max 3–8 x D
										9,50≤Ø<11,00	.3740≤Ø<.4331	
										11,00≤Ø<12,50	.4331≤Ø<.4921	
										12,50≤Ø<14,00	.4921≤Ø<.5512	
										14,00≤Ø<15,50	.5512≤Ø<.6102	
										15,50≤Ø<16,50	.6102≤Ø<.6496	
										16,50≤Ø<20,50	.6496≤Ø<.8071	
										20,50≤Ø<21,00	.8071≤Ø<.8268	
										21,00≤Ø<25,99	.8268≤Ø<1.023	

** Apart from our standard drills, we can offer you a wide variety of special coating solutions and edge preparations to fulfill all your needs.*
If a specific drill is not suitable for your workpiece material, please contact your WIDIA™ distributor for available options.
*** Grade WU25PD™ was previously named K20FTiAlN.*

● Standard Product
○ Engineered Solutions

D1 mm min–max	D1 inch min–max	max drilling depth	coolant	drilling	inclined exit	counter-sinking	counter-boring	2 flute, 2 margin cooled	corner chamfer	plain shank ≤H6	SCF Shanks	page(s)
TOP DRILL M1™ with front clamping mechanism *(continued)*												
7,94–27,99	.3125–1.1020	–		●	●			●	●			U10–U15
12,50–36,01	.4921–1.4177	–				●						U16–U19
		–				●	●					
7,94≤Ø<9,50	.3125≤Ø<.3740	12 x D	●	●	●	○	○			●	●	U6–U8
9,50≤Ø<11,00	.3740≤Ø<.4331	13 x D	●	●	●	○	○			●	●	
11,00≤Ø<12,50	.5424≤Ø<.4921	14 x D	●	●	●	○	○			●	●	
12,50≤Ø<14,00	.4921≤Ø<.5512	15 x D	●	●	●	○	○			●	●	
14,00≤Ø<15,00	.5512≤Ø<.6102	16 x D	●	●	●	○	○			●	●	
15,50≤Ø<16,50	.6102≤Ø<.6496	17 x D	●	●	●	○	○			●	●	
16,50≤Ø<20,50	.6496≤Ø<.8070	18 x D	●	●	●	○	○			●	●	
20,50≤Ø<21,00	.8070≤Ø<.8267	20 x D	●	●	●	○	○			●	●	
21,00≤Ø<27,99	.8267≤Ø<1.1010	500,0mm	●	●	●	○	○			●	●	

TOP DRILL M1

With performance levels and metal removal rates comparable to that of solid carbide drills, WIDIA™ TOP DRILL M1 offers all the quality and performance you need in one versatile, economical package. The unique front clamping system enables inserts to be changed quickly, even inside the machine tool, saving setup time and manufacturing costs.

The TDM1 platform offers UP(M) drill-point design in WU25PD™ grade — a wide application range geometry, specially developed for cost-efficient drilling of steel, cast iron, and stainless steel. It covers diameter ranges from 8–25,99mm within the standard offering in L/D ratios of 3, 5, and 8 x D.

With its high level of performance, wide application range, and proven point geometry, TDM1 combines all of the economic benefits of a modular drilling system with the machining performance and hole quality to tackle even your most challenging operations.

UP Point Design — Versatility and Productivity

- One insert style for all your work in steel, cast iron, and even stainless steels.
- Low cutting forces and excellent centring capabilities.
- Universal point style for consistent performance and excellent hole quality.

Easy Insert Change

- No screws or clamps required.
- Insert blades can be changed with a simple wrench that comes with each holder.

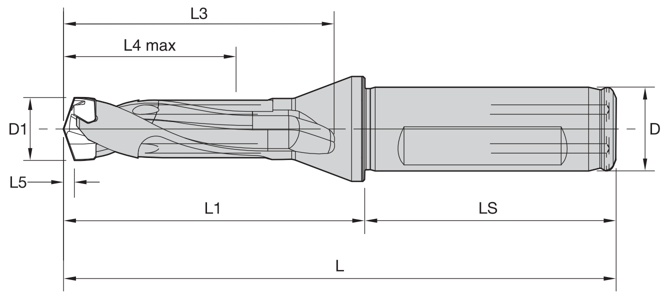
Disposable

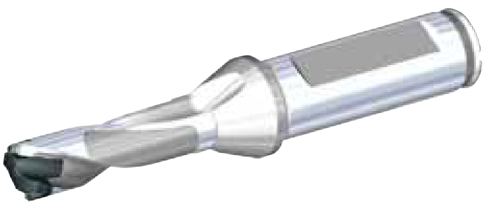
- No reconditioning costs.
- Consistent performance from tip to tip.
- Eliminates number of tools waiting for reconditioning, thus avoiding hidden costs.

Customisation

- All intermediate diameters are quickly available as semi-standards.
- Multiple step drills available as customised solutions.
- New TopSTEP range of inserts offer extended chamfering and counterboring to your one-shot drilling solution.

- Tool body shipped with insert wrench.

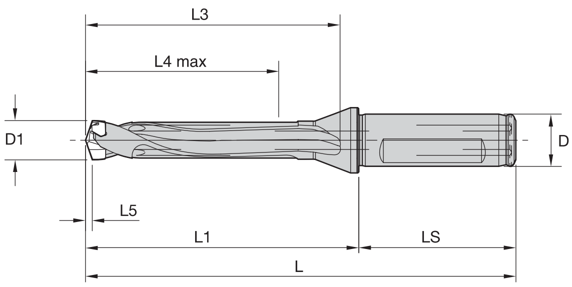




TOP DRILL M1 • 3 x D • Flanged • Metric

order number	catalogue number	D1	D1 max	D	L	L1	L3	L4 max	L5	LS	insert blade seat size
3850904	TDM080R3SCF12M	7,94	8,49	12	86	41	35	26	1,5	45	W10
3850906	TDM085R3SCF12M	8,50	8,99	12	88	43	37	27	1,6	45	W11
3850908	TDM090R3SCF12M	9,00	9,49	12	90	45	39	29	1,7	45	W12
3850910	TDM095R3SCF12M	9,50	9,99	12	92	47	41	30	1,8	45	W13
3850912	TDM100R3SCF16M	10,00	10,49	16	97	49	43	32	1,9	48	W14
3850924	TDM105R3SCF16M	10,50	10,99	16	99	51	45	33	2,0	48	W15
3850926	TDM110R3SCF16M	11,00	11,49	16	101	53	47	35	2,1	48	W16
3850928	TDM115R3SCF16M	11,50	11,99	16	103	55	49	36	2,2	48	W17
3850930	TDM120R3SCF16M	12,00	12,49	16	106	58	52	38	2,3	48	W18
3850932	TDM125R3SCF16M	12,50	12,99	16	108	60	54	39	2,4	48	W19
3850934	TDM130R3SCF16M	13,00	13,49	16	110	62	56	41	2,5	48	W20
3850936	TDM135R3SCF16M	13,50	13,99	16	112	64	58	42	2,6	48	W21
3850938	TDM140R3SCF16M	14,00	14,49	16	114	66	60	44	2,7	48	W22
3850940	TDM145R3SCF16M	14,50	14,99	16	116	68	62	45	2,8	48	W23
3850942	TDM150R3SCF20M	15,00	15,99	20	122	72	66	48	2,8	50	W24
3850944	TDM160R3SCF20M	16,00	16,99	20	126	76	70	51	3,0	50	W25
3850946	TDM170R3SCF20M	17,00	17,99	20	131	81	75	54	3,2	50	W26
3850948	TDM180R3SCF25M	18,00	18,99	25	141	85	79	57	3,4	56	W27
3850950	TDM190R3SCF25M	19,00	19,99	25	144	89	83	60	3,6	56	W28
3850952	TDM200R3SCF25M	20,00	20,99	25	149	93	87	63	3,8	56	W29
3992070	TDM210R3SCF25M	21,00	21,99	25	153	97	91	66	3,7	56	W30
3992071	TDM220R3SCF25M	22,00	22,99	25	158	102	96	69	3,9	56	W31
3992072	TDM230R3SCF25M	23,00	23,99	25	162	106	100	72	4,1	56	W32
3992483	TDM240R3SCF25M	24,00	24,99	25	166	110	104	75	4,2	56	W33
3992484	TDM250R3SCF25M	25,00	25,99	25	170	114	108	78	4,4	56	W34

• Tool body shipped with insert wrench.

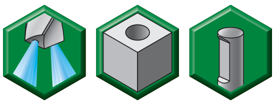


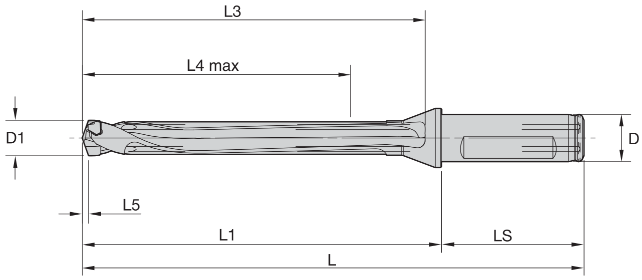
■ TOP DRILL M1 • 5 x D • Flanged • Metric

order number	catalogue number	D1	D1 max	D	L	L1	L3	L4 max	L5	LS	insert blade seat size
3850905	**TDM080R5SCF12M**	7,94	8,49	12	104	59	53	43	1,5	45	W10
3850907	**TDM085R5SCF12M**	8,50	8,99	12	107	62	56	45	1,6	45	W11
3850909	**TDM090R5SCF12M**	9,00	9,49	12	110	65	59	48	1,7	45	W12
3850911	**TDM095R5SCF12M**	9,50	9,99	12	114	69	63	50	1,8	45	W13
3850923	**TDM100R5SCF16M**	10,00	10,49	16	120	72	66	53	1,9	48	W14
3850925	**TDM105R5SCF16M**	10,50	10,99	16	123	75	69	55	2,0	48	W15
3850927	**TDM110R5SCF16M**	11,00	11,49	16	126	78	72	58	2,1	48	W16
3850929	**TDM115R5SCF16M**	11,50	11,99	16	129	81	75	60	2,2	48	W17
3850931	**TDM120R5SCF16M**	12,00	12,49	16	132	84	78	63	2,3	48	W18
3850933	**TDM125R5SCF16M**	12,50	12,99	16	135	87	81	65	2,4	48	W19
3850935	**TDM130R5SCF16M**	13,00	13,49	16	138	90	84	68	2,5	48	W20
3850937	**TDM135R5SCF16M**	13,50	13,99	16	142	94	88	70	2,6	48	W21
3850939	**TDM140R5SCF16M**	14,00	14,49	16	145	97	91	73	2,7	48	W22
3850941	**TDM145R5SCF16M**	14,50	14,99	16	148	100	94	75	2,8	48	W23
3850943	**TDM150R5SCF20M**	15,00	15,99	20	156	106	100	80	2,8	50	W24
3850945	**TDM160R5SCF20M**	16,00	16,99	20	162	112	106	85	3,0	50	W25
3850947	**TDM170R5SCF20M**	17,00	17,99	20	169	119	113	90	3,2	50	W26
3850949	**TDM180R5SCF25M**	18,00	18,99	25	181	125	119	95	3,4	56	W27
3850951	**TDM190R5SCF25M**	19,00	19,99	25	187	131	125	100	3,6	56	W28
3850953	**TDM200R5SCF25M**	20,00	20,99	25	193	137	131	105	3,8	56	W29
3992485	**TDM210R5SCF25M**	21,00	21,99	25	200	144	138	110	3,7	56	W30
3992486	**TDM220R5SCF25M**	22,00	22,99	25	206	150	144	115	3,9	56	W31
3992487	**TDM230R5SCF25M**	23,00	23,99	25	212	156	150	120	4,1	56	W32
3992488	**TDM240R5SCF25M**	24,00	24,99	25	218	162	156	125	4,2	56	W33
3992489	**TDM250R5SCF25M**	25,00	25,99	25	225	169	163	130	4,4	56	W34

WIDIA

- Tool body shipped with insert wrench.





TOP DRILL M1 • 8 x D • Flanged • Metric

order number	catalogue number	D1	D1 max	D	L	L1	L3	L4 max	L5	LS	insert blade seat size
3992141	TDM080R8SCF12M	7,94	8,49	12	129	84	79	68	1,4	45	W10
3992142	TDM085R8SCF12M	8,50	8,99	12	134	89	83	72	1,5	45	W11
3992213	TDM090R8SCF12M	9,00	9,49	12	138	93	88	76	1,6	45	W12
3992214	TDM095R8SCF12M	9,50	9,99	12	144	99	93	80	1,7	45	W13
3992215	TDM100R8SCF16M	10,00	10,49	16	151	103	98	84	1,8	48	W14
3992216	TDM105R8SCF16M	10,50	10,99	16	156	108	102	88	1,9	48	W15
3992217	TDM110R8SCF16M	11,00	11,49	16	160	112	107	92	2,0	48	W16
3992218	TDM115R8SCF16M	11,50	11,99	16	165	117	111	96	2,1	48	W17
3992219	TDM120R8SCF16M	12,00	12,49	16	169	121	116	100	2,1	48	W18
3992220	TDM125R8SCF16M	12,50	12,99	16	174	126	120	104	2,2	48	W19
3992221	TDM130R8SCF16M	13,00	13,49	16	178	130	125	108	2,3	48	W20
3992222	TDM135R8SCF16M	13,50	13,99	16	184	136	130	112	2,4	48	W21
3992223	TDM140R8SCF16M	14,00	14,49	16	188	140	135	116	2,5	48	W22
3992224	TDM145R8SCF16M	14,50	14,99	16	193	145	139	120	2,6	48	W23
3992225	TDM150R8SCF20M	15,00	15,99	20	204	154	148	128	2,7	50	W24
3992226	TDM160R8SCF20M	16,00	16,99	20	213	163	157	136	2,8	50	W25
3992227	TDM170R8SCF20M	17,00	17,99	20	223	173	167	144	3,0	50	W26
3992228	TDM180R8SCF25M	18,00	18,99	25	238	182	176	152	3,2	56	W27
3992229	TDM190R8SCF25M	19,00	19,99	25	247	191	185	160	3,4	56	W28
3992230	TDM200R8SCF25M	20,00	20,99	25	256	200	194	168	3,6	56	W29
3992231	TDM210R8SCF25M	21,00	21,99	25	266	210	204	176	3,7	56	W30
3992232	TDM220R8SCF25M	22,00	22,99	25	275	219	213	184	3,9	56	W31
3992233	TDM230R8SCF25M	23,00	23,99	25	284	228	222	192	4,1	56	W32
3992234	TDM240R8SCF25M	24,00	24,99	25	293	237	231	200	4,2	56	W33
3992235	TDM250R8SCF25M	25,00	25,99	25	303	247	241	208	4,4	56	W34

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ToolBOSS Vending Solutions

ToolBOSS vending solutions help to reduce costs and improve efficiencies to give you a competitive edge.

- Cut tooling inventory by 50% or more.
- Decrease spending on tooling by up to 30%.
- Reduce administrative costs by as much as 90%.

Customer Offering

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Free use of ToolBOSS vending machine combined with a comprehensive maintenance and service package based on agreed sales targets for specified contract terms.

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For more information, please contact us at:
Tel: 888 281 8080
na-help.desk@toolboss.com
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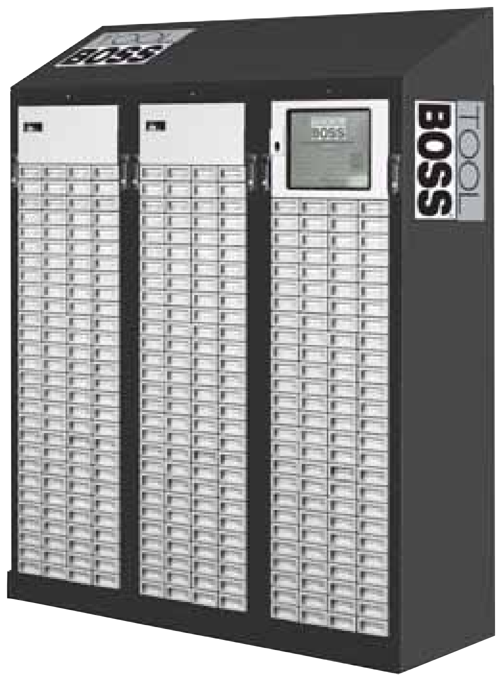

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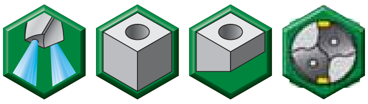
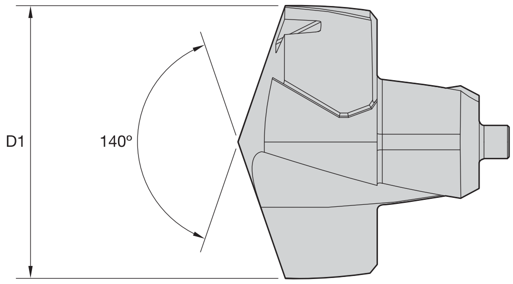




TOP DRILL M1 • UP(M)

P	●
M	○
K	●
N	
S	
H	

● first choice
○ alternate choice

grade WU25PD TiAlN order #	catalogue #	D1	seat size/series
3850959	TDM0794UPM	7,94	W10
3848984	TDM0800UPM	8,00	W10
3848985	TDM0810UPM	8,10	W10
3850960	TDM0816UPM	8,16	W10
3850961	TDM0820UPM	8,20	W10
3848986	TDM0830UPM	8,30	W10
3850962	TDM0833UPM	8,33	W10
3848987	TDM0840UPM	8,40	W10
3850963	TDM0843UPM	8,43	W10
3848988	TDM0850UPM	8,50	W11
3848989	TDM0860UPM	8,60	W11
3850964	TDM0861UPM	8,61	W11
3848990	TDM0870UPM	8,70	W11
3850965	TDM0873UPM	8,73	W11
3848991	TDM0880UPM	8,80	W11
3850966	TDM0884UPM	8,84	W11
3848992	TDM0890UPM	8,90	W11
3849043	TDM0900UPM	9,00	W12
3850967	TDM0909UPM	9,09	W12
3849044	TDM0910UPM	9,10	W12
3850968	TDM0913UPM	9,13	W12
3849045	TDM0920UPM	9,20	W12
3849046	TDM0930UPM	9,30	W12
3850969	TDM0935UPM	9,35	W12

(continued)

(TOP DRILL M1 • UP(M) — continued)

P	M	K	N	S	H
●	○	●			

● first choice
○ alternate choice

grade WU25PD TiAlN

order #	catalogue #	D1	seat size/series
3849047	TDM0940UPM	9,40	W12
3849048	TDM0950UPM	9,50	W13
3850970	TDM0953UPM	9,53	W13
3850971	TDM0956UPM	9,56	W13
3850972	TDM0958UPM	9,58	W13
3849049	TDM0960UPM	9,60	W13
3850973	TDM0970UPM	9,70	W13
3850974	TDM0980UPM	9,80	W13
3849050	TDM0990UPM	9,90	W13
3850975	TDM0992UPM	9,92	W13
3849051	TDM1000UPM	10,00	W14
3850976	TDM1002UPM	10,02	W14
3850977	TDM1008UPM	10,08	W14
3849052	TDM1010UPM	10,10	W14
3849053	TDM1020UPM	10,20	W14
3850978	TDM1026UPM	10,26	W14
3849054	TDM1030UPM	10,30	W14
3850979	TDM1032UPM	10,32	W14
3849055	TDM1040UPM	10,40	W14
3850980	TDM1049UPM	10,49	W14
3849056	TDM1050UPM	10,50	W15
3849057	TDM1060UPM	10,60	W15
3849058	TDM1070UPM	10,70	W15
3850981	TDM1072UPM	10,72	W15
3849059	TDM1080UPM	10,80	W15
3849060	TDM1090UPM	10,90	W15
3849061	TDM1100UPM	11,00	W16
3849062	TDM1110UPM	11,10	W16
3850982	TDM1111UPM	11,11	W16
3849063	TDM1120UPM	11,20	W16
3849064	TDM1130UPM	11,30	W16
3849065	TDM1140UPM	11,40	W16
3849066	TDM1150UPM	11,50	W17
3850983	TDM1151UPM	11,51	W17
3849067	TDM1160UPM	11,60	W17
3850984	TDM1161UPM	11,61	W17
3849068	TDM1170UPM	11,70	W17
3849069	TDM1180UPM	11,80	W17
3849070	TDM1190UPM	11,90	W17
3850985	TDM1191UPM	11,91	W17

(continued)

WIDIA

(TOP DRILL M1 • UP(M) — continued)

P	●
M	○
K	●
N	
S	
H	

● first choice
○ alternate choice

grade WU25PD TiAlN			
order #	catalogue #	D1	seat size/series
3849071	TDM1200UPM	12,00	W18
3849072	TDM1210UPM	12,10	W18
3849073	TDM1220UPM	12,20	W18
3850986	TDM1230UPM	12,30	W18
3849074	TDM1240UPM	12,40	W18
3850987	TDM1247UPM	12,47	W18
3849075	TDM1250UPM	12,50	W19
3849076	TDM1260UPM	12,60	W19
3850988	TDM1270UPM	12,70	W19
3849077	TDM1280UPM	12,80	W19
3850989	TDM1290UPM	12,90	W19
3849078	TDM1300UPM	13,00	W20
3850990	TDM1310UPM	13,10	W20
3849079	TDM1320UPM	13,20	W20
3849080	TDM1330UPM	13,30	W20
3849081	TDM1340UPM	13,40	W20
3850991	TDM1349UPM	13,49	W20
3849082	TDM1350UPM	13,50	W21
3849083	TDM1360UPM	13,60	W21
3849084	TDM1370UPM	13,70	W21
3849085	TDM1380UPM	13,80	W21
3850992	TDM1389UPM	13,89	W21
3850993	TDM1390UPM	13,90	W21
3849086	TDM1400UPM	14,00	W22
3849087	TDM1410UPM	14,10	W22
3849088	TDM1420UPM	14,20	W22
3850994	TDM1429UPM	14,29	W22
3849089	TDM1430UPM	14,30	W22
3849090	TDM1440UPM	14,40	W22
3849091	TDM1450UPM	14,50	W23
3849092	TDM1460UPM	14,60	W23
3850995	TDM1467UPM	14,67	W23
3850996	TDM1468UPM	14,68	W23
3849093	TDM1470UPM	14,70	W23
3849094	TDM1480UPM	14,80	W23
3849095	TDM1490UPM	14,90	W23
3849096	TDM1500UPM	15,00	W24
3850997	TDM1508UPM	15,08	W24
3849097	TDM1510UPM	15,10	W24
3849098	TDM1520UPM	15,20	W24

(continued)

(TOP DRILL M1 • UP(M) — continued)

P	●
M	○
K	●
N	
S	
H	

● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1	seat size/series
3849099	TDM1530UPM	15,30	W24
3849100	TDM1540UPM	15,40	W24
3850998	TDM1548UPM	15,48	W24
3849101	TDM1550UPM	15,50	W24
3849102	TDM1560UPM	15,60	W24
3849103	TDM1570UPM	15,70	W24
3849104	TDM1580UPM	15,80	W24
3850999	TDM1588UPM	15,88	W24
3849105	TDM1600UPM	16,00	W25
3851000	TDM1603UPM	16,03	W25
3851001	TDM1608UPM	16,08	W25
3849106	TDM1610UPM	16,10	W25
4010625	TDM1618UPM	16,18	W25
3849107	TDM1620UPM	16,20	W25
3851002	TDM1627UPM	16,27	W25
3849108	TDM1630UPM	16,30	W25
3849109	TDM1640UPM	16,40	W25
3849110	TDM1650UPM	16,50	W25
3849111	TDM1660UPM	16,60	W25
3851003	TDM1667UPM	16,67	W25
3849112	TDM1670UPM	16,70	W25
3849113	TDM1680UPM	16,80	W25
3851004	TDM1687UPM	16,87	W25
3849114	TDM1690UPM	16,90	W25
3849119	TDM1700UPM	17,00	W26
3851005	TDM1707UPM	17,07	W26
3849120	TDM1710UPM	17,10	W26
3849121	TDM1720UPM	17,20	W26
3849122	TDM1730UPM	17,30	W26
3849193	TDM1740UPM	17,40	W26
3851006	TDM1746UPM	17,46	W26
3849194	TDM1750UPM	17,50	W26
3849195	TDM1760UPM	17,60	W26
3849196	TDM1770UPM	17,70	W26
3849197	TDM1780UPM	17,80	W26
3851007	TDM1786UPM	17,86	W26
3849198	TDM1790UPM	17,90	W26
3849199	TDM1800UPM	18,00	W27
3849200	TDM1810UPM	18,10	W27
3849201	TDM1820UPM	18,20	W27

(continued)

(TOP DRILL M1 • UP(M) — continued)

P	●
M	○
K	●
N	
S	
H	

● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1	seat size/series
3851008	TDM1826UPM	18,26	W27
3849202	TDM1830UPM	18,30	W27
3849203	TDM1840UPM	18,40	W27
3849204	TDM1850UPM	18,50	W27
3849205	TDM1860UPM	18,60	W27
3851009	TDM1865UPM	18,65	W27
3849206	TDM1870UPM	18,70	W27
3849207	TDM1880UPM	18,80	W27
3849208	TDM1890UPM	18,90	W27
3849209	TDM1900UPM	19,00	W28
3851010	TDM1905UPM	19,05	W28
3849210	TDM1910UPM	19,10	W28
3849211	TDM1920UPM	19,20	W28
3851011	TDM1923UPM	19,23	W28
3851012	TDM1925UPM	19,25	W28
3851013	TDM1928UPM	19,28	W28
3849212	TDM1930UPM	19,30	W28
3851014	TDM1935UPM	19,35	W28
3849213	TDM1940UPM	19,40	W28
3851015	TDM1945UPM	19,45	W28
3849214	TDM1950UPM	19,50	W28
3849215	TDM1960UPM	19,60	W28
3849216	TDM1970UPM	19,70	W28
3849217	TDM1980UPM	19,80	W28
3851016	TDM1984UPM	19,84	W28
3849218	TDM1990UPM	19,90	W28
3849219	TDM2000UPM	20,00	W29
3849220	TDM2010UPM	20,10	W29
3849221	TDM2020UPM	20,20	W29
3851017	TDM2024UPM	20,24	W29
3849222	TDM2030UPM	20,30	W29
3849223	TDM2040UPM	20,40	W29
3849224	TDM2050UPM	20,50	W29
3849225	TDM2060UPM	20,60	W29
3851018	TDM2064UPM	20,64	W29
3849226	TDM2070UPM	20,70	W29
3849227	TDM2080UPM	20,80	W29
3849228	TDM2090UPM	20,90	W29
3849229	TDM2099UPM	20,99	W29
4003225	TDM2100UPM	21,00	W30

(continued)

(TOP DRILL M1 • UP(M) — continued)

P	●
M	○
K	●
N	
S	
H	

● first choice
○ alternate choice

grade WU25PD TiAlN order #	catalogue #	D1	seat size/series
4003203	TDM2144UPM	21,44	W30
3969291	TDM2150UPM	21,50	W30
4003226	TDM2200UPM	22,00	W31
4003204	TDM2223UPM	22,23	W31
4003205	TDM2245UPM	22,45	W31
4003227	TDM2250UPM	22,50	W31
4003228	TDM2300UPM	23,00	W32
4003229	TDM2350UPM	23,50	W32
4003206	TDM2381UPM	23,81	W32
4003230	TDM2400UPM	24,00	W33
4003231	TDM2450UPM	24,50	W33
4003207	TDM2461UPM	24,61	W33
4003232	TDM2500UPM	25,00	W34
4003208	TDM2540UPM	25,40	W34
4002444	TDM2550UPM	25,50	W34
4003209	TDM2568UPM	25,68	W34
4003210	TDM2581UPM	25,81	W34
3992013	TDM2599UPM	25,99	W34

Metric

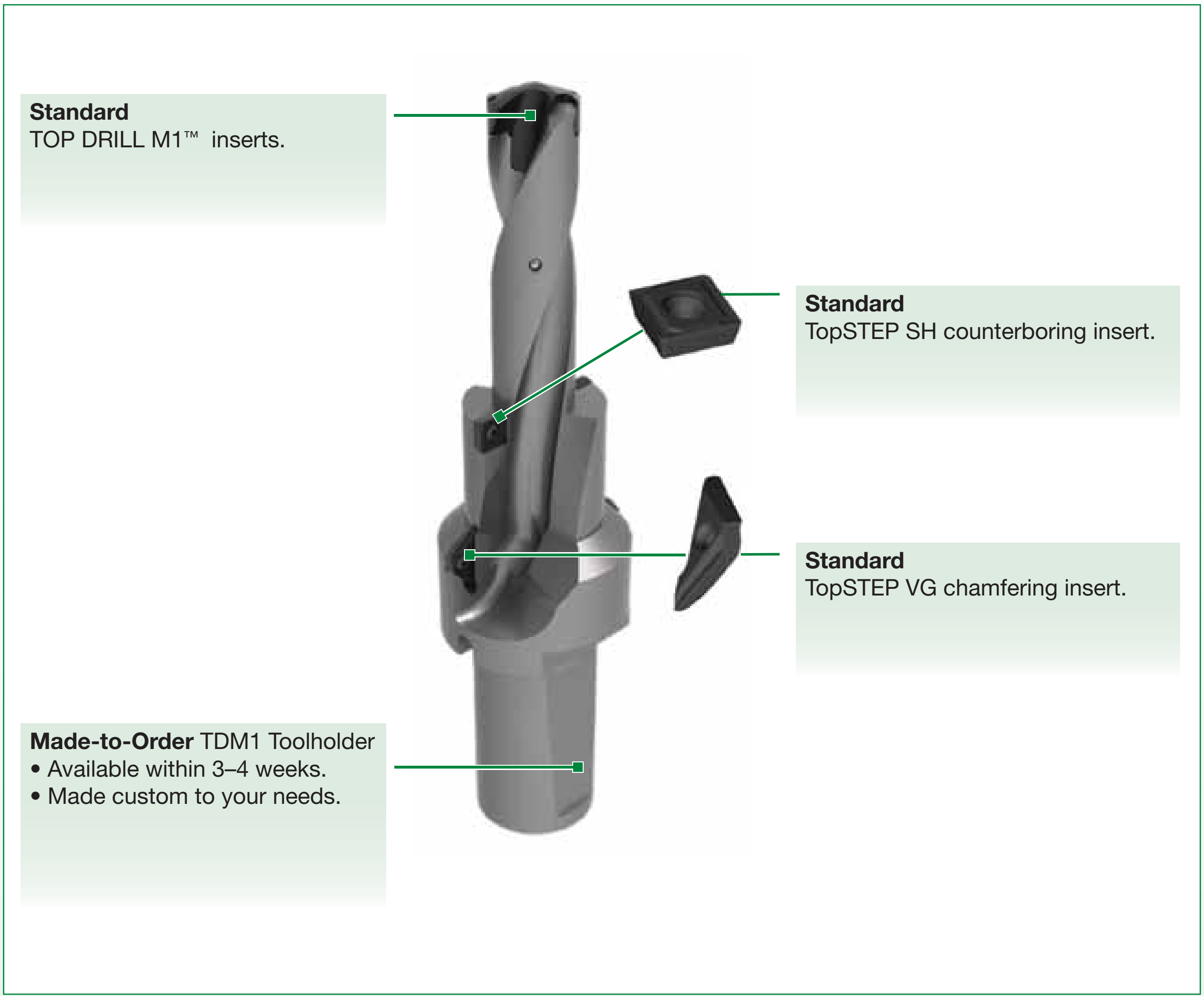
tolerance

D1	tolerance k8
8–10	0,000/+0,022
>10–17	0,000/+0,027
>17–18	0,000/+0,027
>18–21	0,000/+0,033

Modular TOP DRILL M1 Step Drill

Provides high productivity through high-feed, one-shot operations, and excellent tool life.

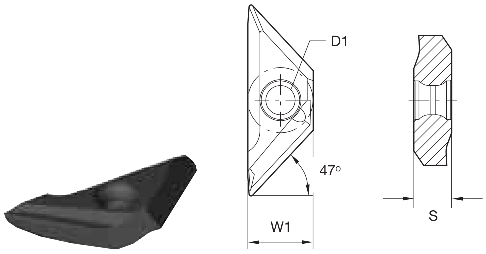
- Use TopSTEP VG and SH chamfer and counterboring inserts to create your specific TDM1 modular step drill.
- Create complex holes with countersinks, chamfers, or even both operations in one shot.
- Save time, achieve better cost, and run your complex drilling process with higher stability.



Let your WIDIA™ representative know about your specific needs. Use the Chamfer and Counterboring Order Planning pages to create and send us your request — available online as well.

TopSTEP VG Chamfering Inserts

- 45° chamfer angle with broad cutting edge.
- Hassle-free usage.
- Very stable and accurate positioning in pocket.
- Two times indexable.
- One universal insert size for a lot of applications.



● first choice
○ alternate choice

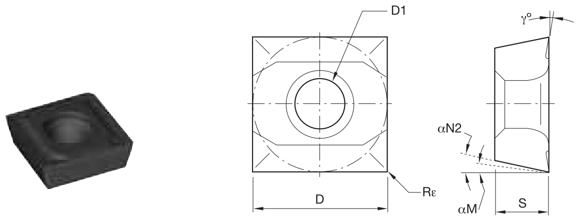
		WP20PH
P		●
M		○
K		●
N		○
S		○
H		

TopSTEP VG Chamfering Inserts

catalogue number	W1	D1	S	WP20PH
VXGX10030234	6,35	2,85	3,48	5983706

TopSTEP SH Conterboring Inserts

- 90° insert can be positioned in alternative angles.
- Very good chip forming and surface quality.
- Two times indexable.
- Stocked standards in six insert sizes.



● first choice
○ alternate choice

		WP20PH
P		●
M		○
K		○
N		
S		
H		

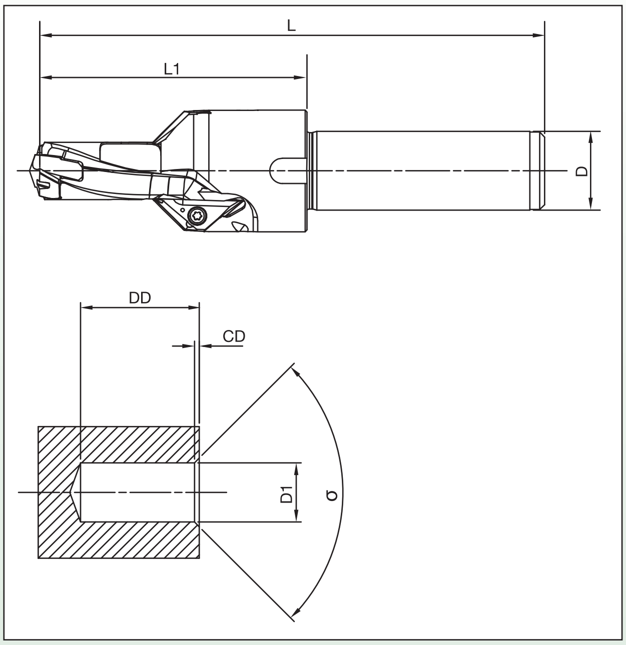
TopSTEP SH Counterboring Inserts

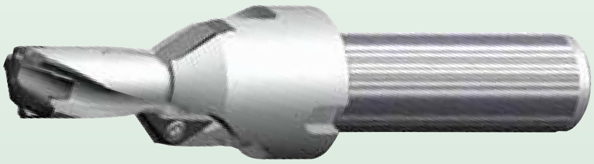
catalogue number	D	D1	S	Rε	αN	αN M	WP20PH
SXHX060204R20	6,35	2,85	2,38	0,40	11	7	5983390
SXHX070304R20	6,35	2,85	2,38	0,40	11	7	5983702
SXHX060208R20	6,35	2,85	2,38	0,80	11	7	5983701
SXHX070308R20	6,35	2,85	2,38	0,80	11	7	5983703
SXHX090304R20	9,52	3,50	3,18	0,40	11	7	5983704
SXHX090308R20	9,52	3,50	3,18	0,80	11	7	5983705

Please utilise guide below to plan your TOP DRILL M1™ modular step drill based on your needs and requirements. Please contact your distributor for a quote.

Option 1 TOP DRILL M1 Drilling and Chamfering

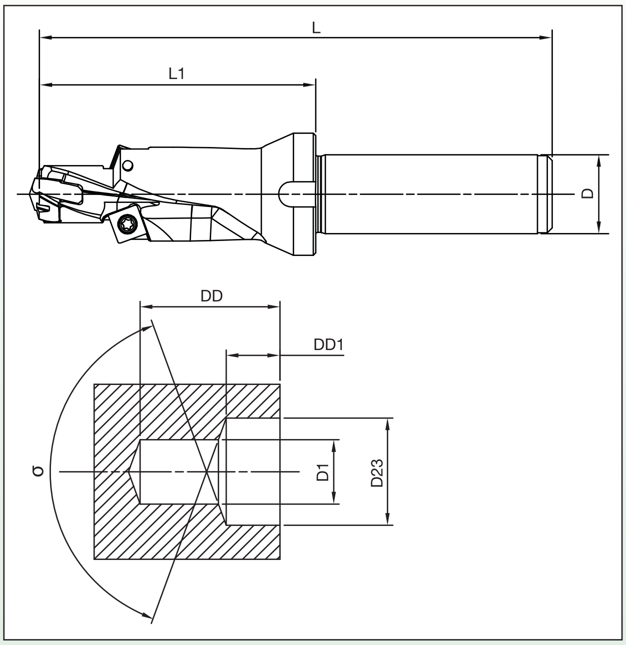
Overall Length	**[L]**	
Drill Length	**[L1]**	
Shank Diameter	**[D]**	
Drill Diameter Min	**[D1]**	
Drilling Depth	**[DD]**	
Cutting Diameter 2 Angle	**σ**	
Chamfering Depth	**[CD]**	

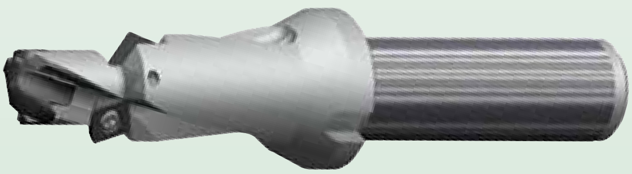




Option 2 TOP DRILL M1 Drilling and Countersinking

Overall Length	**[L]**	
Drill Length	**[L1]**	
Shank Diameter	**[D]**	
Drill Diameter Min	**[D1]**	
Drilling Depth	**[DD]**	
Cut Diameter 23	**[D23]**	
Countersinking Depth	**[DD1]**	
Cutting Diameter 2 Angle	**σ**	

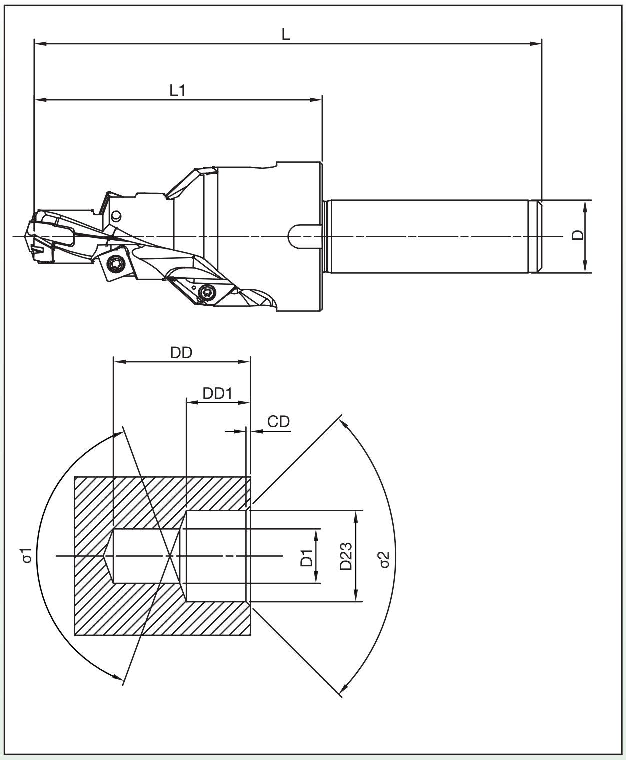


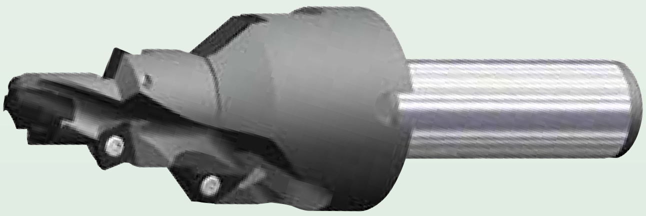


Please utilise guide below to plan your TOP DRILL M1™ modular step drill based on your needs and requirements. Please contact your distributor for a quote.

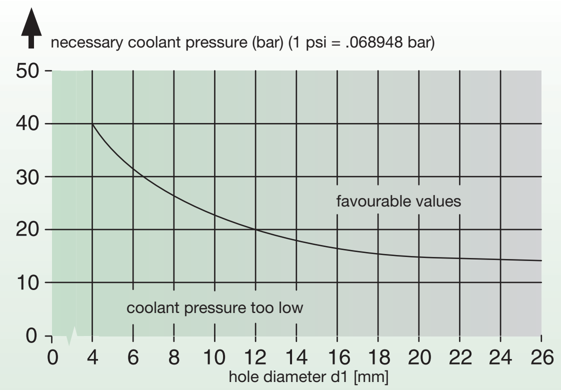
Option 3 TOP DRILL M1 Drilling and Countersinking and Chamfering

Overall Length	**[L]**	
Drill Length	**[L1]**	
Shank Diameter	**[D]**	
Drill Diameter Min	**[D1]**	
Drilling Depth	**[DD]**	
Cut Diameter 23	**[D23]**	
Countersinking Depth	**[DD1]**	
Cutting Diameter 2 Angle	**σ1**	
Cutting Diameter 3 Angle	**σ2**	
Chamfering depth	**[CD]**	





If a more complex tool is required, we need your individual information to serve your specific needs. Please contact your WIDIA™ distributor for further guidance.



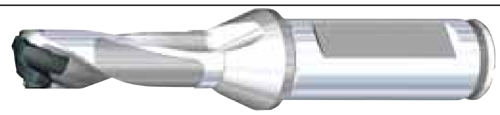
Coolant Pressure

The diagram at left shows the coolant pressure as a function of the hole diameter. The higher the coolant pressure, the better the drilling result. Tool life and hole quality improve with increased coolant flow.

Drilling on Inclined Surfaces

When drilling on inclined or curved surfaces, use a 50% lower feed than the standard value. After the drill margins are fully engaged in the workpiece, increase the feed to the standard value (100%). Premachining is required on surfaces with inclination greater than 3°.

TOP DRILL M1 • UP(M) • WU25PD™ • Speed and Feed Chart • Metric



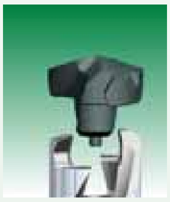
Material Group		Cutting Speed — vc Range — m/min min	Starting Value	max	Recommended Feed Rate Tool Diameter (mm)	8,0	10,0	12,0	14,0	16,0	20,0	25,0
P	1	90	**125**	170	mm/r	0,11–0,20	0,13–0,25	0,14–0,31	0,17–0,39	0,19–0,45	0,25–0,48	0,30–0,52
	2	105	**140**	180	mm/r	0,11–0,28	0,12–0,35	0,16–0,37	0,21–0,46	0,23–0,46	0,28–0,50	0,30–0,52
	3	50	**75**	100	mm/r	0,11–0,28	0,12–0,35	0,16–0,37	0,21–0,46	0,23–0,46	0,28–0,50	0,30–0,52
	4	50	**75**	100	mm/r	0,11–0,28	0,12–0,35	0,16–0,37	0,17–0,36	0,19–0,45	0,22–0,48	0,25–0,50
	5	50	**65**	80	mm/r	0,10–0,20	0,10–0,23	0,10–0,25	0,14–0,29	0,16–0,32	0,18–0,36	0,22–0,42
	6	50	**65**	80	mm/r	0,10–0,20	0,10–0,23	0,10–0,25	0,14–0,29	0,16–0,32	0,18–0,36	0,22–0,42
M	1	40	**80**	110	mm/r	0,06–0,22	0,08–0,23	0,09–0,24	0,10–0,25	0,11–0,26	0,13–0,28	0,13–0,32
	2	35	**55**	75	mm/r	0,06–0,22	0,08–0,23	0,09–0,24	0,10–0,25	0,11–0,26	0,13–0,28	0,13–0,32
	3	20	**35**	50	mm/r	0,06–0,22	0,08–0,23	0,09–0,24	0,10–0,25	0,11–0,26	0,13–0,28	0,13–0,32
K	1	60	**95**	170	mm/r	0,15–0,29	0,16–0,32	0,17–0,35	0,21–0,42	0,25–0,48	0,28–0,52	0,32–0,56
	2	60	**75**	90	mm/r	0,15–0,29	0,16–0,30	0,17–0,33	0,21–0,41	0,25–0,48	0,28–0,52	0,32–0,56
	3	40	**65**	90	mm/r	0,16–0,30	0,17–0,33	0,18–0,36	0,20–0,41	0,21–0,44	0,23–0,48	0,25–0,50

NOTE: Through coolant recommended for greater than 3 x D applications.

How to attach inserts

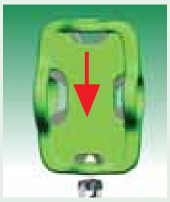
1) Fix drill holder on arbour. For insert exchange, fix arbour on the machine or set on tool presetter.

2) Remove dust using air blast.



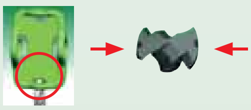
3) Put insert into drill holder. (Use gloves to protect your hands.)

4) Turn lightly in a clockwise direction. (Use gloves to protect your hands.)

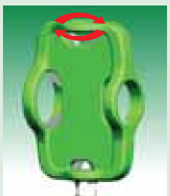


5) Set the wrench properly.*

6) Make sure the wrench fits with the insert slot for the wrench. (Is the wrench unfixed from the slot?)



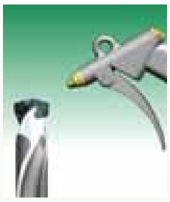
Slot for wrench



7) Slowly turn the wrench in a clockwise direction.

8) Complete.

How to detach inserts



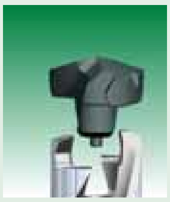
1) Remove dust from insert using air blast.

2) Set the wrench properly.*

3) Fit the wrench to insert slot.

4) Turn the wrench in an anti-clockwise direction.

5) Once lock is released, insert can be turned with fingers. (Use gloves to protect your hands.)



6) Remove insert. (Use gloves to protect your hands.)

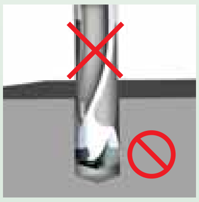
To order the TDM1 Wrench, please use order number 3861623 and catalogue number 170.315.

Cautions

Coolant

1) Internal coolant is recommended.

2) In case of external coolant, cutting depth must be 3 x D or less.

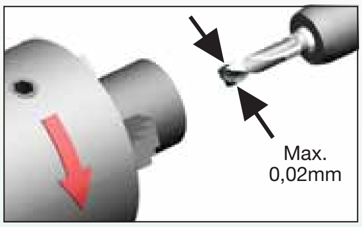


3) Dry cutting is not recommended. Limited applicability in cast iron materials, MQL strongly recommended.

Usage Precautions

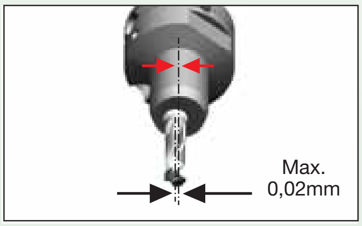
Core deviation

1) For Turning Machines

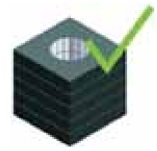


Set deviation amount under 0,02mm between workpiece and drill.

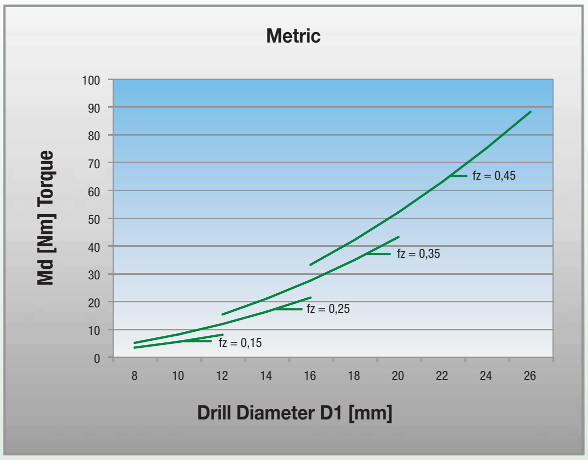
2) For Machining Centres



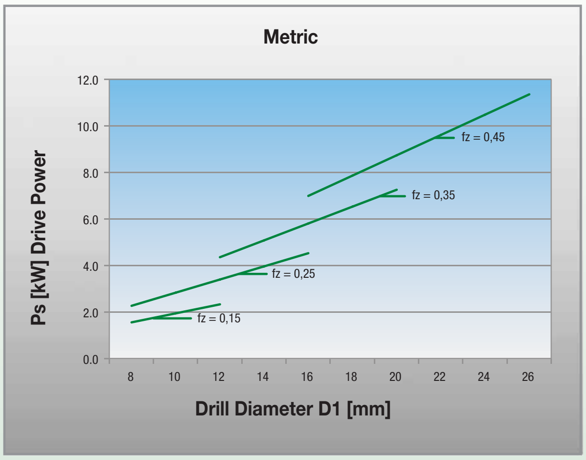
Do not use any arbour with a damaged attachment surface. Centre of arbour deviation must be within 0,02mm.

Application Recommendation	Workpiece Shape
Flat Face **Recommended**	
Stacked Plates **Recommended**	
Inclined Surface >3° **Not Recommended**	
Half Cylindrical **Not Recommended**	
Hole Expansion **Not Recommended**	
Concave Surface **Not Recommended**	
Pipe Material **Not Recommended**	
Cored Hole **Not Recommended**	

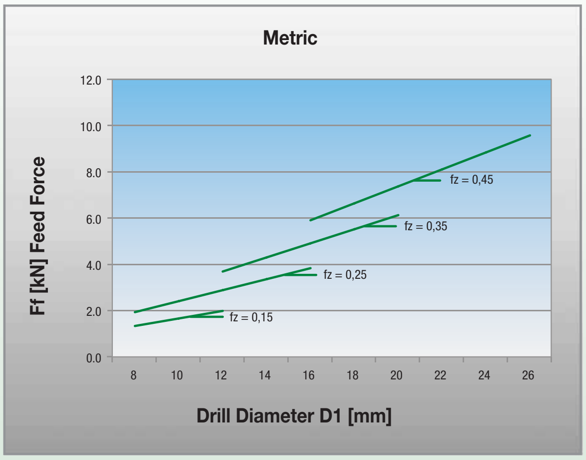
Torque



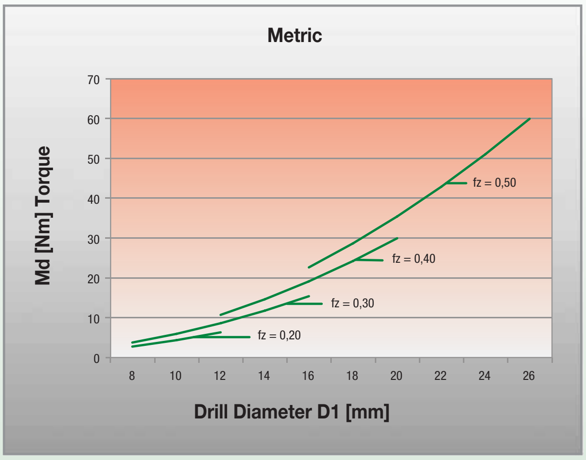
Power



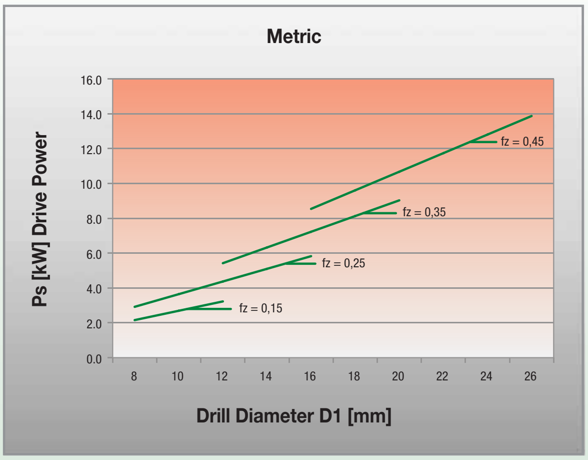
Feed Force



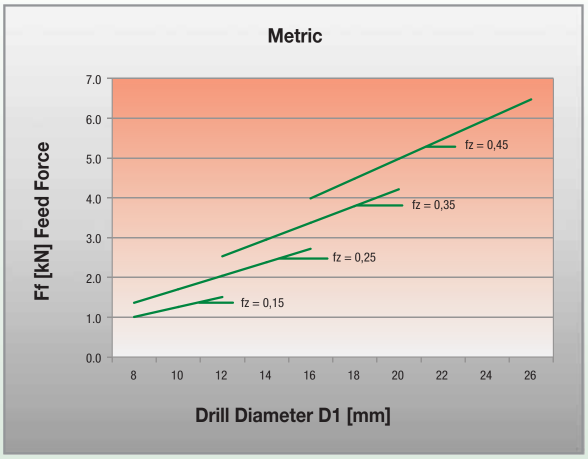
Torque



Power



Feed Force



Spade Blades

WIDIA™ provides a comprehensive line of spade blades from 8–114mm (.315–4.5") to cover a wide range of machining environments and materials.

- Fast penetration rates, less downtime, and lower variability.
- Interchangeable with other conventional spade blade holders.
- Improved surface finish — eliminates subsequent hole finishing operations.
- Standard and special drill body/holder offering, including step drill and porting tool configurations.
- Intermediate diameters and specific toolholder length quickly available upon request.

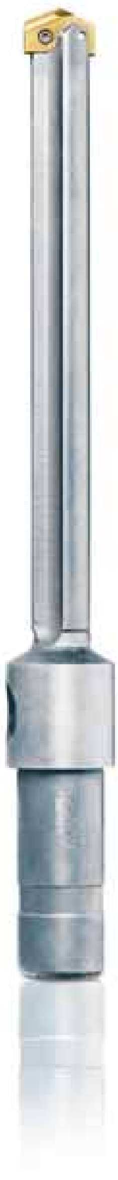
WIDIA-Metcut spade blades are great choices for:

- Universal application for most plain and alloyed steel applications as well as for cast iron and stainless steels.
- Machining environments where rigidity, coolant supply, or speed and feed rates are limiting factors.
- Short run manufacturing and prototyping environments.
- Especially when dealing with larger diameters and deeper holes.

Application Information

T-15 HSS spade blades are recommended:

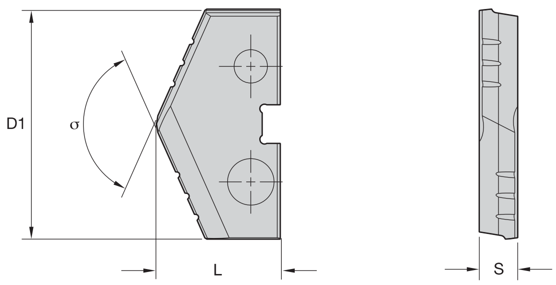
- For providing straighter and more consistent holes with superior surface finishes than can be produced using either HSS twist drills or carbide indexable drills.
- When rigidity of the machine or the fixture requires a more forgiving, durable, and tougher tool; T-15 steel possesses a higher transverse rupture strength and is more impact-resistant than comparable carbide spade blades and/or carbide indexable drills.
- In applications requiring hole depths up through 15x to 20x diameter; pecking may be required for depths above 7x diameter for some materials.
- As a cost-effective alternative to carbide indexable drills since T-15 steel spade blades operate at comparable penetration rates to single-effective indexable drills in materials <35 Rc, and one spade blade holder accommodates multiple diameter blades.



Spade Blade Holders

Generally can accommodate a range of blade sizes up to 1.30–1.35 times the smallest blade size. It is therefore possible to cover the entire range of hole sizes with just a few spade drill holders. Contrast this with the inventories required for indexable drills and steel taper shank drills.

TiAlN TiN



Seat Size Z

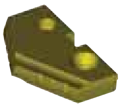
	TiAlN	TiN
P	●	●
M	●	
K	●	
N		○
S	○	
H		

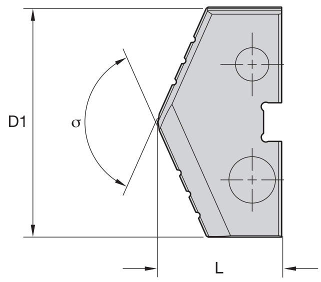
● first choice
○ alternate choice

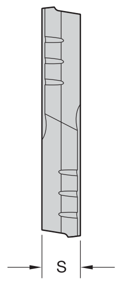
TiAlN order #	TiAlN catalogue #	TiN order #	TiN catalogue #	D1 mm	L mm	S mm	σ
2759621	**7FZ-0438A**	–		11,11	9,19	2,39	132°
2759599	**7FZ-0472A**	–		12,00	9,19	2,39	132°
2759592	**7FZ-0484A**	–		12,30	9,19	2,39	132°
2759588	**7FZ-0492A**	–		12,50	9,19	2,39	132°
2891175	**7FZ-0500A**	**2759581**	**7FZ-0500T**	12,70	9,19	2,39	132°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN


TiN





Seat Size 0

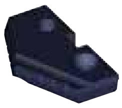
TiAlN	
P	●
M	●
K	●
N	
S	○
H	

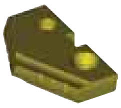
TiN	
P	●
M	
K	
N	○
S	
H	

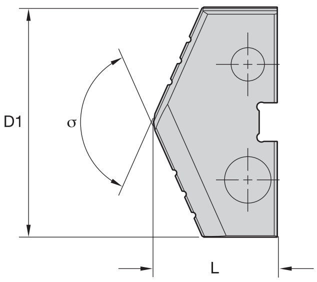
● first choice
○ alternate choice

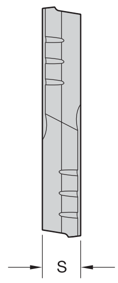
TiAlN order #	TiAlN catalogue #	TiN order #	TiN catalogue #	D1 mm	L mm	S mm	σ
2907270	7F0-0509A	–		12,93	10,80	3,18	132°
–		2760494	7F0-0512T	13,00	10,80	3,18	132°
2760492	7F0-0516A	–		13,10	10,80	3,18	132°
2760489	7F0-0531A	2760485	7F0-0531T	13,50	10,80	3,18	132°
2760481	7F0-0547A	2760478	7F0-0547T	13,89	10,80	3,18	132°
2760477	7F0-0551A	2760473	7F0-0551T	14,00	10,80	3,18	132°
2760472	7F0-0563A	2760466	7F0-0563T	14,29	10,80	3,18	132°
2760463	7F0-0571A	–		14,50	10,80	3,18	132°
2760460	7F0-0578A	2760458	7F0-0578T	14,68	10,80	3,18	132°
2760454	7F0-0591A	2760453	7F0-0591T	15,00	10,80	3,18	132°
2760452	7F0-0594A	2760449	7F0-0594T	15,08	10,80	3,18	132°
2760444	7F0-0609A	2760441	7F0-0609T	15,48	10,80	3,18	132°
2760440	7F0-0610A	–		15,50	10,80	3,18	132°
3053979	7F0-0625A	2760430	7F0-0625T	15,88	10,80	3,18	132°
2891178	7F0-0630A	2760424	7F0-0630T	16,00	10,80	3,18	132°
2760420	7F0-0641A	2760418	7F0-0641T	16,27	10,80	3,18	132°
–		2760415	7F0-0650T	16,50	10,80	3,18	132°
2760413	7F0-0656A	1988432	7F0-0656T	16,67	10,80	3,18	132°
2760404	7F0-0669A	–		17,00	10,80	3,18	132°
2760399	7F0-0672A	2760397	7F0-0672T	17,07	10,80	3,18	132°
2760393	7F0-0688A	2760390	7F0-0688T	17,46	10,80	3,18	132°
3083635	7F0-0689A	2760386	7F0-0689T	17,50	10,80	3,18	132°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN


TiN





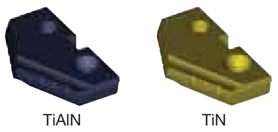
Seat Size 1

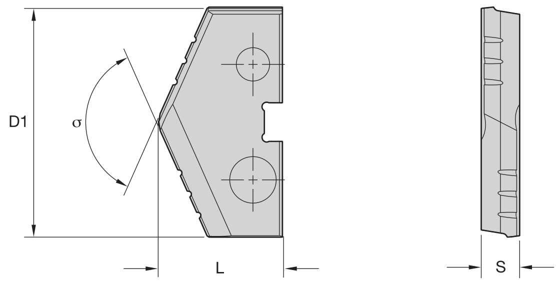
	TiAlN	TiN
P	●	●
M	●	
K	●	
N		○
S	○	
H		

● first choice
○ alternate choice

TiAlN order #	TiAlN catalogue #	TiN order #	TiN catalogue #	D1 mm	L mm	S mm	σ
2760383	7F1-0703A	2760381	7F1-0703T	17,86	13,84	3,96	132°
2760380	7F1-0709A	2760377	7F1-0709T	18,00	13,84	3,96	132°
–		2760371	7F1-0719T	18,26	13,84	3,96	132°
2760365	7F1-0734A	2760362	7F1-0734T	18,65	13,84	3,96	132°
2760361	7F1-0748A	2760359	7F1-0748T	19,00	13,84	3,96	132°
3114699	7F1-0750A	2387228	7F1-0750T	19,05	13,84	3,96	132°
–		2604191	7F1-0756T	19,20	13,84	3,96	132°
2760344	7F1-0766A	2760341	7F1-0766T	19,45	13,84	3,96	132°
–		2760338	7F1-0768T	19,50	13,84	3,96	132°
2760335	7F1-0781A	2760331	7F1-0781T	19,85	13,84	3,96	132°
2760330	7F1-0787A	2760328	7F1-0787T	20,00	13,84	3,96	132°
–		2760323	7F1-0797T	20,24	13,84	3,96	132°
2255810	7F1-0806A	–		20,47	13,84	3,96	132°
2760319	7F1-0807A	2760316	7F1-0807T	20,50	13,84	3,96	132°
2760315	7F1-0813A	2760310	7F1-0813T	20,64	13,84	3,96	132°
2760305	7F1-0827A	2760303	7F1-0827T	21,00	13,84	3,96	132°
2760302	7F1-0828A	2760300	7F1-0828T	21,03	13,84	3,96	132°
–		2760296	7F1-0844T	21,43	13,84	3,96	132°
2760292	7F1-0859A	2760290	7F1-0859T	21,83	13,84	3,96	132°
2940716	7F1-0866A	2760287	7F1-0866T	22,00	13,84	3,96	132°
1926120	7F1-0875A	2760282	7F1-0875T	22,23	13,84	3,96	132°
2760280	7F1-0891A	2760278	7F1-0891T	22,62	13,84	3,96	132°
2760276	7F1-0906A	2760273	7F1-0906T	23,02	13,84	3,96	132°
3099442	7F1-0922A	2760268	7F1-0922T	23,42	13,84	3,96	132°
2760265	7F1-0938A	2760262	7F1-0938T	23,81	13,84	3,96	132°
2891181	7F1-0945A	2760257	7F1-0945T	24,00	13,84	3,96	132°
2760256	7F1-0953A	2760253	7F1-0953T	24,21	13,84	3,96	132°
–		3339713	7F1-0960T	24,38	13,84	3,96	132°

NOTE: Toolholders available upon request as an Engineered Solution.





Seat Size 2

TiAlN		TiN					
P ● M ● K ● N S ○ H		P ● M K N ○ S H				● first choice ○ alternate choice	
				D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
–		2760247	7F2-0969T	24,61	16,13	4,76	132°
2760243	7F2-0984A	2760240	7F2-0984T	25,00	16,13	4,76	132°
2760239	7F2-1000A	2760235	7F2-1000T	25,40	16,13	4,76	132°
2760234	7F2-1003A	–		25,48	16,13	4,76	132°
3088200	7F2-1016A	2760226	7F2-1016T	25,80	16,13	4,76	132°
3096208	7F2-1024A	2760223	7F2-1024T	26,00	16,13	4,76	132°
2760222	7F2-1031A	2760219	7F2-1031T	26,20	16,13	4,76	132°
2760216	7F2-1047A	2760214	7F2-1047T	26,59	16,13	4,76	132°
3096207	7F2-1063A	2760207	7F2-1063T	26,99	16,13	4,76	132°
2261849	7F2-1078A	2760203	7F2-1078T	27,61	16,13	4,76	132°
2760199	7F2-1094A	2760196	7F2-1094T	27,78	16,13	4,76	132°
2760195	7F2-1102A	2760194	7F2-1102T	28,00	16,13	4,76	132°
–		2760189	7F2-1109T	28,17	16,13	4,76	132°
2760188	7F2-1125A	2760184	7F2-1125T	28,58	16,13	4,76	132°
3024915	7F2-1141A	–		28,97	16,13	4,76	132°
2760181	7F2-1142A	–		29,00	16,13	4,76	132°
3088746	7F2-1156A	2760174	7F2-1156T	29,37	16,13	4,76	132°
–		2760169	7F2-1172T	29,77	16,13	4,76	132°
2760167	7F2-1181A	2760164	7F2-1181T	30,00	16,13	4,76	132°
2760162	7F2-1188A	2760159	7F2-1188T	30,16	16,13	4,76	132°
–		2760152	7F2-1203T	30,56	16,13	4,76	132°
2760150	7F2-1219A	2760148	7F2-1219T	30,96	16,13	4,76	132°
2760147	7F2-1221A	–		31,00	16,13	4,76	132°
2907272	7F2-1231A	–		31,27	16,13	4,76	132°
–		2760141	7F2-1234T	31,35	16,13	4,76	132°
2760137	7F2-1250A	2760134	7F2-1250T	31,75	16,13	4,76	132°
–		2895976	7F2-1254T	31,85	16,13	4,76	132°
2760131	7F2-1260A	2760128	7F2-1260T	32,00	16,13	4,76	132°
3032539	7F2-1266A	2967699	7F2-1266T	32,15	16,13	4,76	132°
–		2760121	7F2-1281T	32,55	16,13	4,76	132°
2760118	7F2-1299A	–		33,00	16,13	4,76	132°
2760112	7F2-1313A	2760109	7F2-1313T	33,34	16,13	4,76	132°

NOTE: Toolholders available upon request as an Engineered Solution.

(continued)

(Seat Size 2 — continued)

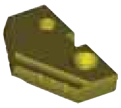
	TiAlN	TiN
P	●	●
M	●	
K	●	
N		○
S	○	
H		

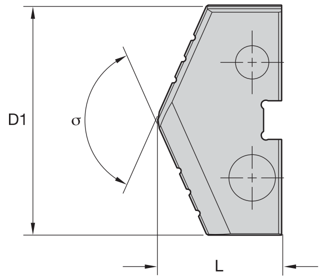
● first choice
○ alternate choice

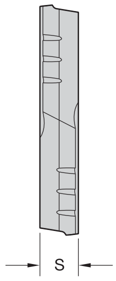
TiAlN order #	TiAlN catalogue #	TiN order #	TiN catalogue #	D1 mm	L mm	S mm	σ
—		**2760106**	**7F2-1328T**	33,73	16,13	4,76	132°
2760105	**7F2-1339A**	—		34,00	16,13	4,76	132°
2760101	**7F2-1344A**	**2760098**	**7F2-1344T**	34,13	16,13	4,76	132°
—		**2760094**	**7F2-1359T**	34,53	16,13	4,76	132°
1926121	**7F2-1375A**	**2760090**	**7F2-1375T**	34,93	16,13	4,76	132°
2760089	**7F2-1378A**	—		35,00	16,13	4,76	132°
2759880	**7F4-2166A**	—		55,02	23,62	7,94	132°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN


TiN





Seat Size 3

TiAlN:

P	●
M	●
K	●
N	
S	○
H	

TiN:

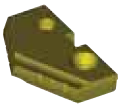
P	●
M	
K	
N	○
S	
H	

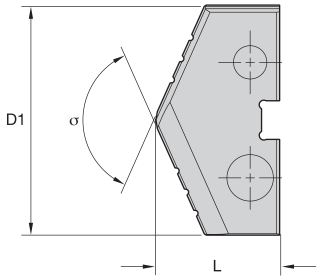
● first choice
○ alternate choice

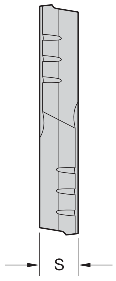
TiAlN order #	TiAlN catalogue #	TiN order #	TiN catalogue #	D1 mm	L mm	S mm	σ
–		2760079	7F3-1391T	35,32	20,45	6,35	132°
2760078	7F3-1406A	2760076	7F3-1406T	35,72	20,45	6,35	132°
2760072	7F3-1417A	2760069	7F3-1417T	36,00	20,45	6,35	132°
2760066	7F3-1438A	2760063	7F3-1438T	36,51	20,45	6,35	132°
2760060	7F3-1457A	2760059	7F3-1457T	37,00	20,45	6,35	132°
2760058	7F3-1469A	2760056	7F3-1469T	37,31	20,45	6,35	132°
–		2760053	7F3-1484T	37,70	20,45	6,35	132°
2760051	7F3-1496A	–		38,00	20,45	6,35	132°
2760048	7F3-1500A	2760045	7F3-1500T	38,10	20,45	6,35	132°
–		2760038	7F3-1516T	38,50	20,45	6,35	132°
–		2760035	7F3-1531T	38,90	20,45	6,35	132°
2760034	7F3-1535A	–		39,00	20,45	6,35	132°
2760027	7F3-1563A	2760024	7F3-1563T	39,69	20,45	6,35	132°
2760023	7F3-1575A	2760021	7F3-1575T	40,00	20,45	6,35	132°
–		2760015	7F3-1594T	40,48	20,45	6,35	132°
2760011	7F3-1614A	–		41,00	20,45	6,35	132°
2760008	7F3-1625A	2760004	7F3-1625T	41,28	20,45	6,35	132°
2760001	7F3-1654A	–		42,00	20,45	6,35	132°
–		2759996	7F3-1656T	42,07	20,45	6,35	132°
2759993	7F3-1688A	2759991	7F3-1688T	42,86	20,45	6,35	132°
–		2759989	7F3-1693T	43,00	20,45	6,35	132°
2759987	7F3-1719A	2759985	7F3-1719T	43,66	20,45	6,35	132°
2759984	7F3-1732A	–		44,00	20,45	6,35	132°
2759977	7F3-1750A	2759974	7F3-1750T	44,45	20,45	6,35	132°
–		2759970	7F3-1766T	44,85	20,45	6,35	132°
2759969	7F3-1772A	2759967	7F3-1772T	45,00	20,45	6,35	132°
–		2759963	7F3-1781T	45,25	20,45	6,35	132°
2759960	7F3-1811A	–		46,00	20,45	6,35	132°
2759958	7F3-1813A	2759956	7F3-1813T	46,04	20,45	6,35	132°
–		2759951	7F3-1844T	46,83	20,45	6,35	132°
–		2759949	7F3-1850T	47,00	20,45	6,35	132°
2759945	7F3-1875A	2759942	7F3-1875T	47,63	20,45	6,35	132°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN


TiN





Seat Size 4

	TiAlN	TiN
P	●	●
M	●	
K	●	
N		○
S	○	
H		

● first choice
○ alternate choice

TiAlN order #	TiAlN catalogue #	TiN order #	TiN catalogue #	D1 mm	L mm	S mm	σ
–		2759937	7F4-1880T	47,75	23,62	7,95	132°
2759936	7F4-1890A	2759935	7F4-1890T	48,00	23,62	7,95	132°
2759934	7F4-1906A	2759932	7F4-1906T	48,42	23,62	7,95	132°
2759930	7F4-1929A	–		49,00	23,62	7,95	132°
2759927	7F4-1938A	2759925	7F4-1938T	49,21	23,62	7,95	132°
2759921	7F4-1969A	2759919	7F4-1969T	50,00	23,62	7,95	132°
2759916	7F4-2000A	2759913	7F4-2000T	50,80	23,62	7,95	132°
–		2759911	7F4-2008T	51,00	23,62	7,95	132°
–		2952747	7F4-2016T	51,20	23,62	7,95	132°
2759904	7F4-2031A	2759902	7F4-2031T	51,60	23,62	7,95	132°
2759901	7F4-2047A	2759900	7F4-2047T	52,00	23,62	7,95	132°
2759899	7F4-2063A	2759896	7F4-2063T	52,39	23,62	7,95	132°
2895971	7F4-2087A	–		53,00	23,62	7,95	132°
–		2759892	7F4-2094T	53,18	23,62	7,95	132°
2759891	7F4-2125A	2759888	7F4-2125T	53,98	23,62	7,95	132°
2759887	7F4-2126A	–		54,00	23,62	7,95	132°
–		2759882	7F4-2156T	54,77	23,62	7,95	132°
2759880	7F4-2166A	–		55,02	23,62	7,94	132°
–		2759876	7F4-2188T	55,56	23,62	7,95	132°
2759874	7F4-2205A	–		56,00	23,62	7,95	132°
2759872	7F4-2219A	2759870	7F4-2219T	56,36	23,62	7,95	132°
2759868	7F4-2244A	–		57,00	23,62	7,95	132°
2759865	7F4-2250A	2759862	7F4-2250T	57,15	23,62	7,95	132°
–		2759858	7F4-2281T	57,95	23,62	7,95	132°
2759857	7F4-2284A	–		58,00	23,62	7,95	132°
2759854	7F4-2313A	2759852	7F4-2313T	58,74	23,62	7,95	132°
2759851	7F4-2323A	–		59,00	23,62	7,95	132°
–		2759848	7F4-2344T	59,53	23,62	7,95	132°

NOTE: Toolholders available upon request as an Engineered Solution.

(continued)

(Seat Size 4 — continued)

TiAlN: P ●, M ●, K ●, N, S ○, H		TiN: P ●, M, K, N ○, S, H		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
–		2759845	7F4-2362T	60,00	23,62	7,95	132°
2759843	7F4-2375A	2759840	7F4-2375T	60,33	23,62	7,95	132°
2759833	7F4-2438A	2759831	7F4-2438T	61,91	23,62	7,95	132°
2759830	7F4-2441A	–		62,00	23,62	7,95	132°
2759828	7F4-2469A	–		62,71	23,62	7,95	132°
–		2759823	7F4-2480T	63,00	23,62	7,95	132°
2759822	7F4-2500A	2759820	7F4-2500T	63,50	23,62	7,95	132°
–		2759816	7F4-2531T	64,30	23,62	7,95	132°
3027222	7F4-2559A	–		65,00	23,62	7,95	132°
2759813	7F4-2563A	2759811	7F4-2563T	65,09	23,62	7,95	132°

● first choice
○ alternate choice

NOTE: Toolholders available upon request as an Engineered Solution.

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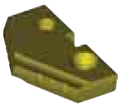
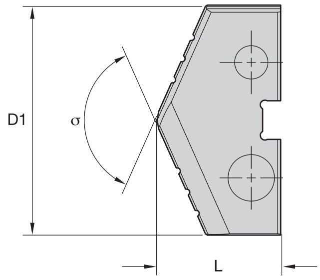
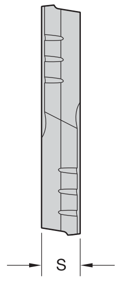






Seat Size 5

TiAlN	
P	●
M	●
K	●
N	
S	○
H	

TiN	
P	●
M	
K	
N	○
S	
H	

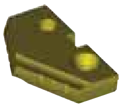
● first choice
○ alternate choice

TiAlN order #	TiAlN catalogue #	TiN order #	TiN catalogue #	D1 mm	L mm	S mm	σ
–		2759808	7F5-2500T	63,50	31,50	11,11	144°
2759802	7F5-2563A	2759801	7F5-2563T	65,09	31,50	11,11	144°
–		2759791	7F5-2625T	66,68	31,50	11,11	144°
–		2759789	7F5-2656T	67,47	31,50	11,11	144°
2759788	7F5-2677A	–		68,00	31,50	11,11	144°
–		2759781	7F5-2719T	69,06	31,50	11,11	144°
2759780	7F5-2750A	2759778	7F5-2750T	69,85	31,50	11,11	144°
2961641	7F5-2756A	–		70,00	31,50	11,11	144°
2759773	7F5-2813A	–		71,44	31,50	11,11	144°
2759766	7F5-2875A	2759764	7F5-2875T	73,03	31,50	11,11	144°
–		2759756	7F5-2938T	74,61	31,50	11,11	144°
2759755	7F5-2969A	2759753	7F5-2969T	75,41	31,50	11,11	144°
2759751	7F5-3000A	2759748	7F5-3000T	76,20	31,50	11,11	144°

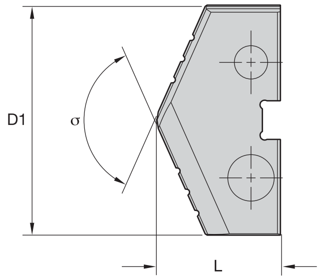
NOTE: Toolholders available upon request as an Engineered Solution.

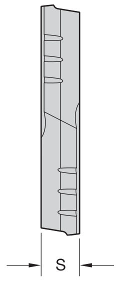
Modular Drills

TiAlN



TiN





Seat Size 6

	TiAlN	TiN
P	●	●
M	●	
K	●	
N		○
S	○	
H		

● first choice
○ alternate choice

TiAlN order #	TiAlN catalogue #	TiN order #	TiN catalogue #	D1 mm	L mm	S mm	σ
2759745	7F6-3063A	2759743	7F6-3063T	77,79	31,50	11,11	144°
2759742	7F6-3071A	–		78,00	31,50	11,11	144°
2759739	7F6-3125A	–		79,38	31,50	11,11	144°
2759736	7F6-3150A	–		80,00	31,50	11,11	144°
–		2759731	7F6-3188T	80,96	31,50	11,11	144°
–		2759726	7F6-3250T	82,55	31,50	11,11	144°
–		2759718	7F6-3375T	85,73	31,50	11,13	144°
–		2759715	7F6-3438T	87,31	31,50	11,13	144°
–		2759709	7F6-3500T	88,90	31,50	11,13	144°

NOTE: Toolholders available upon request as an Engineered Solution.

Seat Size 7

	TiAlN	TiN
P	●	●
M	●	
K	●	
N		○
S	○	
H		

● first choice
○ alternate choice

TiAlN order #	TiAlN catalogue #	TiN order #	TiN catalogue #	D1 mm	L mm	S mm	σ
–		3279755	7F7-3543T	90,00	31,50	11,13	144°
–		2759703	7F7-3563T	90,49	31,50	11,13	144°
–		2759698	7F7-3688T	93,66	31,50	11,13	144°
–		2759688	7F7-3938T	96,00	31,50	11,13	144°
2972689	7F7-3813A	–		96,84	31,50	11,13	144°
2759684	7F7-4000A	–		101,60	31,50	11,13	144°

NOTE: Toolholders available upon request as an Engineered Solution.

HSS Spade Blades • Speed and Feed Chart • Metric

			Grade		Feed (mm/rev)							
Material Group		Hardness BHN	TiN	TiAlN	Y & Z (9.5–12.7)	0 (13–17.5)	1 (17.86–24)	2 (24.61–35)	3 (35.72–47.63)	4 (48–65.09)	5 (63.5–76.2)	6–7–8 (76.99–114.3)
P	0	85–125	55	–	0,18	0,23	0,30	0,38	0,48	0,58	0,64	0,69
		125–175	50	–	0,15	0,23	0,30	0,38	0,48	0,58	0,61	0,66
		175–225	45	–	0,13	0,20	0,25	0,36	0,46	0,53	0,58	0,64
		225–275	45	–	0,13	0,20	0,25	0,36	0,46	0,53	0,58	0,64
	1	100–150	60	–	0,20	0,28	0,36	0,43	0,53	0,64	0,66	0,71
		150–200	55	–	0,18	0,25	0,33	0,41	0,51	0,58	0,61	0,66
		200–250	50	–	0,15	0,25	0,33	0,41	0,51	0,58	0,61	0,66
	2	125–175	50	–	0,15	0,23	0,30	0,38	0,48	0,58	0,64	0,69
		175–225	45	–	0,13	0,20	0,25	0,36	0,46	0,53	0,58	0,64
		225–275	45	65	0,13	0,20	0,25	0,36	0,46	0,53	0,56	0,61
		275–325	40	60	0,10	0,18	0,23	0,30	0,41	0,48	0,53	0,58
	3	125–175	45	–	0,18	0,23	0,28	0,36	0,46	0,53	0,58	0,64
		175–225	45	–	0,15	0,20	0,25	0,36	0,43	0,48	0,53	0,58
		225–275	40	55	0,13	0,18	0,25	0,33	0,43	0,48	0,51	0,53
		275–325	35	50	0,10	0,15	0,23	0,30	0,38	0,43	0,46	0,48
		325–375	35	50	0,08	0,15	0,23	0,30	0,38	0,43	0,46	0,48
	4	225–300	25	35	0,13	0,18	0,23	0,25	0,36	0,41	0,46	0,51
		300–350	20	30	0,10	0,18	0,23	0,25	0,36	0,41	0,46	0,51
		350–400	15	25	0,08	0,15	0,20	0,23	0,30	0,36	0,41	0,46
	5	100–150	45	–	0,15	0,25	0,30	0,36	0,46	0,53	0,56	0,61
		150–250	40	60	0,13	0,23	0,25	0,30	0,41	0,48	0,51	0,56
		250–350	30	50	0,10	0,20	0,23	0,25	0,36	0,43	0,46	0,51
	6	150–200	25	–	0,13	0,15	0,20	0,25	0,30	0,38	0,41	0,43
		200–250	20	–	0,10	0,15	0,20	0,25	0,30	0,38	0,41	0,43
		250–300	15	20	0,10	0,13	0,18	0,20	0,25	0,33	0,36	0,38
		300–350	–	15	0,08	0,10	0,15	0,18	0,23	0,30	0,33	0,36
M	1	135–185	25	35	0,15	0,20	0,23	0,28	0,36	0,41	0,46	0,51
		185–275	30	30	0,13	0,18	0,20	0,25	0,30	0,36	0,41	0,46
		275–350	–	25	0,13	0,15	0,18	0,23	0,28	0,33	0,38	0,43
K	1,2	120–150	55	80	0,20	0,30	0,41	0,51	0,61	0,69	0,74	0,79
		150–200	45	75	0,18	0,28	0,36	0,46	0,56	0,64	0,69	0,74
		200–220	40	65	0,15	0,23	0,30	0,41	0,46	0,53	0,58	0,64
		220–260	35	55	0,13	0,18	0,23	0,30	0,36	0,43	0,48	0,53
		260–320	30	45	0,10	0,15	0,18	0,23	0,30	0,36	0,41	0,46
N	1	–	180	–	0,18	0,30	0,38	0,48	0,53	0,61	0,64	0,66
		–	90	–	0,20	0,33	0,41	0,51	0,56	0,64	0,66	0,69
S	1	140–210	–	15	0,13	0,18	0,20	0,25	0,30	0,38	0,41	0,43
		210–280	–	10	0,10	0,15	0,18	0,20	0,25	0,30	0,33	0,36
		280–340	–	10	0,10	0,13	0,15	0,18	0,23	0,28	0,30	0,33

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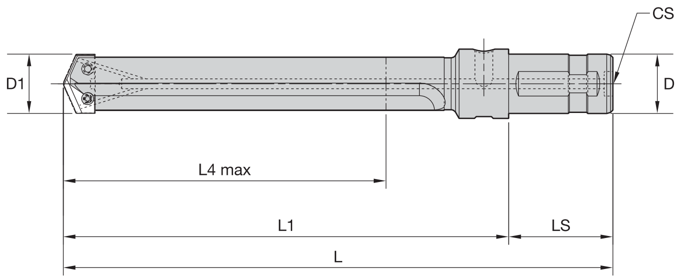
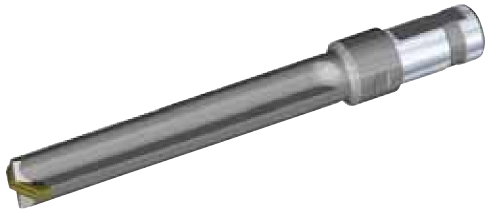




Straight Flute Holders • Inch • Short

short	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
7SZSS	11,10	.437	12,90	.508	5.75	3.37	1.09	2.38	.750	Z	1/8 - 27 NPT	**56-1015**	**56-2026**
7S0SS	12,93	.509	17,65	.695	6.35	3.97	1.85	2.38	.750	0	1/8 - 27 NPT	**56-1014**	**56-2017**
7S0.5SS	15,47	.609	17,65	.695	6.35	3.97	1.76	2.38	.750	–	1/8 - 27 NPT	**56-1014**	**56-2017**
7S1SS	17,53	.690	24,38	.960	7.23	4.85	2.25	2.38	1.000	1	1/4 - 18 NPT	**56-1020**	**56-2028**
7S1.5SS	21,82	.859	24,38	.960	7.23	4.85	2.17	2.38	1.000	1.5	1/4 - 18 NPT	**56-1020**	**56-2028**
7S2SS	24,41	.961	35,05	1.380	8.00	5.56	2.77	2.44	1.250	2	1/4 - 18 NPT	**56-1018**	**56-2015**
7S2.5SS	30,15	1.187	35,05	1.380	8.00	5.56	3.59	2.44	1.250	2.5	1/4 - 18 NPT	**56-1018**	**56-2015**
7S3SS	35,08	1.381	47,73	1.879	9.88	7.25	3.76	2.63	1.500	3	1/4 - 18 NPT	**56-1585**	**56-2020**
7S4SS	47,75	1.880	65,28	2.570	11.38	8.75	6.21	2.63	1.500	4	1/4 - 18 NPT	**56-1585**	**56-2020**
7S5SS	63,50	2.500	88,90	3.500	12.50	9.25	5.36	3.25	2.000	5	1/4 - 18 NPT	**56-1025**	**56-2125**

Straight Flute Holders • Inch • Medium

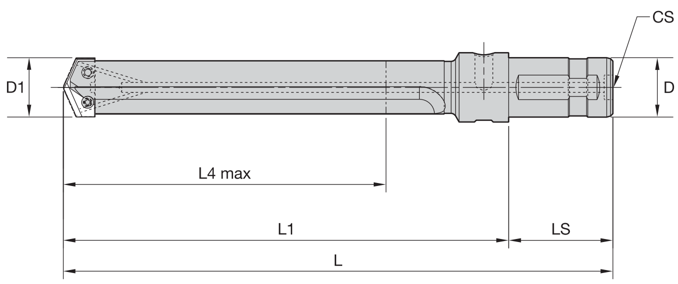
medium	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
7SZSM	11,10	.437	12,90	.508	6.76	4.38	2.08	2.38	.750	Z	1/8 - 27 NPT	**56-1015**	**56-2026**
7S0SM	12,93	.509	17,65	.695	7.71	5.33	2.93	2.38	.750	0	1/8 - 27 NPT	**56-1014**	**56-2017**
7S0.5SM	15,47	.609	17,65	.695	7.71	5.33	2.90	2.38	.750	–	1/8 - 27 NPT	**56-1014**	**56-2017**
7S1SM	17,53	.690	24,38	.960	9.18	6.80	4.20	2.38	1.000	1	1/4 - 18 NPT	**56-1020**	**56-2028**
7S1.5SM	21,82	.859	24,38	.960	9.18	6.80	4.12	2.38	1.000	1.5	1/4 - 18 NPT	**56-1020**	**56-2028**
7S2SM	24,41	.961	35,05	1.380	10.38	7.94	5.15	2.44	1.250	2	1/4 - 18 NPT	**56-1018**	**56-2015**
7S2.5SM	30,15	1.187	35,05	1.380	10.38	7.94	5.03	2.44	1.250	2.5	1/4 - 18 NPT	**56-1020**	**56-2028**
7S3SM	35,08	1.381	47,73	1.879	13.88	11.25	7.89	2.63	1.500	3	1/4 - 18 NPT	**56-1585**	**56-2020**
7S4SM	47,75	1.880	65,28	2.570	15.38	12.75	9.57	2.63	1.500	4	1/4 - 18 NPT	**56-1585**	**56-2020**
7S5SM	63,50	2.500	88,90	3.500	18.25	15.00	11.38	3.25	2.000	5	1/4 - 18 NPT	**56-1025**	**56-2125**
7S7SM	88,93	3.501	114,30	4.500	21.25	14.62	11.50	6.63	3.000	7	1/4 - 18 NPT	**56-1025**	**56-2125**

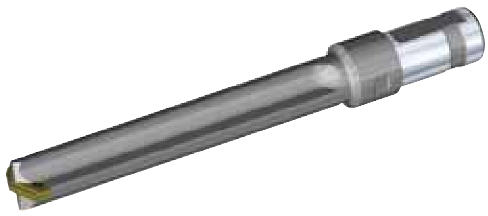
Straight Flute Holders • Inch • Long

long	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
7SZSL	11,10	.437	12,90	.508	7.76	5.38	3.10	2.38	.750	Z	1/8 - 27 NPT	**56-1015**	**56-2026**
7S0SL	12,93	.509	17,65	.695	9.13	6.75	4.60	2.38	.750	0	1/8 - 27 NPT	**56-1014**	**56-2017**
7S0.5SL	15,47	.609	17,65	.695	9.13	6.75	7.36	2.38	.750	—	1/8 - 27 NPT	**56-1014**	**56-2017**
7S1SL	17,53	.690	24,38	.960	11.10	8.72	6.34	2.38	1.000	1	1/4 - 18 NPT	**56-1020**	**56-2028**
7S2SL	24,41	.961	35,05	1.380	12.75	10.31	7.86	2.44	1.250	2	1/4 - 18 NPT	**56-1018**	**56-2015**
7S3SL	35,08	1.381	47,73	1.879	18.63	16.00	13.28	2.63	1.500	3	1/4 - 18 NPT	**56-1585**	**56-2020**
7S4SL	47,75	1.880	65,28	2.570	21.50	18.87	15.89	2.63	1.500	4	1/4 - 18 NPT	**56-1585**	**56-2020**
7S7SL	88,93	3.501	114,30	4.500	29.50	22.88	19.25	6.63	3.000	7	1/4 - 18 NPT	**56-1025**	**56-2125**

Straight Flute Holders • Inch • Extra Long

extra long	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
7S0SE	12,93	.509	17,65	.695	12.17	9.80	7.44	2.38	.750	0	1/8 - 27 NPT	**56-1014**	**56-2017**
7S0.5SE	15,47	.609	17,65	.695	12.17	9.80	7.60	2.38	.750	—	1/8 - 27 NPT	**56-1014**	**56-2017**
7S1SE	17,53	.690	24,38	.960	15.12	12.75	5.67	2.38	1.000	1	1/4 - 18 NPT	**56-1020**	**56-2028**
7S1.5SE	21,82	.859	24,38	.960	15.13	12.75	10.29	2.38	1.000	1.5	1/4 - 18 NPT	**56-1020**	**56-2028**
7S2SE	24,41	.961	35,05	1.380	15.82	13.38	11.07	2.44	1.250	2	1/4 - 18 NPT	**56-1018**	**56-2015**
7S3SE	35,08	1.381	47,73	1.879	25.51	22.88	20.16	2.63	1.500	3	1/4 - 18 NPT	**56-1585**	**56-2020**
7S4SE	47,75	1.880	65,28	2.570	—	—	15.89	2.63	1.500	4	1/4 - 18 NPT	**56-1585**	**56-2020**





Straight Flute Holders • Metric • Short

short	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	insert screw	Torx wrench
8S0SS	13,00	.512	17,50	.689	4.88	2.88	1.91	2.01	.787	0	**56-1014**	**FT7**
8S1SS	17,86	.703	24,00	.945	6.53	4.33	2.16	2.24	.984	1	**56-1020**	**FT8**
8S2SS	24,61	.969	35,00	1.378	7.49	5.13	2.72	2.40	1.260	2	**56-1585**	**FT15**
8S4SS	48,00	1.890	65,09	2.563	10.08	7.32	3.97	2.80	1.575	4	**56-1585**	**FT20**

Straight Flute Holders • Metric • Medium

medium	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	insert screw	Torx wrench
8S0SM	13,00	.512	17,50	.689	6.01	4.00	2.76	2.01	.787	0	**56-1014**	**FT7**
8S1SM	17,86	.703	24,00	.945	8.58	6.33	4.16	2.24	.984	1	**56-1020**	**FT8**
8S2SM	24,61	.969	35,00	1.378	9.53	7.13	4.72	2.40	1.260	2	**56-1018**	**FT15**
8S3SM	35,72	1.406	47,63	1.875	11.11	8.31	5.32	2.80	1.575	3	**56-1585**	**FT20**

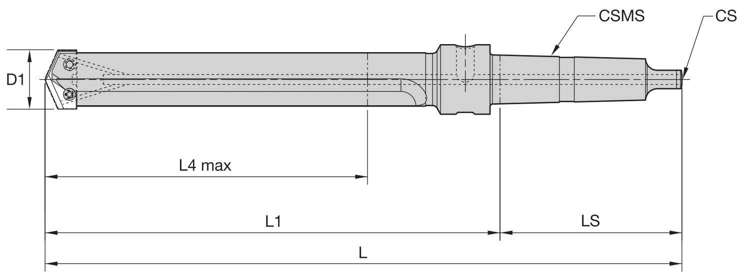
Straight Flute Holders • Metric • Long

long	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
8S0SL	12,93	.509	17,53	.690	8.01	6.00	4.13	2.01	.787	0	R1/8	**56-1014**	**FT7**
8S1SL	17,86	.703	24,00	.945	10.53	8.33	6.16	2.24	.984	1	–	**56-1020**	**FT8**
8S2SL	24,61	.969	35,00	1.378	11.53	9.13	6.72	2.40	1.260	2	–	**56-1018**	**FT15**

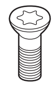
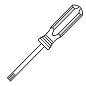
Straight Flute Holders • Metric • Extra Long

extra long	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	insert screw	Torx wrench
8S2SE	24,61	.969	35,00	1.378	18.17	15.76	14.27	2.40	1.260	2	**56-1018**	**FT15**

- Through coolant must be used with spade drills depths greater than 1 x D.
- Direct spindle cooling is preferable when using WIDIA™ Spade Blades.
- If spindle cooling is unavailable, then coolant glands or inducers should be used to provide through coolant capability.
- Our holders provide both options; please find available coolant glants below.

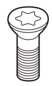
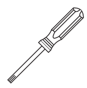


Straight Flute Holders • Short

	D1		D1 max										
short	mm	in	mm	in	L	L1	L4 max	LS	CSMS system size	seat size	CS	insert screw	Torx wrench
7SZTS	11,10	.437	12,90	.508	6.50	3.56	1.30	3.13	2	Z	8 - 32	**56-1015**	**56-2026**
7S1TS	17,53	.690	24,38	.960	8.73	5.04	2.48	3.88	3	1	1/4 - 20	**56-1020**	**56-2028**
7S2TS	24,41	.961	35,05	1.380	9.44	5.75	3.11	3.88	3	2	1/4 - 20	**56-1018**	**56-2015**
7S2.5TS	30,15	1.187	35,05	1.380	9.44	5.56	3.00	3.88	3	2.5	1/4 - 20	**56-1018**	**56-2015**
7S3TS	35,08	1.381	47,73	1.879	12.13	7.50	4.21	4.88	4	3	5/16-18	**56-1585**	**56-2020**
7S4TS	47,75	1.880	65,28	2.570	13.62	9.00	5.60	4.88	4	4	5/16-18	**56-1585**	**56-2020**
7S5TS	63,50	2.500	88,90	3.500	15.38	9.50	5.63	6.13	5	5	1/2 - 13	**56-1025**	**56-2125**

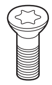
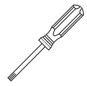
NOTE: CSMS = Morse taper size.

Straight Flute Holders • Medium

	D1		D1 max										
medium	mm	in	mm	in	L	L1	L4 max	LS	CSMS system size	seat size	CS	insert screw	Torx wrench
7S0TM	12,93	.509	17,65	.695	8.46	5.52	3.20	3.13	2	0	8 - 32	**56-1014**	**56-2017**
7S1TM	17,53	.690	24,38	.960	10.68	6.99	4.43	3.88	3	1	1/4 - 20	**56-1020**	**56-2028**
7S1.5TM	21,82	.859	24,38	.960	10.68	6.80	4.35	3.88	3	1.5	1/4 - 20	**56-1020**	**56-2028**
7S2TM	24,41	.961	35,05	1.380	11.82	8.13	5.49	3.88	3	2	1/4 - 20	**56-1018**	**56-2015**
7S2.5TM-4MT	30,15	1.187	35,05	1.380	12.82	8.19	5.38	4.88	4	2.5	5/16-18	**56-1018**	**56-2015**
7S3TM	35,08	1.381	47,73	1.879	16.13	11.50	8.34	4.88	4	3	5/16-18	**56-1585**	**56-2020**
7S4TM	47,75	1.880	65,28	2.570	17.63	13.00	9.58	4.88	4	4	5/16-18	**56-1585**	**56-2020**
7S5TM	63,50	2.500	88,90	3.500	21.13	15.25	11.38	6.13	5	5	1/2 - 13	**56-1025**	**56-2125**
7S7TM	88,93	3.501	114,30	4.500	22.28	16.40	11.50	6.13	5	7	1/2 - 13	**56-1025**	**56-2125**

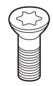
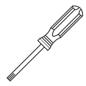
NOTE: CSMS = Morse taper size.

Straight Flute Holders • Long

	D1		D1 max										
long	**mm**	**in**	**mm**	**in**	**L**	**L1**	**L4 max**	**LS**	**CSMS system size**	**seat size**	**CS**	**insert screw**	**Torx wrench**
7SZTL	11,10	.437	12,90	.508	8.51	5.57	3.30	3.13	2	Z	8 - 32	**56-1015**	**56-2026**
7S0TL	12,93	.509	17,65	.695	9.88	6.94	4.60	3.13	2	0	8 - 32	**56-1014**	**56-2017**
7S1TL	17,53	.690	24,38	.960	12.60	8.91	6.36	3.88	3	1	1/4 - 20	**56-1020**	**56-2028**
7S2TL	24,41	.961	35,05	1.380	14.19	10.50	7.86	3.88	3	2	1/4 - 20	**56-1018**	**56-2015**
7S3TL	35,08	1.381	47,73	1.879	20.88	16.25	13.28	4.88	4	3	5/16-18	**56-1585**	**56-2020**
7S4TL	47,75	1.880	65,28	2.570	23.75	19.12	15.90	4.88	4	4	5/16-18	**56-1585**	**56-2020**
7S5TL	63,50	2.500	88,90	3.500	26.88	21.00	17.13	6.13	5	5	1/2 - 13	**56-1025**	**56-2125**
7S7TL	88,93	3.501	114,30	4.500	30.53	24.65	19.75	6.13	5	7	1/2 - 13	**56-1025**	**56-2125**

NOTE: CSMS = Morse taper size.

Straight Flute Holders • Extra Long

	D1		D1 max										
extra long	**mm**	**in**	**mm**	**in**	**L**	**L1**	**L4 max**	**LS**	**CSMS system size**	**seat size**	**CS**	**insert screw**	**Torx wrench**
7S0TE	12,93	.509	17,65	.695	12.93	10.00	7.65	3.13	2	0	8 - 32	**56-1014**	**56-2017**
7S0.5TE	15,47	.609	17,65	.695	12.93	9.80	7.60	3.13	2	—	8 - 32	**56-1014**	**56-2017**
7S2TE	24,41	.961	35,05	1.380	17.26	13.57	11.07	3.88	3	2	1/4 - 20	**56-1018**	**56-2015**

NOTE: CSMS = Morse taper size.

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- Contact our Customer Application Support team for technical support and product recommendations.
- Log in to NOVO™ for instant access to inventory availability, application recommendations, CAD drawings, and 3D models.
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HydroForce™ HT Chuck

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

HydroForce™ HT Chuck High Torque for High Metal Removal Rates (MRR) and Superior Surface Finish

- HydroForce gives you an unmatched combination of accuracy and clamping forces.
- Compact and stable design.
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- Focused and flexible product offering.

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Authorised Distributor or visit **www.widia.com.**

WIDIA™

Holemaking • Indexable Drills

		standard						hole tolerance	standard range			customised solution range		
		● first choice ○ alternate choice							diameter range		drilling depth L/D1	diameter range		drilling depth
									D1 mm	D1 in		D1 mm	D1 inch	
		P	M	K	N	S	H		min–max	min–max		min–max	min–max	
	**Top Cut 4™** *Indexable Drill Body* *Short Hole Drilling*	●	●	●				IT9–11	12–68	.473–2.5	2 x D 3 x D 4 x D 5 x D	12–110	.473–4.33	2–5 x D 2)

In regard to insert and drill coatings, anything is possible. If a specific insert or drill is not suitable for your workpiece material, please contact our Engineered Solutions Department for an offer about special coatings and edge preparations.
**Except for L/D 5 x D.*
1) Other shank styles available as customised solution.
2) Dependent on the application, up to 6 x D is possible.

	● standard capabilities 1)			● standard ○ customised solution capabilities										page(s)
	Coolant													
		●	● ●	●	●	●	●	●	●*	●	●	●	●	V8–V23

Top Cut 4

The new WIDIA Top Cut 4 (TC4) portfolio is a broad offering for customers looking for a versatile indexable drilling platform.

The newly developed TC4 features improved centring capabilities and inserts with four cutting edges for both pocket seats (central and periphery). This, in combination with the renowned WIDIA grade technology, leads to outstanding flexibility and efficiency.

The TC4 platform offers three easy-to-select grades and two geometries applicable for steel, cast iron, and stainless steel materials. It covers the diameter range from 12–68mm within the standard offering in L/D ratios of 2–5 x D.

One Comprehensive Platform

- Standard diameter range covering 12–68mm in 2 x D, 3 x D, 4 x D, and 5 x D.
- Four real cutting edges each for entire platform.
- Eight insert sizes to cover complete diameter range.

Easy to Apply

- No risk of mixing up inner and outer insert due to clear visual differences.
- Easy-to-change inserts, laser marked with geometries and grades.
- Easy-to-use nomenclature guide enabling the tool body and the related insert selection to avoid order failures.

Highly Versatile

- Breadth of application capabilities include through and cross holes, inclined entry and exit opportunity, 45º corner, half cylindrical, concave, or chain drilling.
- Various geometries and grades available.

Highest Performance

- 2x four true cutting edges.
- Cutting edge profile of central and periphery insert work together, leading to high stabilisation of the drill, preventing drifting of the tool even on irregular surfaces.
- X-offset design to adjust diameter size on turning machines and optimise tolerances on machining centres.
- Apply where speed and economy are prime considerations.
- Three grades to achieve higher tool life at accelerated speeds:
  – WU25CH grade for highest metal removal rate in general applications.
  – WU40PH grade for high toughness demands.
  – WPK10CH grade for high-speed applications.

The guide below provides an example of how to select the
Top Cut 4 tool body and accompanying inserts for a stable steel drilling application.

Metric Body

TCF	250	R	3	SL	32	M	D
Tool Family Top Cut 4	Diameter Metric = 3 digits (e.g. 250 = 25mm) Inch = 4 digits (e.g. 2500 = 2.5")	Right-Hand Cutting	Length Diameter Ratio L/D = 3 x D	Shank Style SL = Side Lock Adaptor	Shank Size	Metric	Insert Size

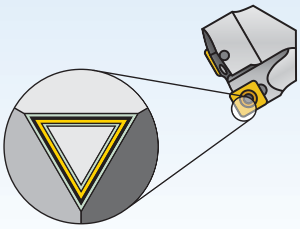
Periphery Insert

TCF	08	03	08	D	P	V34	WU25CH
Tool Family Top Cut 4	Size In-Circle D1	Insert Thickness	Insert Corner Radius	Insert Size	Insert Positioning C = Central P = Periphery	Insert Geometry	Grade

Insert Geometry – V34 for steel or cast iron or V36 for stainless steel and long chipping steel.

Insert Guide for Grades

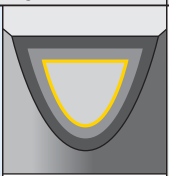
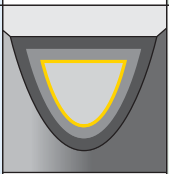
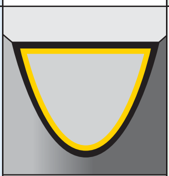
W	U	25	C	H
W	U	40	P	H
W	PK	10	C	H
WIDIA™	Material Range U = Universal P = Steel K = Cast Iron	Toughness Range Choose high numbers for toughness in stable conditions, low numbers for high wear resistance at continuous cuts.	Coating P = PVD C = CVD	Application H = Holemaking



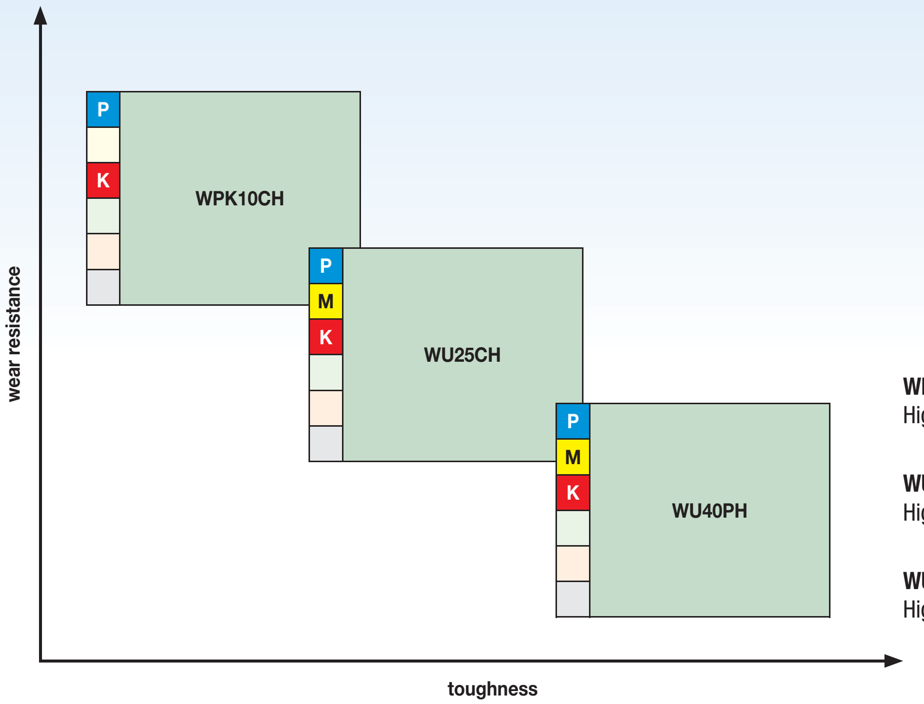
Coatings provide high-speed capability and are engineered for finishing to light roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟷ toughness

Grade	Coating	Grade Description
WPK10CH	 $TiCN-Al_2O_3$	**Composition:** With an advanced CVD $TiCN-Al_2O_3$ coating combined with a cobalt-enriched carbide substrate, this grade offers a balanced combination of deformation-resistance and edge toughness. **Application:** Offers outstanding abrasion and crater wear resistance for high-speed machining of steels and cast irons. Use for very high cutting speeds with low to medium feed rates.
WU25CH	 $TiCN-Al_2O_3$	**Composition:** Advanced CVD $TiCN-Al_2O_3$ coating together with a newly engineered tough carbide substrate. Ensures adequate deformation resistance and excellent edge strength and offers very good wear resistance over a wide range of machining conditions. **Application:** A high productivity grade with high speeds and feeds. First choice for high productivity with very good reliability in steels, stainless steels, and cast iron rates.
WU40PH	 $TiCN-Al_2O_3$	**Composition:** With a multilayered PVD TiN-TiAlN coating and a tough substrate, this grade withstands interruptions and provides high wear resistance for long tool life. **Application:** First choice for high reliability in most materials. This grade should be used at medium speeds and high feeds due to sharper edges and as a grade for high-toughness applications. It covers steel, stainless steel, cast iron, and high-temp alloys under certain conditions.

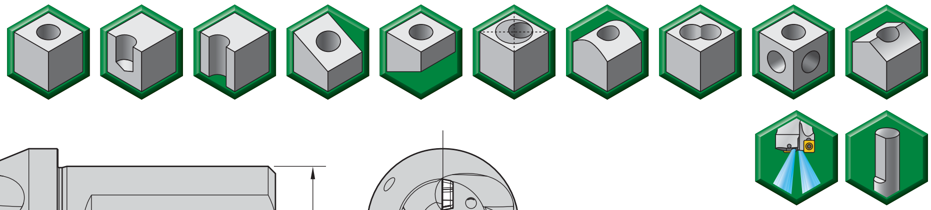
Grade		05	10	15	20	25	30	35	40	45
WPK10CH	P	■	■	■	■					
	M									
	K	■	■	■	■					
	N									
	S									
	H									
WU25CH	P				■	■	■	■		
	M			■	■	■	■			
	K			■	■	■	■			
	N									
	S									
	H									
WU40PH	P						■	■	■	■
	M					■	■	■	■	
	K				■	■	■	■		
	N									
	S									
	H									

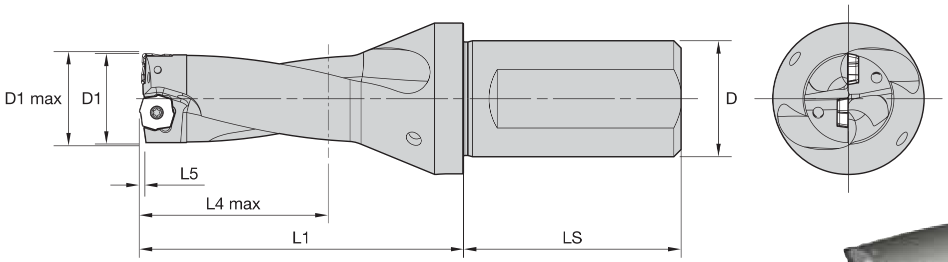


WPK10CH:
High-Speed Grade

WU25CH:
High Metal Removal Rate Grade

WU40PH:
High Toughness Grade





For information on LS, see the table on page V10.

Top Cut 4 Drill • Metric • 2 x D • SL Shanks

order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537778	TCF120R2SL20MA	12,00	12,50	20	54,6	24,0	0,41	A	TCF040204AP	TCF040203AC
5537779	TCF125R2SL20MA	12,50	13,00	20	55,8	25,0	0,48	A	TCF040204AP	TCF040203AC
5537860	TCF127R2SL20MA	12,70	13,20	20	56,2	26,0	0,51	A	TCF040204AP	TCF040203AC
5537861	TCF130R2SL20MA	13,00	13,50	20	56,9	26,0	0,56	A	TCF040204AP	TCF040203AC
5537862	TCF135R2SL20MA	13,50	14,00	20	58,1	27,0	0,64	A	TCF040204AP	TCF040203AC
5577828	TCF140R2SL25MB	14,00	14,50	25	59,8	28,0	0,42	B	TCF050204BP	TCF060203BC
5577829	TCF145R2SL25MB	14,50	15,00	25	60,9	29,0	0,45	B	TCF050204BP	TCF060203BC
5577920	TCF150R2SL25MB	15,00	15,50	25	62,1	30,0	0,49	B	TCF050204BP	TCF060203BC
5577921	TCF155R2SL25MB	15,50	16,00	25	63,3	31,0	0,54	B	TCF050204BP	TCF060203BC
5577922	TCF160R2SL25MB	16,00	16,50	25	64,4	32,0	0,60	B	TCF050204BP	TCF060203BC
5577923	TCF165R2SL25MB	16,50	17,00	25	65,6	33,0	0,68	B	TCF050204BP	TCF060203BC
5577924	TCF170R2SL25MB	17,00	17,50	25	68,4	34,0	0,74	B	TCF050204BP	TCF060203BC
5577925	TCF175R2SL25MB	17,50	18,00	25	69,6	35,0	0,79	B	TCF050204BP	TCF060203BC
5577926	TCF180R2SL25MB	18,00	18,50	25	70,8	36,0	0,86	B	TCF050204BP	TCF060203BC
5577927	TCF185R2SL25MB	18,50	19,00	25	71,9	37,0	0,83	B	TCF050204BP	TCF060203BC
5578820	TCF190R2SL25MC	19,00	19,50	25	72,1	38,0	0,60	C	TCF070306CP	TCF070304CC
5578821	TCF195R2SL25MC	19,50	20,00	25	73,2	39,0	0,70	C	TCF070306CP	TCF070304CC
5578822	TCF200R2SL25MC	20,00	20,50	25	74,4	40,0	0,70	C	TCF070306CP	TCF070304CC
5578823	TCF205R2SL25MC	20,50	21,00	25	75,6	41,0	0,70	C	TCF070306CP	TCF070304CC
5578824	TCF210R2SL25MC	21,00	21,50	25	76,7	42,0	0,80	C	TCF070306CP	TCF070304CC
5578825	TCF220R2SL25MC	22,00	22,50	25	79,0	44,0	1,00	C	TCF070306CP	TCF070304CC
5578826	TCF225R2SL25MC	22,50	23,00	25	80,2	45,0	1,10	C	TCF070306CP	TCF070304CC
5578827	TCF230R2SL25MC	23,00	23,50	25	81,4	46,0	1,10	C	TCF070306CP	TCF070304CC
5537167	TCF240R2SL25MD	24,00	25,00	25	87,2	48,0	0,78	D	TCF080308DP	TCF090305DC
5537168	TCF250R2SL32MD	25,00	26,00	32	89,6	50,0	0,86	D	TCF080308DP	TCF090305DC
5537169	TCF260R2SL32MD	26,00	27,00	32	91,9	52,0	0,97	D	TCF080308DP	TCF090305DC
5537820	TCF265R2SL32MD	26,50	27,50	32	93,0	53,0	1,05	D	TCF080308DP	TCF090305DC
5537821	TCF270R2SL32MD	27,00	28,00	32	94,2	54,0	1,15	D	TCF080308DP	TCF090305DC
5537822	TCF280R2SL32MD	28,00	29,00	32	96,5	56,0	1,30	D	TCF080308DP	TCF090305DC
5537823	TCF290R2SL32MD	29,00	30,00	32	98,8	58,0	1,45	D	TCF080308DP	TCF090305DC
5537937	TCF300R2SL32ME	30,00	31,00	32	100,2	60,0	0,63	E	TCF100408EP	TCF120405EC
5537938	TCF310R2SL32ME	31,00	32,00	32	102,5	62,0	0,72	E	TCF100408EP	TCF120405EC

(continued)

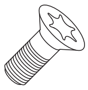
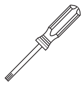
(Top Cut 4 Drill • Metric • 2 x D • SL Shanks — continued)

order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537939	TCF320R2SL32ME	32,00	33,00	32	104,8	64,0	0,82	E	TCF100408EP	TCF120405EC
5537940	TCF330R2SL40ME	33,00	34,00	40	107,1	66,0	0,95	E	TCF100408EP	TCF120405EC
5537941	TCF340R2SL40ME	34,00	35,00	40	109,4	68,0	1,14	E	TCF100408EP	TCF120405EC
5537942	TCF350R2SL40ME	35,00	36,00	40	111,8	70,0	1,30	E	TCF100408EP	TCF120405EC
5537943	TCF360R2SL40ME	36,00	37,00	40	114,1	72,0	1,45	E	TCF100408EP	TCF120405EC
5578539	TCF370R2SL40MF	37,00	38,00	40	118,1	74,0	1,19	F	TCF120412FP	TCF150406FC
5578600	TCF375R2SL40MF	37,50	38,50	40	119,3	75,0	1,23	F	TCF120412FP	TCF150406FC
5578601	TCF380R2SL40MF	38,00	39,00	40	120,5	76,0	1,27	F	TCF120412FP	TCF150406FC
5578602	TCF390R2SL40MF	39,00	40,00	40	122,8	78,0	1,36	F	TCF120412FP	TCF150406FC
5578603	TCF400R2SL40MF	40,00	41,00	40	125,1	80,0	1,47	F	TCF120412FP	TCF150406FC
5578604	TCF410R2SL40MF	41,00	42,00	40	127,4	82,0	1,60	F	TCF120412FP	TCF150406FC
5578605	TCF420R2SL40MF	42,00	43,00	40	129,7	84,0	1,77	F	TCF120412FP	TCF150406FC
5578606	TCF430R2SL40MF	43,00	44,00	40	132,1	86,0	1,99	F	TCF120412FP	TCF150406FC
5578607	TCF440R2SL40MF	44,00	45,00	40	134,4	88,0	2,10	F	TCF120412FP	TCF150406FC
5578608	TCF450R2SL50MF	45,00	46,00	50	136,7	90,0	2,21	F	TCF120412FP	TCF150406FC
5578694	TCF460R2SL50MG	46,00	47,00	50	139,0	92,0	1,45	G	TCF150512GP	TCF180508GC
5578695	TCF470R2SL50MG	47,00	48,00	50	141,3	94,0	1,53	G	TCF150512GP	TCF180508GC
5578696	TCF480R2SL50MG	48,00	49,00	50	143,7	96,0	1,63	G	TCF150512GP	TCF180508GC
5578697	TCF490R2SL50MG	49,00	50,00	50	146,0	98,0	1,74	G	TCF150512GP	TCF180508GC
5578698	TCF500R2SL50MG	50,00	51,00	50	149,8	100,0	1,87	G	TCF150512GP	TCF180508GC
5578699	TCF505R2SL50MG	50,50	51,50	50	151,0	101,0	1,94	G	TCF150512GP	TCF180508GC
5578710	TCF510R2SL50MG	51,00	52,00	50	152,1	102,0	2,02	G	TCF150512GP	TCF180508GC
5578711	TCF520R2SL50MG	52,00	53,00	50	154,4	104,0	2,22	G	TCF150512GP	TCF180508GC
5578712	TCF530R2SL50MG	53,00	54,00	50	156,8	106,0	2,46	G	TCF150512GP	TCF180508GC
5578713	TCF540R2SL50MG	54,00	55,00	50	159,1	108,0	2,53	G	TCF150512GP	TCF180508GC
5578714	TCF550R2SL50MG	55,00	56,00	50	161,4	110,0	2,73	G	TCF150512GP	TCF180508GC
5578715	TCF560R2SL50MG	56,00	57,00	50	163,7	112,0	2,37	G	TCF150512GP	TCF180508GC
5538613	TCF570R2SL50MH	57,00	58,00	50	165,5	114,0	1,76	H	TCF180614HP	TCF210608HC
5538614	TCF580R2SL50MH	58,00	59,00	50	167,9	116,0	1,85	H	TCF180614HP	TCF210608HC
5538615	TCF590R2SL50MH	59,00	60,00	50	170,2	118,0	1,96	H	TCF180614HP	TCF210608HC
5538616	TCF600R2SL50MH	60,00	61,00	50	172,5	120,0	1,42	H	TCF180614HP	TCF210608HC
5538617	TCF610R2SL50MH	61,00	62,00	50	174,8	122,0	2,23	H	TCF180614HP	TCF210608HC
5538618	TCF620R2SL50MH	62,00	63,00	50	177,1	124,0	2,41	H	TCF180614HP	TCF210608HC
5538619	TCF630R2SL50MH	63,00	64,00	50	179,5	126,0	2,64	H	TCF180614HP	TCF210608HC
5538630	TCF640R2SL50MH	64,00	65,00	50	181,8	128,0	2,94	H	TCF180614HP	TCF210608HC
5538631	TCF650R2SL50MH	65,00	66,00	50	184,1	130,0	3,06	H	TCF180614HP	TCF210608HC
5538632	TCF660R2SL50MH	66,00	67,00	50	186,4	132,0	3,18	H	TCF180614HP	TCF210608HC
5538633	TCF670R2SL50MH	67,00	68,00	50	188,7	134,0	3,30	H	TCF180614HP	TCF210608HC
5538634	TCF680R2SL50MH	68,00	69,00	50	191,1	136,0	2,93	H	TCF180614HP	TCF210608HC

(continued)

(Top Cut 4 Drill • Metric • 2 x D • SL Shanks — continued)

Spare Parts

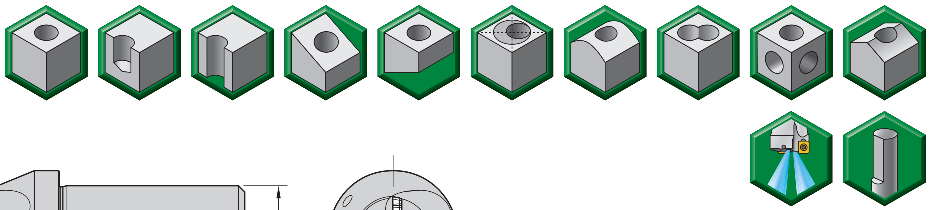



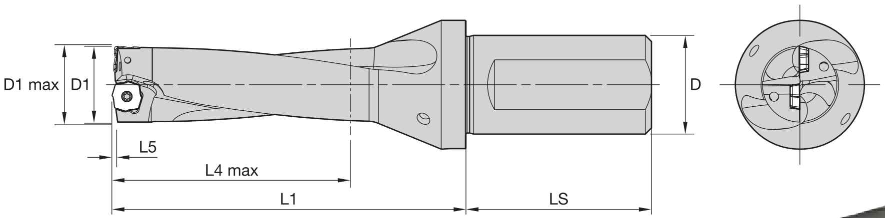
insert size	periphery insert	centre insert	insert screw order number	Torx size	Torx driver order number	tightening torque Nm
A	TCF040204AP	TCF040203AC	**2025073**	T5	**2029221**	0,40
B	TCF050204BP	TCF060203BC	**1175225**	T6	**1138455**	0,53
C	TCF070306CP	TCF070304CC	**1021337**	T7	**2029266**	0,90
D	TCF080308DP	TCF090305DC	**1134385**	T8	**2029598**	1,10
E	TCF100408EP	TCF120405EC	**2018194**	T9	**1138430**	2,00
F	TCF120412FP	TCF150406FC	**1756815**	T15	**2029596**	4,00
G	TCF150512GP	TCF180508GC	**1099645**	T20	**2029488**	6,30
H	TCF180614HP	TCF210608HC	**1823871**	T25	**1022519**	8,80

D	LS
20,00	50
25,00	56
32,00	60
40,00	70
50,00	80

NOTE: Drilling in stacked plates possible in certain applications. Ask for technical support.
Drill shipped with insert screws and Torx wrench.
See pages V20–V23 for inserts.
SL = Side Lock
D1 max is an achievable diameter using x-offset.

WARNING
During through-hole operations, a slug or disc is produced as the tool breaks through the workpiece. When the drill is stationary and the workpiece is rotating, this slug may be hurled from the chuck by centrifugal force. Provide adequate shielding to protect bystanders.





For information on LS, see the table on page V13.

■ Top Cut 4 Drill • Metric • 3 x D • SL Shanks

order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537863	TCF120R3SL20MA	12,00	12,50	20	66,6	36,0	0,41	A	TCF040204AP	TCF040203AC
5537864	TCF125R3SL20MA	12,50	13,00	20	68,3	37,5	0,48	A	TCF040204AP	TCF040203AC
5537866	TCF127R3SL20MA	12,70	13,20	20	68,9	38,1	0,51	A	TCF040204AP	TCF040203AC
5537867	TCF130R3SL20MA	13,00	13,50	20	69,9	39,0	0,56	A	TCF040204AP	TCF040203AC
5537868	TCF135R3SL20MA	13,50	14,00	20	71,6	41,0	0,64	A	TCF040204AP	TCF040203AC
5577928	TCF140R3SL25MB	14,00	14,50	25	73,8	42,0	0,42	B	TCF050204BP	TCF060203BC
5577929	TCF145R3SL25MB	14,50	15,00	25	75,4	43,5	0,45	B	TCF050204BP	TCF060203BC
5577930	TCF150R3SL25MB	15,00	15,50	25	77,1	45,0	0,49	B	TCF050204BP	TCF060203BC
5577931	TCF155R3SL25MB	15,50	16,00	25	78,8	46,5	0,54	B	TCF050204BP	TCF060203BC
5577932	TCF160R3SL25MB	16,00	16,50	25	80,4	48,0	0,60	B	TCF050204BP	TCF060203BC
5577933	TCF165R3SL25MB	16,50	17,00	25	82,1	49,5	0,68	B	TCF050204BP	TCF060203BC
5577934	TCF170R3SL25MB	17,00	17,50	25	85,4	51,0	0,74	B	TCF050204BP	TCF060203BC
5577935	TCF175R3SL25MB	17,50	18,00	25	87,1	52,5	0,79	B	TCF050204BP	TCF060203BC
5577936	TCF180R3SL25MB	18,00	18,50	25	88,8	54,0	0,86	B	TCF050204BP	TCF060203BC
5577937	TCF185R3SL25MB	18,50	19,00	25	90,4	55,5	0,83	B	TCF050204BP	TCF060203BC
5578828	TCF190R3SL25MC	19,00	19,50	25	91,1	57,0	0,60	C	TCF070306CP	TCF070304CC
5578829	TCF195R3SL25MC	19,50	20,00	25	92,7	58,5	0,70	C	TCF070306CP	TCF070304CC
5578830	TCF200R3SL25MC	20,00	20,50	25	94,4	60,0	0,70	C	TCF070306CP	TCF070304CC
5578831	TCF205R3SL25MC	20,50	21,00	25	96,1	61,5	0,70	C	TCF070306CP	TCF070304CC
5578832	TCF210R3SL25MC	21,00	21,50	25	97,7	63,0	0,80	C	TCF070306CP	TCF070304CC
5578833	TCF220R3SL25MC	22,00	22,50	25	101,0	66,0	1,00	C	TCF070306CP	TCF070304CC
5578834	TCF225R3SL25MC	22,50	23,00	25	102,7	67,5	1,10	C	TCF070306CP	TCF070304CC
5578835	TCF230R3SL25MC	23,00	23,50	25	104,4	69,0	1,10	C	TCF070306CP	TCF070304CC
5537824	TCF240R3SL25MD	24,00	25,00	25	111,2	72,0	0,78	D	TCF080308DP	TCF090305DC
5537825	TCF250R3SL32MD	25,00	26,00	32	114,6	75,0	0,86	D	TCF080308DP	TCF090305DC
5537826	TCF260R3SL32MD	26,00	27,00	32	117,9	78,0	0,97	D	TCF080308DP	TCF090305DC
5537827	TCF265R3SL32MD	26,50	27,50	32	119,5	79,5	1,05	D	TCF080308DP	TCF090305DC
5537828	TCF270R3SL32MD	27,00	28,00	32	121,2	81,0	1,15	D	TCF080308DP	TCF090305DC
5537829	TCF280R3SL32MD	28,00	29,00	32	124,5	84,0	1,30	D	TCF080308DP	TCF090305DC
5537830	TCF290R3SL32MD	29,00	30,00	32	127,8	87,0	1,45	D	TCF080308DP	TCF090305DC
5537944	TCF300R3SL32ME	30,00	31,00	32	130,2	90,0	0,63	E	TCF100408EP	TCF120405EC
5537945	TCF310R3SL32ME	31,00	32,00	32	133,5	93,0	0,72	E	TCF100408EP	TCF120405EC

(continued)

Indexable Drills

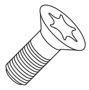
(Top Cut 4 Drill • Metric • 3 x D • SL Shanks — continued)

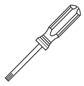
order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537946	TCF320R3SL32ME	32,00	33,00	32	136,8	96,0	0,82	E	TCF100408EP	TCF120405EC
5537947	TCF330R3SL40ME	33,00	34,00	40	140,1	99,0	0,95	E	TCF100408EP	TCF120405EC
5537948	TCF340R3SL40ME	34,00	35,00	40	143,4	102,0	1,14	E	TCF100408EP	TCF120405EC
5537949	TCF350R3SL40ME	35,00	36,00	40	146,8	105,0	1,30	E	TCF100408EP	TCF120405EC
5537950	TCF360R3SL40ME	36,00	37,00	40	150,1	108,0	1,45	E	TCF100408EP	TCF120405EC
5578609	TCF370R3SL40MF	37,00	38,00	40	155,1	111,0	1,19	F	TCF120412FP	TCF150406FC
5578610	TCF375R3SL40MF	37,50	38,50	40	156,8	113,0	1,23	F	TCF120412FP	TCF150406FC
5578611	TCF380R3SL40MF	38,00	39,00	40	158,5	114,0	1,27	F	TCF120412FP	TCF150406FC
5578612	TCF390R3SL40MF	39,00	40,00	40	161,8	117,0	1,36	F	TCF120412FP	TCF150406FC
5578613	TCF400R3SL40MF	40,00	41,00	40	165,1	120,0	1,47	F	TCF120412FP	TCF150406FC
5578614	TCF410R3SL40MF	41,00	42,00	40	168,4	123,0	1,60	F	TCF120412FP	TCF150406FC
5578615	TCF420R3SL40MF	42,00	43,00	40	171,7	126,0	1,77	F	TCF120412FP	TCF150406FC
5578616	TCF430R3SL40MF	43,00	44,00	40	175,1	129,0	1,99	F	TCF120412FP	TCF150406FC
5578617	TCF440R3SL40MF	44,00	45,00	40	178,4	132,0	2,10	F	TCF120412FP	TCF150406FC
5578618	TCF450R3SL50MF	45,00	46,00	50	181,7	135,0	2,21	F	TCF120412FP	TCF150406FC
5578716	TCF460R3SL50MG	46,00	47,00	50	185,0	138,0	1,45	G	TCF150512GP	TCF180508GC
5578717	TCF470R3SL50MG	47,00	48,00	50	188,3	141,0	1,53	G	TCF150512GP	TCF180508GC
5578718	TCF480R3SL50MG	48,00	49,00	50	191,7	144,0	1,63	G	TCF150512GP	TCF180508GC
5578719	TCF490R3SL50MG	49,00	50,00	50	195,0	147,0	1,74	G	TCF150512GP	TCF180508GC
5578720	TCF500R3SL50MG	50,00	51,00	50	199,8	150,0	1,87	G	TCF150512GP	TCF180508GC
5578721	TCF505R3SL50MG	50,50	51,50	50	201,5	152,0	1,94	G	TCF150512GP	TCF180508GC
5578722	TCF510R3SL50MG	51,00	52,00	50	203,1	153,0	2,02	G	TCF150512GP	TCF180508GC
5578723	TCF520R3SL50MG	52,00	53,00	50	206,4	156,0	2,22	G	TCF150512GP	TCF180508GC
5578724	TCF530R3SL50MG	53,00	54,00	50	209,8	159,0	2,46	G	TCF150512GP	TCF180508GC
5578726	TCF540R3SL50MG	54,00	55,00	50	213,1	162,0	2,53	G	TCF150512GP	TCF180508GC
5578727	TCF550R3SL50MG	55,00	56,00	50	216,4	165,0	2,73	G	TCF150512GP	TCF180508GC
5578728	TCF560R3SL50MG	56,00	57,00	50	219,7	168,0	2,37	G	TCF150512GP	TCF180508GC
5538635	TCF570R3SL50MH	57,00	58,00	50	222,5	171,0	1,76	H	TCF180614HP	TCF210608HC
5538636	TCF580R3SL50MH	58,00	59,00	50	225,9	174,0	1,85	H	TCF180614HP	TCF210608HC
5538637	TCF590R3SL50MH	59,00	60,00	50	229,2	177,0	1,96	H	TCF180614HP	TCF210608HC
5538638	TCF600R3SL50MH	60,00	61,00	50	232,5	180,0	1,42	H	TCF180614HP	TCF210608HC
5538639	TCF610R3SL50MH	61,00	62,00	50	235,8	183,0	2,23	H	TCF180614HP	TCF210608HC
5538640	TCF620R3SL50MH	62,00	63,00	50	239,1	186,0	2,41	H	TCF180614HP	TCF210608HC
5538641	TCF630R3SL50MH	63,00	64,00	50	242,5	189,0	2,64	H	TCF180614HP	TCF210608HC
5538642	TCF640R3SL50MH	64,00	65,00	50	245,8	192,0	2,94	H	TCF180614HP	TCF210608HC
5538643	TCF650R3SL50MH	65,00	66,00	50	249,1	195,0	3,06	H	TCF180614HP	TCF210608HC
5538644	TCF660R3SL50MH	66,00	67,00	50	252,4	198,0	3,18	H	TCF180614HP	TCF210608HC
5538645	TCF670R3SL50MH	67,00	68,00	50	255,7	201,0	3,30	H	TCF180614HP	TCF210608HC
5538646	TCF680R3SL50MH	68,00	69,00	50	259,1	204,0	2,93	H	TCF180614HP	TCF210608HC

(continued)

(Top Cut 4 Drill • Metric • 3 x D • SL Shanks — continued)

Spare Parts



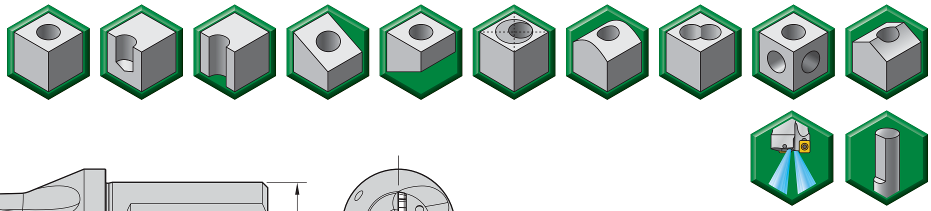


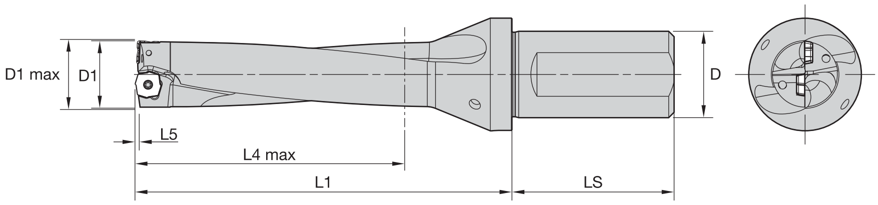
insert size	periphery insert	centre insert	insert screw order number	Torx size	Torx driver order number	tightening torque Nm
A	TCF040204AP	TCF040203AC	**2025073**	T5	**2029221**	0,40
B	TCF050204BP	TCF060203BC	**1175225**	T6	**1138455**	0,53
C	TCF070306CP	TCF070304CC	**1021337**	T7	**2029266**	0,90
D	TCF080308DP	TCF090305DC	**1134385**	T8	**2029598**	1,10
E	TCF100408EP	TCF120405EC	**2018194**	T9	**1138430**	2,00
F	TCF120412FP	TCF150406FC	**1756815**	T15	**2029596**	4,00
G	TCF150512GP	TCF180508GC	**1099645**	T20	**2029488**	6,30
H	TCF180614HP	TCF210608HC	**1823871**	T25	**1022519**	8,80

D	LS
20,00	50
25,00	56
32,00	60
40,00	70
50,00	80

NOTE: Drilling in stacked plates possible in certain applications. Ask for technical support.
Drill shipped with insert screws and Torx wrench.
See pages V20–V23 for inserts.
SL = Side Lock
D1 max is an achievable diameter using x-offset.

WARNING
During through-hole operations, a slug or disc is produced as the tool breaks through the workpiece. When the drill is stationary and the workpiece is rotating, this slug may be hurled from the chuck by centrifugal force. Provide adequate shielding to protect bystanders.





For information on LS, see the table on page V16.

■ Top Cut 4 Drill • Metric • 4 x D • SL Shanks

order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537869	TCF120R4SL20MA	12,00	12,50	20	78,6	48,0	0,41	A	TCF040204AP	TCF040203AC
5537870	TCF125R4SL20MA	12,50	13,00	20	80,8	50,0	0,48	A	TCF040204AP	TCF040203AC
5537871	TCF127R4SL20MA	12,70	13,20	20	81,6	50,8	0,51	A	TCF040204AP	TCF040203AC
5537872	TCF130R4SL20MA	13,00	13,50	20	82,9	52,0	0,56	A	TCF040204AP	TCF040203AC
5537873	TCF135R4SL20MA	13,50	14,00	20	85,1	54,0	0,64	A	TCF040204AP	TCF040203AC
5577938	TCF140R4SL25MB	14,00	14,50	25	87,8	56,0	0,42	B	TCF050204BP	TCF060203BC
5577939	TCF145R4SL25MB	14,50	15,00	25	89,9	58,0	0,45	B	TCF050204BP	TCF060203BC
5577940	TCF150R4SL25MB	15,00	15,50	25	92,1	60,0	0,49	B	TCF050204BP	TCF060203BC
5577941	TCF155R4SL25MB	15,50	16,00	25	94,3	62,0	0,54	B	TCF050204BP	TCF060203BC
5577942	TCF160R4SL25MB	16,00	16,50	25	96,4	64,0	0,60	B	TCF050204BP	TCF060203BC
5577943	TCF165R4SL25MB	16,50	17,00	25	98,6	66,0	0,68	B	TCF050204BP	TCF060203BC
5577944	TCF170R4SL25MB	17,00	17,50	25	102,4	68,0	0,74	B	TCF050204BP	TCF060203BC
5577945	TCF175R4SL25MB	17,50	18,00	25	104,6	70,0	0,79	B	TCF050204BP	TCF060203BC
5577946	TCF180R4SL25MB	18,00	18,50	25	106,8	72,0	0,86	B	TCF050204BP	TCF060203BC
5577947	TCF185R4SL25MB	18,50	19,00	25	108,9	74,0	0,83	B	TCF050204BP	TCF060203BC
5578836	TCF190R4SL25MC	19,00	19,50	25	110,1	76,0	0,60	C	TCF070306CP	TCF070304CC
5578837	TCF195R4SL25MC	19,50	20,00	25	112,2	78,0	0,70	C	TCF070306CP	TCF070304CC
5578838	TCF200R4SL25MC	20,00	20,50	25	114,4	80,0	0,70	C	TCF070306CP	TCF070304CC
5578839	TCF205R4SL25MC	20,50	21,00	25	116,6	82,0	0,70	C	TCF070306CP	TCF070304CC
5578840	TCF210R4SL25MC	21,00	21,50	25	118,7	84,0	0,80	C	TCF070306CP	TCF070304CC
5578841	TCF220R4SL25MC	22,00	22,50	25	123,0	88,0	1,00	C	TCF070306CP	TCF070304CC
5578842	TCF225R4SL25MC	22,50	23,00	25	125,2	90,0	1,10	C	TCF070306CP	TCF070304CC
5578843	TCF230R4SL25MC	23,00	23,50	25	127,4	92,0	1,10	C	TCF070306CP	TCF070304CC
5537831	TCF240R4SL25MD	24,00	25,00	25	135,2	96,0	0,78	D	TCF080308DP	TCF090305DC
5537832	TCF250R4SL32MD	25,00	26,00	32	139,6	100,0	0,86	D	TCF080308DP	TCF090305DC
5537833	TCF260R4SL32MD	26,00	27,00	32	143,9	104,0	0,97	D	TCF080308DP	TCF090305DC
5537834	TCF265R4SL32MD	26,50	27,50	32	146,0	106,0	1,05	D	TCF080308DP	TCF090305DC
5537835	TCF270R4SL32MD	27,00	28,00	32	148,2	108,0	1,15	D	TCF080308DP	TCF090305DC
5537836	TCF280R4SL32MD	28,00	29,00	32	152,5	112,0	1,30	D	TCF080308DP	TCF090305DC
5537837	TCF290R4SL32MD	29,00	30,00	32	156,8	116,0	1,45	D	TCF080308DP	TCF090305DC
5537951	TCF300R4SL32ME	30,00	31,00	32	160,2	120,0	0,63	E	TCF100408EP	TCF120405EC
5537952	TCF310R4SL32ME	31,00	32,00	32	164,5	124,0	0,72	E	TCF100408EP	TCF120405EC

(continued)

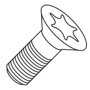
(Top Cut 4 Drill • Metric • 4 x D • SL Shanks — continued)

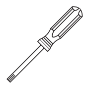
order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537953	TCF320R4SL32ME	32,00	33,00	32	168,8	128,0	0,82	E	TCF100408EP	TCF120405EC
5537954	TCF330R4SL40ME	33,00	34,00	40	173,1	132,0	0,95	E	TCF100408EP	TCF120405EC
5537955	TCF340R4SL40ME	34,00	35,00	40	177,4	136,0	1,14	E	TCF100408EP	TCF120405EC
5537956	TCF350R4SL40ME	35,00	36,00	40	181,8	140,0	1,30	E	TCF100408EP	TCF120405EC
5537957	TCF360R4SL40ME	36,00	37,00	40	186,1	144,0	1,45	E	TCF100408EP	TCF120405EC
5578619	TCF370R4SL40MF	37,00	38,00	40	192,1	148,0	1,19	F	TCF120412FP	TCF150406FC
5578620	TCF375R4SL40MF	37,50	38,50	40	194,3	150,0	1,23	F	TCF120412FP	TCF150406FC
5578621	TCF380R4SL40MF	38,00	39,00	40	196,5	152,0	1,27	F	TCF120412FP	TCF150406FC
5578622	TCF390R4SL40MF	39,00	40,00	40	200,8	156,0	1,36	F	TCF120412FP	TCF150406FC
5578623	TCF400R4SL40MF	40,00	41,00	40	205,1	160,0	1,47	F	TCF120412FP	TCF150406FC
5578624	TCF410R4SL40MF	41,00	42,00	40	209,4	164,0	1,60	F	TCF120412FP	TCF150406FC
5578625	TCF420R4SL40MF	42,00	43,00	40	213,7	168,0	1,77	F	TCF120412FP	TCF150406FC
5578626	TCF430R4SL40MF	43,00	44,00	40	218,1	172,0	1,99	F	TCF120412FP	TCF150406FC
5578627	TCF440R4SL40MF	44,00	45,00	40	222,4	176,0	2,10	F	TCF120412FP	TCF150406FC
5578628	TCF450R4SL50MF	45,00	46,00	50	226,7	180,0	2,21	F	TCF120412FP	TCF150406FC
5578729	TCF460R4SL50MG	46,00	47,00	50	231,0	184,0	1,45	G	TCF150512GP	TCF180508GC
5578730	TCF470R4SL50MG	47,00	48,00	50	235,3	188,0	1,53	G	TCF150512GP	TCF180508GC
5578731	TCF480R4SL50MG	48,00	49,00	50	239,7	192,0	1,63	G	TCF150512GP	TCF180508GC
5578732	TCF490R4SL50MG	49,00	50,00	50	244,0	196,0	1,74	G	TCF150512GP	TCF180508GC
5578733	TCF500R4SL50MG	50,00	51,00	50	249,8	200,0	1,87	G	TCF150512GP	TCF180508GC
5578734	TCF505R4SL50MG	50,50	51,50	50	252,0	202,0	1,94	G	TCF150512GP	TCF180508GC
5578735	TCF510R4SL50MG	51,00	52,00	50	254,1	204,0	2,02	G	TCF150512GP	TCF180508GC
5578736	TCF520R4SL50MG	52,00	53,00	50	258,4	208,0	2,22	G	TCF150512GP	TCF180508GC
5578737	TCF530R4SL50MG	53,00	54,00	50	262,8	212,0	2,46	G	TCF150512GP	TCF180508GC
5578738	TCF540R4SL50MG	54,00	55,00	50	267,1	216,0	2,53	G	TCF150512GP	TCF180508GC
5578739	TCF550R4SL50MG	55,00	56,00	50	271,4	220,0	2,73	G	TCF150512GP	TCF180508GC
5578750	TCF560R4SL50MG	56,00	57,00	50	275,7	224,0	2,37	G	TCF150512GP	TCF180508GC
5538647	TCF570R4SL50MH	57,00	58,00	50	279,5	228,0	1,76	H	TCF180614HP	TCF210608HC
5538648	TCF580R4SL50MH	58,00	59,00	50	283,9	232,0	1,85	H	TCF180614HP	TCF210608HC
5538649	TCF590R4SL50MH	59,00	60,00	50	288,2	236,0	1,96	H	TCF180614HP	TCF210608HC
5538650	TCF600R4SL50MH	60,00	61,00	50	292,5	240,0	1,42	H	TCF180614HP	TCF210608HC
5538651	TCF610R4SL50MH	61,00	62,00	50	296,8	244,0	2,23	H	TCF180614HP	TCF210608HC
5538652	TCF620R4SL50MH	62,00	63,00	50	301,1	248,0	2,41	H	TCF180614HP	TCF210608HC
5538653	TCF630R4SL50MH	63,00	64,00	50	305,5	252,0	2,64	H	TCF180614HP	TCF210608HC
5538654	TCF640R4SL50MH	64,00	65,00	50	309,8	256,0	2,94	H	TCF180614HP	TCF210608HC
5538655	TCF650R4SL50MH	65,00	66,00	50	314,1	260,0	3,06	H	TCF180614HP	TCF210608HC
5538656	TCF660R4SL50MH	66,00	67,00	50	318,4	264,0	3,18	H	TCF180614HP	TCF210608HC
5538657	TCF670R4SL50MH	67,00	68,00	50	322,7	268,0	3,30	H	TCF180614HP	TCF210608HC
5538658	TCF680R4SL50MH	68,00	69,00	50	327,1	272,0	2,93	H	TCF180614HP	TCF210608HC

(continued)

(Top Cut 4 Drill • Metric • 4 x D • SL Shanks — continued)

Spare Parts



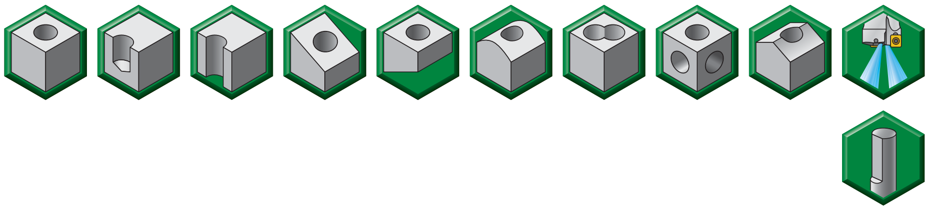


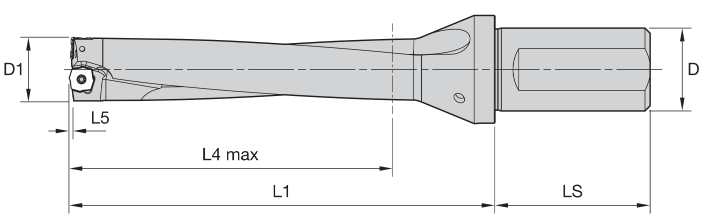
insert size	periphery insert	centre insert	insert screw order number	Torx size	Torx driver order number	tightening torque Nm
A	TCF040204AP	TCF040203AC	**2025073**	T5	**2029221**	0,40
B	TCF050204BP	TCF060203BC	**1175225**	T6	**1138455**	0,53
C	TCF070306CP	TCF070304CC	**1021337**	T7	**2029266**	0,90
D	TCF080308DP	TCF090305DC	**1134385**	T8	**2029598**	1,10
E	TCF100408EP	TCF120405EC	**2018194**	T9	**1138430**	2,00
F	TCF120412FP	TCF150406FC	**1756815**	T15	**2029596**	4,00
G	TCF150512GP	TCF180508GC	**1099645**	T20	**2029488**	6,30
H	TCF180614HP	TCF210608HC	**1823871**	T25	**1022519**	8,80

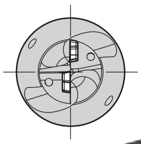
D	LS
20,00	50
25,00	56
32,00	60
40,00	70
50,00	80

NOTE: Drilling in stacked plates possible in certain applications. Ask for technical support.
Drill shipped with insert screws and Torx wrench.
See pages V20–V23 for inserts.
SL = Side Lock
D1 max is an achievable diameter using x-offset.

WARNING
During through-hole operations, a slug or disc is produced as the tool breaks through the workpiece. When the drill is stationary and the workpiece is rotating, this slug may be hurled from the chuck by centrifugal force. Provide adequate shielding to protect bystanders.







For information on LS, see the table on page V19.

■ Top Cut 4 Drill • Metric • 5 x D • SL Shanks

order number	catalogue number	D1	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537874	TCF120R5SL20MA	12,00	20	86,0	60,0	0,41	A	TCF040204AP	TCF040203AC
5537875	TCF125R5SL20MA	12,50	20	89,0	63,0	0,48	A	TCF040204AP	TCF040203AC
5537876	TCF127R5SL20MA	12,70	20	90,0	63,5	0,51	A	TCF040204AP	TCF040203AC
5537877	TCF130R5SL20MA	13,00	20	90,0	65,0	0,56	A	TCF040204AP	TCF040203AC
5537878	TCF135R5SL20MA	13,50	20	94,0	68,0	0,64	A	TCF040204AP	TCF040203AC
5577948	TCF140R5SL25MB	14,00	25	99,0	70,0	0,42	B	TCF050204BP	TCF060203BC
5577949	TCF145R5SL25MB	14,50	25	100,0	72,5	0,45	B	TCF050204BP	TCF060203BC
5577950	TCF150R5SL25MB	15,00	25	103,0	75,0	0,49	B	TCF050204BP	TCF060203BC
5577951	TCF155R5SL25MB	15,50	25	104,8	77,5	0,54	B	TCF050204BP	TCF060203BC
5577952	TCF160R5SL25MB	16,00	25	108,4	80,0	0,60	B	TCF050204BP	TCF060203BC
5577953	TCF165R5SL25MB	16,50	25	111,1	82,5	0,68	B	TCF050204BP	TCF060203BC
5577954	TCF170R5SL25MB	17,00	25	115,4	85,0	0,74	B	TCF050204BP	TCF060203BC
5577955	TCF175R5SL25MB	17,50	25	118,1	87,5	0,79	B	TCF050204BP	TCF060203BC
5577956	TCF180R5SL25MB	18,00	25	120,8	90,0	0,86	B	TCF050204BP	TCF060203BC
5577957	TCF185R5SL25MB	18,50	25	122,4	92,5	0,83	B	TCF050204BP	TCF060203BC
5578844	TCF190R5SL25MC	19,00	25	129,1	95,0	0,60	C	TCF070306CP	TCF070304CC
5578845	TCF195R5SL25MC	19,50	25	131,7	97,5	0,70	C	TCF070306CP	TCF070304CC
5578846	TCF200R5SL25MC	20,00	25	132,0	100,0	0,70	C	TCF070306CP	TCF070304CC
5578847	TCF205R5SL25MC	20,50	25	134,1	102,5	0,70	C	TCF070306CP	TCF070304CC
5578848	TCF210R5SL25MC	21,00	25	137,0	105,0	0,80	C	TCF070306CP	TCF070304CC
5578849	TCF220R5SL25MC	22,00	25	142,0	110,0	1,00	C	TCF070306CP	TCF070304CC
5578850	TCF225R5SL25MC	22,50	25	144,7	112,5	1,10	C	TCF070306CP	TCF070304CC
5578851	TCF230R5SL25MC	23,00	25	147,0	115,0	1,10	C	TCF070306CP	TCF070304CC
5537838	TCF240R5SL25MD	24,00	25	152,0	120,0	0,78	D	TCF080308DP	TCF090305DC
5537839	TCF250R5SL32MD	25,00	32	158,0	125,0	0,86	D	TCF080308DP	TCF090305DC
5537840	TCF260R5SL32MD	26,00	32	164,0	130,0	0,97	D	TCF080308DP	TCF090305DC
5537841	TCF265R5SL32MD	26,50	32	166,5	132,5	1,05	D	TCF080308DP	TCF090305DC
5537842	TCF270R5SL32MD	27,00	32	170,0	135,0	1,15	D	TCF080308DP	TCF090305DC
5537843	TCF280R5SL32MD	28,00	32	176,5	140,0	1,30	D	TCF080308DP	TCF090305DC
5537844	TCF290R5SL32MD	29,00	32	181,0	145,0	1,45	D	TCF080308DP	TCF090305DC
5537958	TCF300R5SL32ME	30,00	32	186,0	150,0	0,63	E	TCF100408EP	TCF120405EC
5537959	TCF310R5SL32ME	31,00	32	193,0	155,0	0,72	E	TCF100408EP	TCF120405EC

(continued)

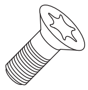
(Top Cut 4 Drill • Metric • 5 x D • SL Shanks — continued)

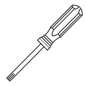
order number	catalogue number	D1	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537960	TCF320R5SL32ME	32,00	32	199,0	160,0	0,82	E	TCF100408EP	TCF120405EC
5537961	TCF330R5SL40ME	33,00	40	204,0	165,0	0,95	E	TCF100408EP	TCF120405EC
5537962	TCF340R5SL40ME	34,00	40	210,0	170,0	1,14	E	TCF100408EP	TCF120405EC
5537963	TCF350R5SL40ME	35,00	40	216,8	175,0	1,30	E	TCF100408EP	TCF120405EC
5537964	TCF360R5SL40ME	36,00	40	222,0	180,0	1,45	E	TCF100408EP	TCF120405EC
5578629	TCF370R5SL40MF	37,00	40	228,0	185,0	1,19	F	TCF120412FP	TCF150406FC
5578640	TCF375R5SL40MF	37,50	40	231,8	188,0	1,23	F	TCF120412FP	TCF150406FC
5578641	TCF380R5SL40MF	38,00	40	234,5	190,0	1,27	F	TCF120412FP	TCF150406FC
5578642	TCF390R5SL40MF	39,00	40	239,8	195,0	1,36	F	TCF120412FP	TCF150406FC
5578643	TCF400R5SL40MF	40,00	40	245,1	200,0	1,47	F	TCF120412FP	TCF150406FC
5578644	TCF410R5SL40MF	41,00	40	250,4	205,0	1,60	F	TCF120412FP	TCF150406FC
5578645	TCF420R5SL40MF	42,00	40	255,7	210,0	1,77	F	TCF120412FP	TCF150406FC
5578646	TCF430R5SL40MF	43,00	40	261,1	215,0	1,99	F	TCF120412FP	TCF150406FC
5578647	TCF440R5SL40MF	44,00	40	266,4	220,0	2,10	F	TCF120412FP	TCF150406FC
5578648	TCF450R5SL50MF	45,00	50	271,7	225,0	2,21	F	TCF120412FP	TCF150406FC
5578751	TCF460R5SL50MG	46,00	50	277,0	230,0	1,45	G	TCF150512GP	TCF180508GC
5578752	TCF470R5SL50MG	47,00	50	282,3	235,0	1,53	G	TCF150512GP	TCF180508GC
5578753	TCF480R5SL50MG	48,00	50	287,7	240,0	1,63	G	TCF150512GP	TCF180508GC
5578754	TCF490R5SL50MG	49,00	50	293,0	245,0	1,74	G	TCF150512GP	TCF180508GC
5578755	TCF500R5SL50MG	50,00	50	299,8	250,0	1,87	G	TCF150512GP	TCF180508GC
5578756	TCF505R5SL50MG	50,50	50	302,5	253,0	1,94	G	TCF150512GP	TCF180508GC
5578757	TCF510R5SL50MG	51,00	50	305,1	255,0	2,02	G	TCF150512GP	TCF180508GC
5578758	TCF520R5SL50MG	52,00	50	310,4	260,0	2,22	G	TCF150512GP	TCF180508GC
5578759	TCF530R5SL50MG	53,00	50	315,8	265,0	2,46	G	TCF150512GP	TCF180508GC
5578760	TCF540R5SL50MG	54,00	50	321,1	270,0	2,53	G	TCF150512GP	TCF180508GC
5578761	TCF550R5SL50MG	55,00	50	326,4	275,0	2,73	G	TCF150512GP	TCF180508GC
5578762	TCF560R5SL50MG	56,00	50	331,7	280,0	2,37	G	TCF150512GP	TCF180508GC
5538659	TCF570R5SL50MH	57,00	50	330,0	285,0	1,76	H	TCF180614HP	TCF210608HC
5538680	TCF580R5SL50MH	58,00	50	336,0	290,0	1,85	H	TCF180614HP	TCF210608HC
5538681	TCF590R5SL50MH	59,00	50	339,2	295,0	1,96	H	TCF180614HP	TCF210608HC
5538682	TCF600R5SL50MH	60,00	50	345,5	300,0	1,42	H	TCF180614HP	TCF210608HC
5538683	TCF610R5SL50MH	61,00	50	347,8	305,0	2,23	H	TCF180614HP	TCF210608HC
5538684	TCF620R5SL50MH	62,00	50	358,0	310,0	2,41	H	TCF180614HP	TCF210608HC
5538685	TCF630R5SL50MH	63,00	50	365,0	315,0	2,64	H	TCF180614HP	TCF210608HC
5538686	TCF640R5SL50MH	64,00	50	363,8	320,0	2,94	H	TCF180614HP	TCF210608HC
5538687	TCF650R5SL50MH	65,00	50	375,0	325,0	3,06	H	TCF180614HP	TCF210608HC
5538688	TCF660R5SL50MH	66,00	50	376,4	330,0	3,18	H	TCF180614HP	TCF210608HC
5538689	TCF670R5SL50MH	67,00	50	385,0	335,0	3,30	H	TCF180614HP	TCF210608HC
5538700	TCF680R5SL50MH	68,00	50	390,0	340,0	2,93	H	TCF180614HP	TCF210608HC

(continued)

(Top Cut 4 Drill • Metric • 5 x D • SL Shanks — continued)

Spare Parts



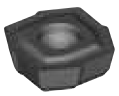


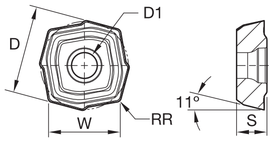
insert size	periphery insert	centre insert	insert screw order number	Torx size	Torx driver order number	tightening torque Nm
A	TCF040204AP	TCF040203AC	**2025073**	T5	**2029221**	0,40
B	TCF050204BP	TCF060203BC	**1175225**	T6	**1138455**	0,53
C	TCF070306CP	TCF070304CC	**1021337**	T7	**2029266**	0,90
D	TCF080308DP	TCF090305DC	**1134385**	T8	**2029598**	1,10
E	TCF100408EP	TCF120405EC	**2018194**	T9	**1138430**	2,00
F	TCF120412FP	TCF150406FC	**1756815**	T15	**2029596**	4,00
G	TCF150512GP	TCF180508GC	**1099645**	T20	**2029488**	6,30
H	TCF180614HP	TCF210608HC	**1823871**	T25	**1022519**	8,80

D	LS
20,00	50
25,00	56
32,00	60
40,00	70
50,00	80

NOTE: Drill shipped with insert screws and Torx wrench.
See pages V20–V23 for inserts.
SL = Side Lock

WARNING
During through-hole operations, a slug or disc is produced as the tool breaks through the workpiece. When the drill is stationary and the workpiece is rotating, this slug may be hurled from the chuck by centrifugal force. Provide adequate shielding to protect bystanders.





● first choice
○ alternate choice

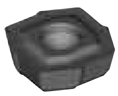
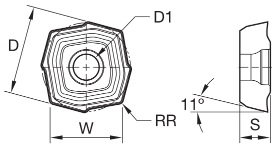
		WPK10CH	WU25CH	WU40PH
P		○	○	●
M			○	○
K		○	○	●
N				
S				
H				

■ Top Cut 4 Drill • Centre Inserts • V34

catalogue number	D	D1	W	S	RR	insert size	WPK10CH	WU25CH	WU40PH
TCF040203ACV34	4,47	2,10	3,65	2,00	0,300	A	-	5541817	5541818
TCF060203BCV34	6,00	2,40	4,90	2,40	0,300	B	-	5542602	5542604
TCF070304CCV34	7,59	2,60	6,20	2,80	0,400	C	-	5542642	5542643
TCF090305DCV34	9,55	2,80	7,80	3,00	0,500	D	-	5538554	5538555
TCF120405ECV34	12,00	3,40	9,80	3,60	0,500	E	-	5538603	5538604
TCF150406FCV34	14,94	4,80	12,20	4,20	0,600	F	-	5542623	5542624
TCF180508GCV34	17,88	6,00	14,60	5,40	0,800	G	-	5542475	5542476
TCF210608HCV34	21,68	7,50	17,70	6,50	0,800	H	-	5542002	5542003

NOTE: For application-specific insert selection, please refer to the application data on pages V24–V35.

Geometry	Application
V34	First choice for machining steel, cast iron, and short chipping materials. Suitable for severe cutting conditions.
V36	First choice for stainless steel. Suitable for long chipping steel and where low power consumption is required.

● first choice
○ alternate choice

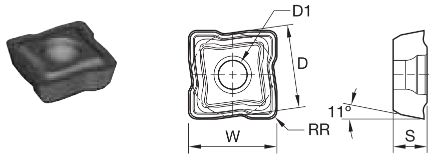
		WPK10CH	WU25CH	WU40PH
P		○	○	●
M			○	●
K		○	○	●
N				
S				
H				

■ Top Cut 4 Drill • Centre Inserts • V36

catalogue number	D	D1	W	S	RR	insert size	WPK10CH	WU25CH	WU40PH
TCF040203ACV36	4,47	2,10	3,65	2,00	0,300	A	-	5541819	5541840
TCF060203BCV36	6,00	2,40	4,90	2,40	0,300	B	-	5542606	5542607
TCF070304CCV36	7,59	2,60	6,20	2,80	0,400	C	-	5542644	5542645
TCF090305DCV36	9,55	2,80	7,80	3,00	0,500	D	-	5538556	5538557
TCF120405ECV36	12,00	3,40	9,80	3,60	0,500	E	-	5538606	5538607
TCF150406FCV36	14,94	4,80	12,20	4,20	0,600	F	-	5542625	5542626
TCF180508GCV36	17,88	6,00	14,60	5,40	0,800	G	-	5542477	5542478
TCF210608HCV36	21,68	7,50	17,70	6,50	0,800	H	-	5542004	5542005

NOTE: For application-specific insert selection, please refer to the application data on pages V24–V35.

Geometry	Application
V34	First choice for machining steel, cast iron, and short chipping materials. Suitable for severe cutting conditions.
V36	First choice for stainless steel. Suitable for long chipping steel and where low power consumption is required.



● first choice
○ alternate choice

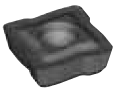
		WPK10CH	WU25CH	WU40PH
P		○	●	○
M			○	○
K		○	●	○
N				
S				
H				

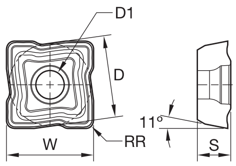
Top Cut 4 Drill • Periphery Inserts • V34

catalogue number	D	D1	W	S	RR	insert size	WPK10CH	WU25CH	WU40PH
TCF040204APV34	4,14	2,10	4,40	2,00	0,400	A	5541843	5541841	5541842
TCF050204BPV34	5,07	2,40	5,40	2,40	0,400	B	5542620	5542608	5542609
TCF070306CPV34	6,67	2,60	7,10	2,80	0,600	C	5542648	5542646	5542647
TCF080308DPV34	8,08	2,80	8,60	3,00	0,800	D	5538600	5538558	5538559
TCF100408EPV34	9,96	3,40	10,60	3,60	0,800	E	5538610	5538608	5538609
TCF120412FPV34	12,59	4,80	13,40	4,20	1,200	F	5542629	5542627	5542628
TCF150512GPV34	15,13	6,00	16,10	5,40	1,200	G	5542601	5542479	5542600
TCF180614HPV34	18,04	7,50	19,20	6,50	1,400	H	5542008	5542006	5542007

NOTE: For application-specific insert selection, please refer to the application data on pages V24–V35.

Geometry	Application
V34	First choice for machining steel, cast iron, and short chipping materials. Suitable for severe cutting conditions.
V36	First choice for stainless steel. Suitable for long chipping steel and where low power consumption is required.





● first choice
○ alternate choice

		WPK10CH	WU25CH	WU40PH
P		○	○	●
M			○	●
K		○	○	●
N				
S				
H				

■ Top Cut 4 Drill • Periphery Inserts • V36

catalogue number	D	D1	W	S	RR	insert size	WPK10CH	WU25CH	WU40PH
TCF040204APV36	4,14	2,10	4,40	2,00	0,400	A	-	5541844	5541845
TCF050204BPV36	5,07	2,40	5,40	2,40	0,400	B	-	5542621	5542622
TCF070306CPV36	6,67	2,60	7,10	2,80	0,600	C	-	5542649	5542650
TCF080308DPV36	8,08	2,80	8,60	3,00	0,800	D	-	5538601	5538602
TCF100408EPV36	9,96	3,40	10,60	3,60	0,800	E	-	5538611	5538612
TCF120412FPV36	12,59	4,80	13,40	4,20	1,200	F	-	5542640	5542641
TCF150512GPV36	15,13	6,00	16,10	5,40	1,200	G	-	5542603	5542605
TCF180614HPV36	18,04	7,50	19,20	6,50	1,400	H	-	5542009	5542020

NOTE: For application-specific insert selection, please refer to the application data on pages V24–V35.

Geometry	Application
V34	First choice for machining steel, cast iron, and short chipping materials. Suitable for severe cutting conditions.
V36	First choice for stainless steel. Suitable for long chipping steel and where low power consumption is required.

Top Cut 4 • Steel • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4						Recommended Feed Rate by Diameter (mm/r)											
						Insert Size A			Insert Size B			Insert Size C			Insert Size D		
						TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	1	S	P	V36	WU25CH	0,06	**0,08**	0,10	0,08	**0,10**	0,13	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,13	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,13	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
	2	S	P	V34	WPK10CH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	0,08	**0,11**	0,15	0,10	**0,12**	0,16	0,11	**0,14**	0,18	0,12	**0,15**	0,20
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
	4	S	P	V34	WPK10CH	0,08	**0,11**	0,15	0,10	**0,12**	0,16	0,11	**0,14**	0,18	0,12	**0,15**	0,20
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
	5	S	P	V36	WU25CH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
	6	S	P	V36	WU25CH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Top Cut 4 • Steel • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4						Recommended Cutting Speed by Diameter (m/min)											
						Insert Size A			Insert Size B			Insert Size C			Insert Size D		
						TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	1	S	P	V36	WU25CH	120	**140**	160	140	**160**	240	150	**180**	260	160	**180**	260
P	1	S	C	V36	WU40PH												
P	1	U	P	V36	WU40PH	110	**120**	140	130	**150**	220	130	**170**	250	140	**170**	250
P	1	U	C	V36	WU40PH												
P	1	I	P	V36	WU40PH	90	**100**	120	130	**150**	210	130	**170**	240	140	**170**	240
P	1	I	C	V36	WU40PH												
P	2	S	P	V34	WPK10CH	120	**140**	160	140	**170**	260	150	**190**	280	160	**190**	280
P	2	S	C	V34	WU40PH												
P	2	U	P	V34	WU25CH	110	**120**	140	130	**170**	240	140	**180**	260	150	**180**	260
P	2	U	C	V34	WU40PH												
P	2	I	P	V34	WU40PH	90	**100**	120	130	**170**	230	130	**170**	240	140	**170**	240
P	2	I	C	V34	WU40PH												
P	3	S	P	V34	WPK10CH	120	**140**	180	140	**170**	270	150	**200**	290	160	**200**	310
P	3	S	C	V34	WU40PH												
P	3	U	P	V34	WU25CH	110	**120**	160	130	**160**	260	140	**200**	280	150	**200**	280
P	3	U	C	V34	WU40PH												
P	3	I	P	V34	WU40PH	100	**110**	140	120	**150**	250	130	**180**	260	140	**180**	260
P	3	I	C	V34	WU40PH												
P	4	S	P	V34	WPK10CH	120	**140**	180	140	**170**	270	150	**200**	290	160	**200**	310
P	4	S	C	V34	WU40PH												
P	4	U	P	V34	WU25CH	110	**120**	160	130	**160**	260	140	**200**	280	150	**200**	280
P	4	U	C	V34	WU40PH												
P	4	I	P	V34	WU40PH	100	**110**	140	120	**150**	250	130	**180**	260	140	**180**	260
P	4	I	C	V34	WU40PH												
P	5	S	P	V36	WU25CH	120	**140**	160	140	**170**	240	150	**180**	250	160	**180**	250
P	5	S	C	V36	WU40PH												
P	5	U	P	V36	WU40PH	110	**120**	140	130	**160**	230	140	**170**	240	150	**170**	240
P	5	U	C	V36	WU40PH												
P	5	I	P	V36	WU40PH	90	**100**	120	130	**160**	230	130	**160**	220	140	**160**	220
P	5	I	C	V36	WU40PH												
P	6	S	P	V36	WU25CH	120	**140**	160	140	**170**	200	140	**170**	210	150	**170**	210
P	6	S	C	V36	WU40PH												
P	6	U	P	V36	WU40PH	110	**120**	140	120	**150**	190	130	**160**	200	140	**160**	200
P	6	U	C	V36	WU40PH												
P	6	I	P	V36	WU40PH	90	**100**	120	110	**130**	180	120	**140**	190	120	**140**	190
P	6	I	C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Top Cut 4 • Steel • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4						Recommended Feed Rate by Diameter (mm/r)											
						Insert Size E			Insert Size F			Insert Size G			Insert Size H		
						TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	1	S	P	V36	WU25CH	0,13	**0,14**	0,18	0,15	**0,17**	0,20	0,16	**0,23**	0,27	0,17	**0,24**	0,29
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,13	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,13	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
	2	S	P	V34	WPK10CH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	0,08	**0,11**	0,15	0,10	**0,12**	0,16	0,11	**0,14**	0,18	0,12	**0,15**	0,20
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
	4	S	P	V34	WPK10CH	0,08	**0,11**	0,15	0,10	**0,12**	0,16	0,11	**0,14**	0,18	0,12	**0,15**	0,20
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
	5	S	P	V36	WU25CH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
	6	S	P	V36	WU25CH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Top Cut 4 • Steel • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4						Recommended Cutting Speed by Diameter (m/min)											
						Insert Size E			Insert Size F			Insert Size G			Insert Size H		
						TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	1	S	P	V36	WU25CH	160	**180**	260	160	**180**	260	160	**180**	260	160	**180**	260
			C	V36	WU40PH												
		U	P	V36	WU40PH	140	**170**	250	140	**170**	250	140	**170**	250	140	**170**	250
			C	V36	WU40PH												
		I	P	V36	WU40PH	140	**170**	240	140	**170**	240	140	**170**	240	140	**170**	240
			C	V36	WU40PH												
	2	S	P	V34	WPK10CH	160	**190**	280	160	**190**	280	160	**190**	280	160	**190**	280
			C	V34	WU40PH												
		U	P	V34	WU25CH	150	**180**	260	150	**180**	260	150	**180**	260	150	**180**	260
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**170**	240	140	**170**	240	140	**170**	240	140	**170**	240
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	160	**200**	310	160	**200**	310	160	**200**	310	160	**200**	310
			C	V34	WU40PH												
		U	P	V34	WU25CH	150	**200**	280	150	**200**	280	150	**200**	280	150	**200**	280
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**180**	260	140	**180**	260	140	**180**	260	140	**180**	260
			C	V34	WU40PH												
	4	S	P	V34	WPK10CH	160	**200**	310	160	**200**	310	160	**200**	310	160	**200**	310
			C	V34	WU40PH												
		U	P	V34	WU25CH	150	**200**	280	150	**200**	280	150	**200**	280	150	**200**	280
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**180**	260	140	**180**	260	140	**180**	260	140	**180**	260
			C	V34	WU40PH												
	5	S	P	V36	WU25CH	160	**180**	250	160	**180**	250	160	**180**	250	160	**180**	250
			C	V36	WU40PH												
		U	P	V36	WU40PH	150	**170**	240	150	**170**	240	150	**170**	240	150	**170**	240
			C	V36	WU40PH												
		I	P	V36	WU40PH	140	**160**	220	140	**160**	220	140	**160**	220	140	**160**	220
			C	V36	WU40PH												
	6	S	P	V36	WU25CH	150	**170**	210	150	**170**	210	150	**170**	210	150	**170**	210
			C	V36	WU40PH												
		U	P	V36	WU40PH	140	**160**	200	140	**160**	200	140	**160**	200	140	**160**	200
			C	V36	WU40PH												
		I	P	V36	WU40PH	120	**140**	190	120	**140**	190	120	**140**	190	120	**140**	190
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Indexable Drills

WIDIA

Top Cut 4 • Stainless Steel • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4					Recommended Feed Rate by Diameter (mm/r)											
					Insert Size A			Insert Size B			Insert Size C			Insert Size D		
					TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
M	1	S	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,13	0,08	**0,10**	0,15	0,10	**0,12**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,12	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,11	0,07	**0,10**	0,11	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												
	2	S	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,13	0,08	**0,10**	0,15	0,10	**0,12**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,12	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,11	0,07	**0,10**	0,11	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												
	3	S	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,13	0,08	**0,10**	0,15	0,10	**0,12**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,12	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,11	0,07	**0,10**	0,11	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Top Cut 4 • Stainless Steel • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4					Recommended Cutting Speed by Diameter (m/min)											
					Insert Size A			Insert Size B			Insert Size C			Insert Size D		
					TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
M	1	S	P	V36	WU40PH	120	**140**	160	140	**160**	230	150	**170**	240	150	**170**	240
			C	V36	WU40PH												
		U	P	V36	WU40PH	110	**120**	140	130	**150**	210	130	**160**	210	130	**160**	210
			C	V36	WU40PH												
		I	P	V36	WU40PH	90	**100**	120	130	**150**	200	130	**160**	200	130	**160**	200
			C	V36	WU40PH												
	2	S	P	V36	WU40PH	120	**140**	160	140	**160**	200	150	**170**	210	150	**170**	210
			C	V36	WU40PH												
		U	P	V36	WU40PH	110	**120**	140	130	**150**	180	130	**160**	200	130	**160**	200
			C	V36	WU40PH												
		I	P	V36	WU40PH	90	**100**	120	120	**140**	170	130	**150**	180	130	**150**	180
			C	V36	WU40PH												
	3	S	P	V36	WU40PH	110	**120**	140	130	**150**	180	140	**160**	200	140	**160**	200
			C	V36	WU40PH												
		U	P	V36	WU40PH	90	**110**	120	120	**130**	160	130	**140**	180	130	**140**	180
			C	V36	WU40PH												
		I	P	V36	WU40PH	80	**100**	110	100	**120**	150	110	**130**	160	110	**130**	160
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Top Cut 4 • Stainless Steel • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4					Recommended Feed Rate by Diameter (mm/r)											
					Insert Size E			Insert Size F			Insert Size G			Insert Size H		
					TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
M	1	S	P	V36	WU40PH	0,12	**0,14**	0,20	0,14	**0,16**	0,25	0,16	**0,18**	0,28	0,16	**0,20**	0,30
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												
	2	S	P	V36	WU40PH	0,12	**0,14**	0,20	0,14	**0,16**	0,25	0,16	**0,18**	0,28	0,16	**0,20**	0,30
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												
	3	S	P	V36	WU40PH	0,12	**0,14**	0,20	0,14	**0,16**	0,25	0,16	**0,18**	0,28	0,16	**0,20**	0,30
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
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Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Top Cut 4 • Stainless Steel • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4						Recommended Cutting Speed by Diameter (m/min)											
						Insert Size E			Insert Size F			Insert Size G			Insert Size H		
						TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		**Condition**	**Pocket Seat**	**Geometry**	**Grade**	**min**	**Start**	**max**	**min**	**Start**	**max**	**min**	**Start**	**max**	**min**	**Start**	**max**
M	**1**	**S**	**P**	**V36**	**WU40PH**	150	**170**	240	150	**170**	240	150	**170**	240	150	**170**	240
			C	**V36**	**WU40PH**												
		U	**P**	**V36**	**WU40PH**	130	**160**	210	130	**160**	210	130	**160**	210	130	**160**	210
			C	**V36**	**WU40PH**												
		I	**P**	**V36**	**WU40PH**	130	**160**	200	130	**160**	200	130	**160**	200	130	**160**	200
			C	**V36**	**WU40PH**												
	2	**S**	**P**	**V36**	**WU40PH**	150	**170**	210	150	**170**	210	150	**170**	210	150	**170**	210
			C	**V36**	**WU40PH**												
		U	**P**	**V36**	**WU40PH**	130	**160**	200	130	**160**	200	130	**160**	200	130	**160**	200
			C	**V36**	**WU40PH**												
		I	**P**	**V36**	**WU40PH**	130	**150**	180	130	**150**	180	130	**150**	180	130	**150**	180
			C	**V36**	**WU40PH**												
	3	**S**	**P**	**V36**	**WU40PH**	140	**160**	200	140	**160**	200	140	**160**	200	140	**160**	200
			C	**V36**	**WU40PH**												
		U	**P**	**V36**	**WU40PH**	130	**140**	180	130	**140**	180	130	**140**	180	130	**140**	180
			C	**V36**	**WU40PH**												
		I	**P**	**V36**	**WU40PH**	110	**130**	160	110	**130**	160	110	**130**	160	110	**130**	160
			C	**V36**	**WU40PH**												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Top Cut 4 • Cast Iron • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4						Recommended Feed Rate by Diameter (mm/r)											
						Insert Size A			Insert Size B			Insert Size C			Insert Size D		
						TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
K	1	S	P	V34	WPK10CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												
	2	S	P	V34	WPK10CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Top Cut 4 • Cast Iron • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4					Recommended Cutting Speed by Diameter (m/min)											
					Insert Size A			Insert Size B			Insert Size C			Insert Size D		
					TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
K	1	S	P	V34	WPK10CH	120	**140**	180	140	**170**	250	150	**180**	260	160	**200**	280
			C	V34	WU25CH												
		U	P	V34	WU25CH	110	**120**	160	130	**160**	240	140	**170**	250	150	**180**	260
			C	V34	WU40PH												
		I	P	V34	WU40PH	100	**110**	140	120	**150**	230	130	**160**	240	140	**170**	260
			C	V34	WU40PH												
	2	S	P	V34	WPK10CH	120	**140**	180	130	**160**	240	140	**180**	250	150	**180**	260
			C	V34	WU25CH												
		U	P	V34	WU25CH	110	**120**	160	120	**150**	230	130	**160**	240	140	**160**	250
			C	V34	WU40PH												
		I	P	V34	WU40PH	100	**110**	140	120	**150**	220	130	**160**	240	140	**160**	250
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	120	**140**	160	130	**160**	240	140	**170**	240	150	**170**	250
			C	V34	WU25CH												
		U	P	V34	WU25CH	110	**120**	140	120	**150**	230	130	**160**	230	140	**160**	240
			C	V34	WU40PH												
		I	P	V34	WU40PH	90	**100**	120	120	**150**	230	130	**160**	230	140	**160**	220
			C	V34	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Indexable Drills

Top Cut 4 • Cast Iron • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4						Recommended Feed Rate by Diameter (mm/r)											
						Insert Size E			Insert Size F			Insert Size G			Insert Size H		
						TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
K	1	S	P	V34	WPK10CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												
	2	S	P	V34	WPK10CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
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Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

■ Top Cut 4 • Cast Iron • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4					Recommended Cutting Speed by Diameter (m/min)											
					Insert Size E			Insert Size F			Insert Size G			Insert Size H		
					TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
K	1	S	P	V34	WPK10CH	160	**200**	280	160	**200**	280	160	**200**	280	160	**200**	280
			C	V34	WU25CH												
		U	P	V34	WU25CH	150	**180**	260	150	**180**	260	150	**180**	260	150	**180**	260
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**170**	260	140	**170**	260	140	**170**	260	140	**170**	260
			C	V34	WU40PH												
	2	S	P	V34	WPK10CH	150	**180**	260	150	**180**	260	150	**180**	260	150	**180**	260
			C	V34	WU25CH												
		U	P	V34	WU25CH	140	**160**	250	140	**160**	250	140	**160**	250	140	**160**	250
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**160**	250	140	**160**	250	140	**160**	250	140	**160**	250
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	150	**170**	250	150	**170**	250	150	**170**	250	150	**170**	250
			C	V34	WU25CH												
		U	P	V34	WU25CH	140	**160**	240	140	**160**	240	140	**160**	240	140	**160**	240
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**160**	220	140	**160**	220	140	**160**	220	140	**160**	220
			C	V34	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
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For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

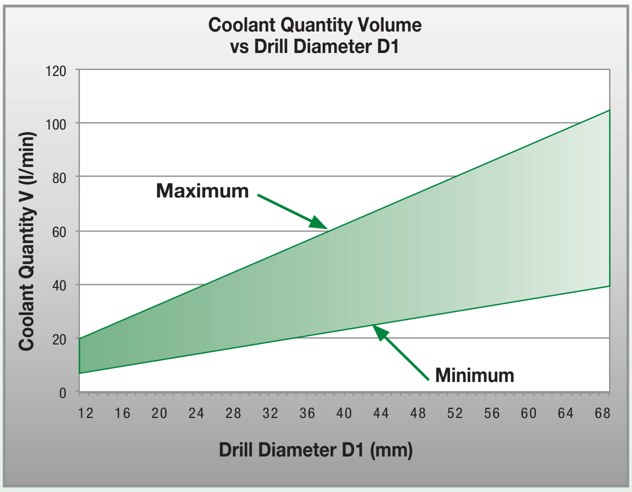
Top Cut 4 • Drill Depth • 2 x D/3 x D • Hole Tolerance Table

Insert size	Diameter Range (mm)	Hole Tolerance (mm)
A	12,00–13,99	+/- 0,20
B	14,00–18,99	+/- 0,20
C	19,00–23,99	+/- 0,20
D	24,00–29,99	+/- 0,20
E	30,00–36,99	+/- 0,20
F	37,00–45,99	+/- 0,25
G	46,00–56,99	+/- 0,25
H	57,00–68,00	+/- 0,28

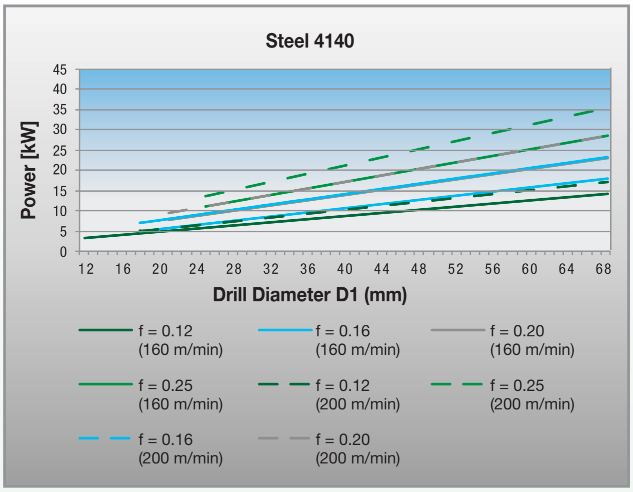
Top Cut 4 • Drill Depth • 4 x D/5 x D • Hole Tolerance Table

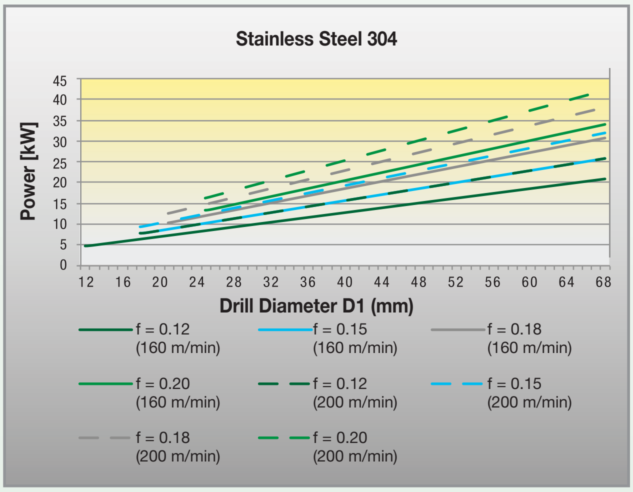
Insert size	Diameter Range (mm)	Hole Tolerance (mm)
A	12,00–13,99	+/- 0,35
B	14,00–18,99	+/- 0,35
C	19,00–23,99	+/- 0,35
D	24,00–29,99	+/- 0,35
E	30,00–36,99	+/- 0,35
F	37,00–45,99	+/- 0,38
G	46,00–56,99	+/- 0,38
H	57,00–68,00	+/- 0,42

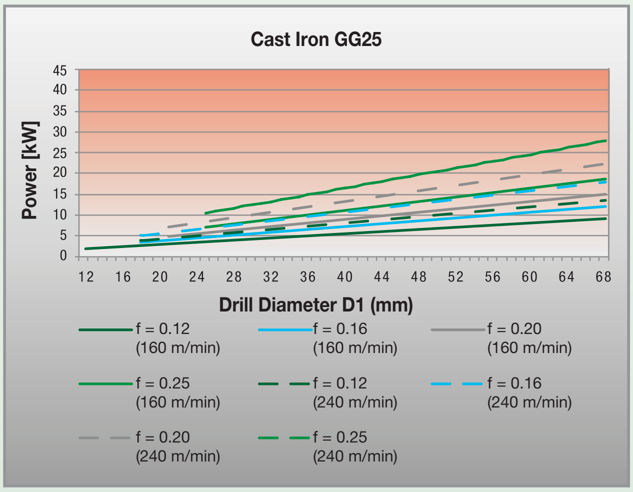
Coolant Requirement/Recommendation



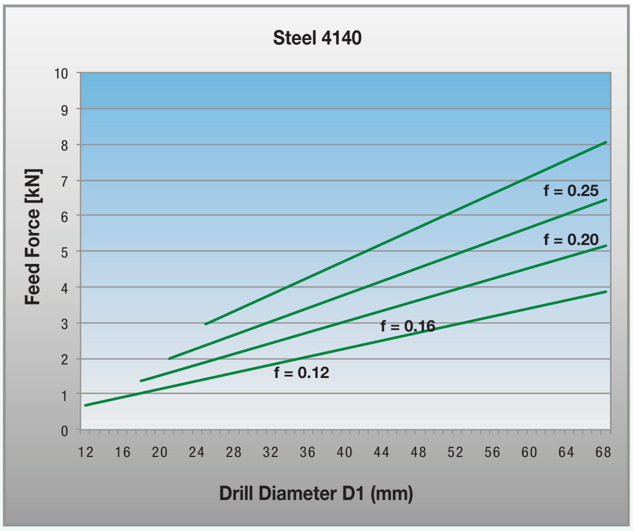
Power Requirement

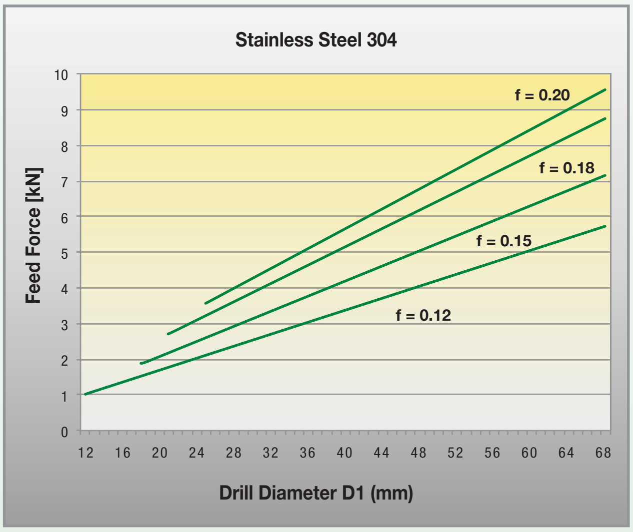


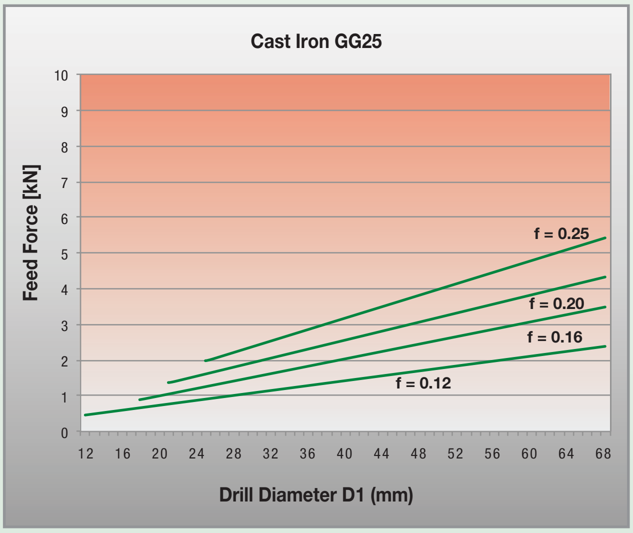




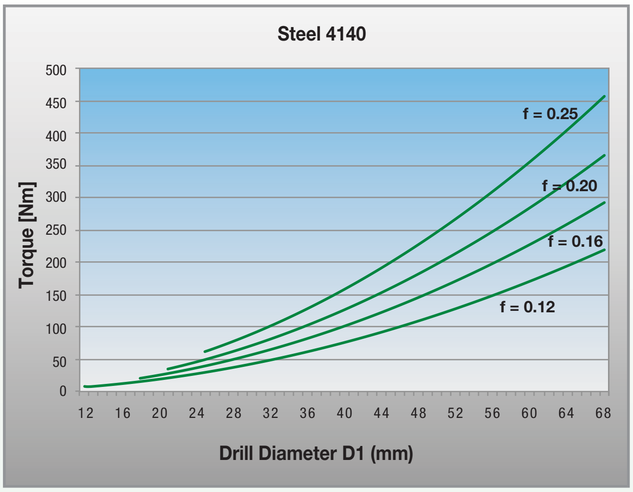
Feed Force Requirement

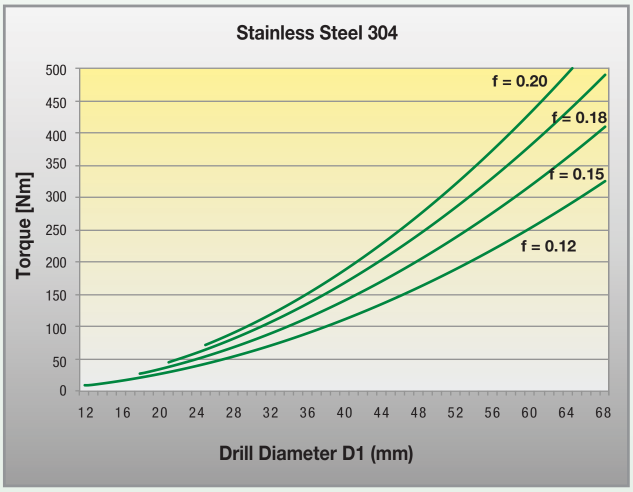


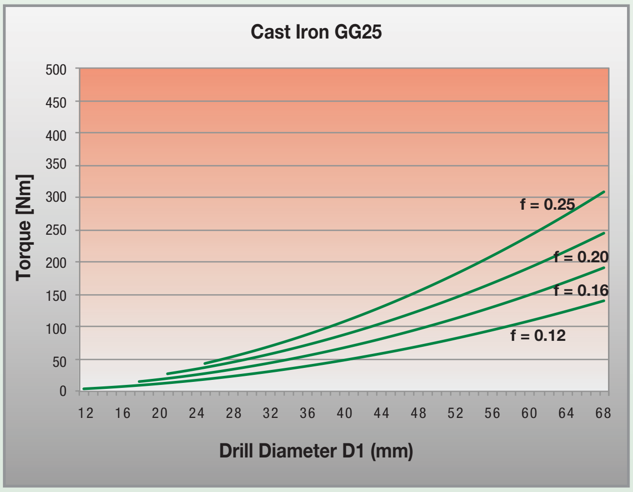




Torque Requirement







X-Offset Capabilities • Metric

Insert size	Diameter Range (mm)	2 x D and 3 x D		4 x D		5 x D	
		X-offset value max. in mm	D1 max value	X-offset value max. in mm	D1 max value	X-offset value max.	D1 max value
A	12,00–13,99	0,5	D1 + 1mm	0,5	D1 + 1mm	—	—
B	14,00–18,99	0,5	D1 + 1mm	0,5	D1 + 1mm	—	—
C	19,00–23,99	0,5	D1 + 1mm	0,5	D1 + 1mm	—	—
D	24,00–29,99	0,8	D1 + 1,6mm	0,8	D1 + 1mm	—	—
E	30,00–36,99	0,8	D1 + 1,6mm	0,8	D1 + 1mm	—	—
F	37,00–45,99	0,8	D1 + 1,6mm	0,8	D1 + 1mm	—	—
G	46,00–56,99	1	D1 + 2mm	0,8	D1 + 1mm	—	—
H	57,00–68,00	1	D1 + 2mm	0,8	D1 + 1mm	—	—

Reconditioning Services

WIDIA™ Reconditioning Services Optimise the Total Value of Metalcutting Tools Throughout Their Entire Life

WIDIA Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

- Local support you can trust.
- Rapid turnaround to minimise inventory.
- Like-new performance continues delivering productivity.
- Application support throughout the tool lifecycle.
- WIDIA proprietary geometry specifications after each regrind.
- WIDIA certified coatings.
- Easy logistics through the reconditioning process.

Simple Logistics

Our unique reconditioning program simplifies sending and receiving reconditioned tools to reduce shipping time and increase on-hand inventory.

To use WIDIA tool reconditioning services, contact your authorised WIDIA distributor to get started.

Global Reconditioning Network

To locate a Reconditioning Center near you, visit **widia.com/services.**

WIDIA™

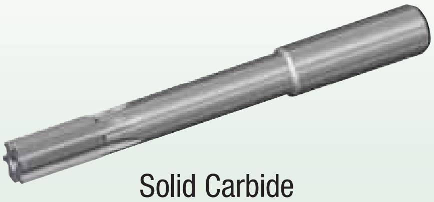
Holemaking • Hole Finishing

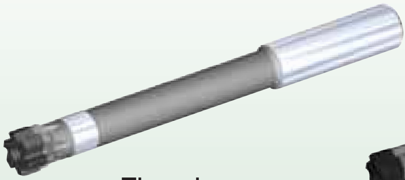
Hole Finishing with WIDIA™

Hole Finishing with WIDIA

WIDIA is one of the only sources in the metalworking industry that offers all types of hole finishing tooling — from reaming and fine boring to motion tooling. By owning the entire process chain — from raw materials to reconditioning — WIDIA offers customised solutions to meet any imaging challenge, regardless of portfolio or capacity.

REAMING


Solid Carbide


Tipped


Modular

BORING


Roughing


Finishing

COUNTERSINKING


Countersinkers

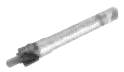

Porting
Fluid Power

PCD ROUND TOOLS


Steel-based


Carbide-based

● first choice
○ alternate choice

			P	M	K	N	S	H	standard diameter range	standard diameter accuracy	engineered solution diameter range	engineered solution diameter accuracy	⌖	⌭
reaming tools		**HSR™ — Solid Carbide** High-Speed Reamer Carbide	●	●	●	●	○		.196–.551" 5–14mm	IT7	.056–1.00" 1,4–25,4mm	IT6 >.39" >10mm	.0004" 10 µm	.0003" 7 µm
		**HSR — Carbide Tipped** High-Speed Reamer Carbide/Cermet	●	●	●	●	○		.551–1.26" 14–32mm	IT7	.551–2.55" 14–65mm	IT6	.0004" 10 µm	.0003" 7 µm
boring/fine-boring tools		**ROTAFLEX™ FBHBB** Fine-Boring Carbide/Cermet/PCD/CBN	●	●	●	●	●	○	.236–.866" 6–22mm	IT7	–	–	.0002" 5 µm	.0002– .0004" 5–10 µm
		**ROTAFLEX FBH** Fine-Boring Carbide/Cermet/PCD/CBN	●	●	●	●	●	○	.866–4.25" 22–115mm	IT7	–	–	.0002" 5 µm	.0002– .0004" 5–10 µm
		**ROTAFLEX TCHS** Roughing Carbide/Cermet/PCD/CBN	●	●	●	●	●		.886–4.52" 22,5–115mm	IT7	–	–	.0004" 10 µm	>.0008" >20 µm
		**ROTAFLEX Small Bridge Tools** Roughing Carbide/Cermet/PCD/CBN	●	●	●	●	●		3.425–7.87" 87–200mm	IT7	–	–	.0004" 10 µm	>.0008" >20 µm
		**ROTAFLEX Large Bridge Tools** Roughing Carbide/Cermet/PCD/CBN	●	●	●	●	●		7.87–20.47" 200–520mm	IT7	–	–	.0004" 10 µm	>.0008" >20 µm
		**Fine-Boring Cartridges** Fine-Boring Carbide/Cermet/PCD/CBN	●	○	●	●	○		3.425–20.47" 87–520mm	IT7	–	–	.0002" 5 µm	.0002– .0004" 5–10 µm
countersinking		**Countersinking** Round Tools Steel Base				●			–	–	–	IT7	.0004" 10 µm	.0004" 10 µm
		**Port Cutters** Carbide/Cermet Steel Base				●			for standard ports SAE, BSPP, ISO	–	–	IT7	.0004" 10 µm	.0004" 10 µm
PCD		**PCD** Round Tools Steel Base CBN				●			–	–	.394–4.00" 10–100mm	IT6	.0004" 10 µm	.0004" 10 µm
		**PCD** Round Tools Carbide Base				●			–	–	.197–1.00" 5–25mm	IT6	.0002" 5 µm	.0003" 7 µm

⌭ *Cylindricity*
NOTE: Process- and application-dependent.
Highly dependent on the pre-machine hole accuracy.
Use of high-performance drilling/pre-machining tools mandatory to reach values.

⌖ *Position*
NOTE: Process- and application-dependent.
Highly dependent on the pre-machine hole accuracy.
Use of high-performance drilling/pre-machining tools mandatory to reach values.

achievable surface quality Ra						capability				cost/part	cycle time	required operator experience	page(s)
P	M	K	N	S	H								
20–40 µ-in 0,5–1,0 µm	20–40 µ-in 0,5–1,0 µm	20–60 µ-in 0,5–1,5 µm	–	20–40 µ-in 0,5–1,0 µm	–	●	●	●	●	moderate	low	low	W8–W10, W13–W14
20–40 µ-in 0,5–1,0 µm	20–40 µ-in 0,5–1,0 µm	20–60 µ-in 0,5–1,5 µm	–	20–40 µ-in 0,5–1,0 µm	–	●	●	● carbide only	● carbide only	moderate	low	low	W11–W12, W15–W16
32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	<48 µ-in <1,2 µm	●	●	●	●	low	moderate	low–moderate	W49–W51
32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	<48 µ-in <1,2 µm	●	●	●	●	low	moderate	low–moderate	W52–W53
40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–80 µ-in 1,0–2,0 µm	40–200 µ-in 1,0–5,0 µm	–	●	●	●	●	low	moderate	low–moderate	W36–W37
40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–80 µ-in 1,0–2,0 µm	40–200 µ-in 1,0–5,0 µm	–	●	●	●	●	low	low	low–moderate	W38–W39
40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–80 µ-in 1,0–2,0 µm	40–200 µ-in 1,0–5,0 µm	–	●	●	●	●	low	moderate	low–moderate	W40–W45
32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	–	●	●	○	○	low	moderate	low–moderate	W46–W48
32–80µ-in -2,0 µm	32–80µ-in -2,0 µm	32–80µ-in -2,0 µm	32–80 µ-in 0,8–2,0 µm	–	–	●	●	●	●	very low	very low	moderate	W76–W77
32–80µ-in -2,0 µm	32–80µ-in -2,0 µm	32–80µ-in -2,0 µm	32–80 µ-in 0,8–2,0 µm	–	–	●	●	●	●	very low	very low	moderate	W74–W75
–	–	–	4–32 µ-in 0,1–0,8 µm	–	–	●	●	●	●	low	very low	moderate	W80–W81
–	–	–	4–32 µ-in 0,1–0,8 µm	–	–	●	●	●	●	low	very low	moderate	W80–W81

Ra *Surface roughness*
NOTE: Surface roughness values are guidelines and depend on the application, coolant situation, machine, and cutting data applied.

HSR™ Reaming Tools combine high-performance micrograin substrates, specific coatings, and extremely unequal flutes for outstanding machining results. Increase your productivity with the HSR leads and lapped grinding surface of rake, clearance, and relief angle.

HSR Reaming Tools

HSR Solid Carbide Reaming Tools

- Diameters starting at 1,40mm (.055") with internal coolant supply available as standard.
- Ground to H7 tolerance class for use in most applications.
- Specific coatings and lead configurations available for high-speed machining of steel, stainless steel, and cast iron.
- Uncoated micrograin substrates for machining stainless steel and non-ferrous materials at accelerated speeds.

Features and Benefits

- Lapped ground leads for high-speed cutting.
- Long tool life with increased hole and surface quality.
- High Metal Removal Rates (MRR) at increased speeds and feeds.
- Radial coolant supply for through hole applications and axial coolant supply for blind holes to achieve higher feed rates.
- Decreased runout and improved straightness due to unequal flutes.

Customisation

- Diameters starting at 1,40mm (.055") up to 14,15mm (.557") available with and without internal coolant in 0,001mm steps.
- Solid cermet reaming tools and tooling for heat-resistant materials are available on request.

HSR™ Carbide- and Cermet-Tipped Reaming Tools

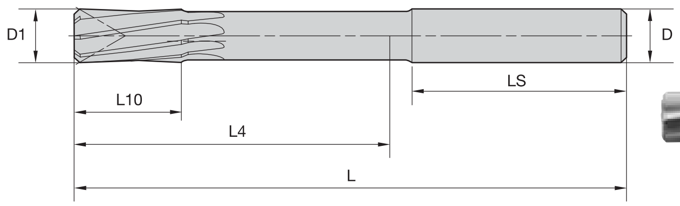
- Achieve solid carbide and solid cermet metal removal rates from 14–32mm (.551–1.26") with no customisation required.
- Ground to H7 tolerance class to accomodate most applications.
- Specific coatings and lead configuration for high-speed machining of steel, stainless steel, cast iron, and non-ferrous materials at accelerated speeds.
- Coated and uncoated micrograin substrate carbide and coated cermet specifically engineered for reaming.

Features and Benefits

- Lapped ground leads for high-speed cutting.
- Long tool life with increased hole and surface quality.
- High metal removal rates at higher speeds and feeds.
- Decreased runout and improved straightness due to unequal flutes.
- Adjustment screw at straight-fluted HSR reamers to change internal coolant supply from axial to radial.
- Optimised coolant options for blind holes and blind hole applications with interrupted cut.

Customisation

- Diameters up to 50mm (1.968") available with and without internal coolant in 0,001mm steps.
- HSR tooling for machining heat-resistant materials is available on request.



HSR Reamers with Helical Flutes for Through Holes • K10™ • 1,4–10mm

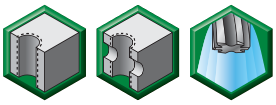
≤h6

P	●
M	●
K	●
N	●
S	●
H	

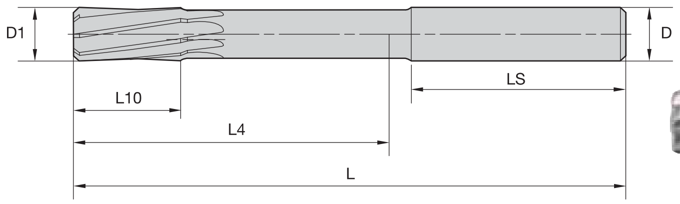
● first choice
○ alternate choice

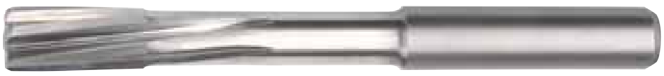
grade K10
uncoated

order #	catalogue #	D1	D	L	L4	L10	LS	Z
2293636	050221-000014	1,40	1,40	40	18	8	22	3
2293637	050221-000015	1,50	1,50	40	18	8	22	3
2293638	050221-000016	1,60	1,60	43	20	9	23	3
2283423	050221-000020	2,00	2,00	49	24	11	25	4
2283424	050221-000022	2,20	2,20	53	26	12	27	4
2283426	050221-000025	2,50	2,50	57	28	14	29	4
2283427	050221-000028	2,80	2,80	61	32	15	29	4
2283428	050221-000030	3,00	3,00	61	32	15	29	6
2283429	050221-000032	3,20	3,20	65	35	16	30	6
2283430	050221-000035	3,50	3,50	70	40	18	30	6
2283431	050221-000040	4,00	4,00	75	41	19	32	6
2293640	050221-000045	4,50	4,50	80	44	21	33	6
2283445	050221-000050	5,00	5,00	86	51	23	34	6
2293641	050221-000055	5,50	5,60	93	57	26	36	6
2293642	050221-000060	6,00	5,60	93	53	26	36	6
2293643	050221-000065	6,50	6,30	101	63	28	38	6
2293644	050221-000070	7,00	7,10	109	69	31	40	6
2283450	050221-000075	7,50	7,10	109	69	31	40	6
2283451	050221-000080	8,00	8,00	117	75	33	42	6
2283463	050221-000085	8,50	8,00	117	75	33	42	6
2283464	050221-000090	9,00	9,00	125	81	36	44	6
2283465	050221-000095	9,50	9,00	125	81	36	44	6
2283466	050221-000100	10,00	10,00	133	87	38	46	6

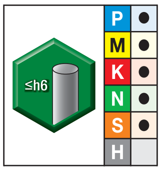


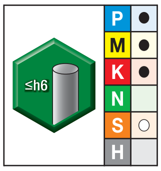
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 hole tolerance capability starting at diameter 10mm is available as a Custom Solution. Additional diameters and lengths made to order.





■ HSR Reamers with Helical Flutes for Through Holes • K10F™/K10F-DCFD™ • 2–144mm

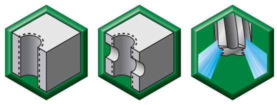


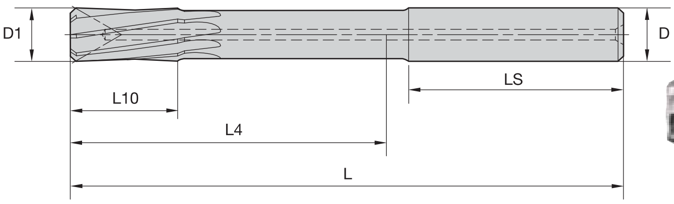


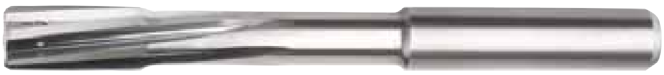
● first choice
○ alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**L**	**L4**	**L10**	**LS**	**Z**
2436494	**050227-000200**	**2441162**	**450227-000200**	2,00	3,00	48	15	6	28	4
2436871	**050227-000300**	**2441253**	**450227-000300**	3,00	3,00	48	15	6	28	4
2436872	**050227-000400**	**2441254**	**450227-000400**	4,00	4,00	54	21	8	28	4
2436913	**050227-000500**	**2441256**	**450227-000500**	5,00	6,00	74	32	12	36	4
2436914	**050227-000600**	**2441257**	**450227-000600**	6,00	6,00	74	33	12	36	4
2436916	**050227-000800**	**2441260**	**450227-000800**	8,00	8,00	91	50	16	36	6
2436919	**050227-001000**	**2441261**	**450227-001000**	10,00	10,00	103	58	20	40	6
2436922	**050227-001200**	**2441284**	**450227-001200**	12,00	12,00	118	68	24	45	6
2436946	**050227-001400**	**2441285**	**450227-001400**	14,00	14,00	132	81	28	45	6

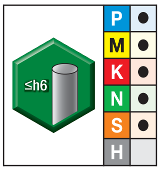
- Standard reamers listed are ground to achieve an H7 tolerance hole.
  IT6 capability is available. Additional diameters and lengths made to order.

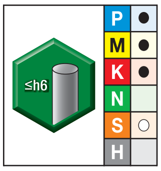






■ HSR Reamers with Helical Flutes for Through Holes • K10F™/K10F-DCFD™ • 5–14mm



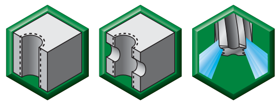


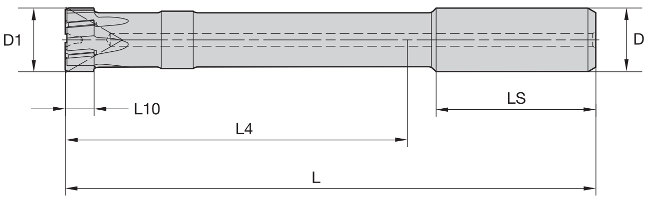
● first choice
○ alternate choice

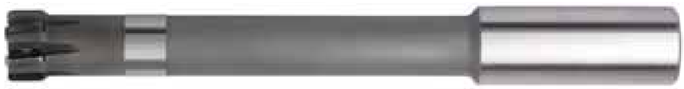
grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	**catalogue #**	**order #**	**catalogue #**	**D1**	**D**	**L**	**L4**	**L10**	**LS**	**Z**
2437425	**050271-000500**	**2441380**	**450271-000500**	5,00	6,00	74	32	12	36	4
2437426	**050271-000600**	**2441381**	**450271-000600**	6,00	6,00	74	33	12	36	4
2437428	**050271-000800**	**2441453**	**450271-000800**	8,00	8,00	91	50	16	36	6
2437430	**050271-001000**	**2441455**	**450271-001000**	10,00	10,00	103	58	20	40	6
2437432	**050271-001200**	**2441457**	**450271-001200**	12,00	12,00	118	68	24	45	6
2437468	**050271-001400**	**2441494**	**450271-001400**	14,00	14,00	132	81	28	45	6

Hole Finishing

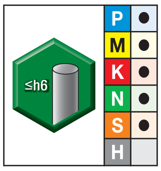
- Standard reamers listed are ground to achieve an H7 tolerance hole.
  IT6 capability is available. Additional diameters and lengths made to order.

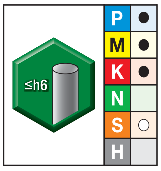






HSR Reamers with Helical Flutes for Through Holes • K10F™/K10F-DCFD™ • 14–32mm

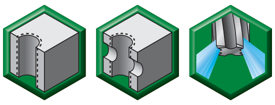


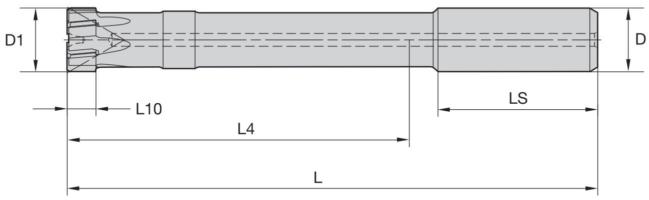


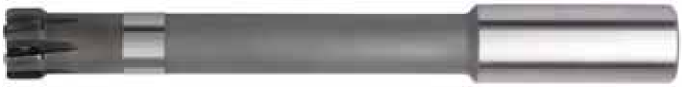
● first choice
○ alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	L	L4	L10	LS	Z
3084978	050281-001400	3084312	450281-001400	14,00	16,00	145	90	9	48	6
3084983	050281-001600	3084317	450281-001600	16,00	20,00	157	100	9	50	6
3084992	050281-001800	3084321	450281-001800	18,00	20,00	171	114	9	50	6
3085083	050281-002000	3084319	450281-002000	20,00	20,00	200	143	9	50	6
3085084	050281-002200	3084322	450281-002200	22,00	20,00	210	153	11	50	6
3085087	050281-002400	3084323	450281-002400	24,00	20,00	210	153	11	50	6
3085089	050281-002500	3084324	450281-002500	25,00	20,00	210	153	11	50	6
3085090	050281-002600	3084325	450281-002600	26,00	25,00	240	177	11	56	8
3085092	050281-002800	3084327	450281-002800	28,00	25,00	240	177	11	56	8
3085104	050281-003000	3084320	450281-003000	30,00	25,00	270	207	11	56	8
–		3084328	450281-003200	32,00	25,00	270	207	11	56	8

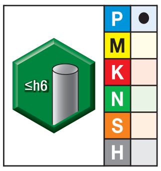
- Standard reamers listed are ground to achieve an H7 tolerance hole.
  IT6 capability is available. Additional diameters and lengths made to order.







HSR Reamers with Helical Flutes for Through Holes • CERMET-DCFD™ • 14–20mm

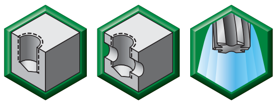


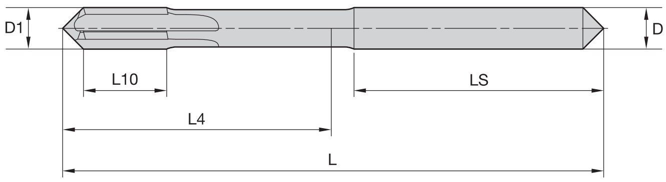
● first choice
○ alternate choice

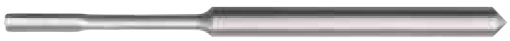
grade CERMET-DCFD
TiAlN

order #	catalogue #	D1	D	L	L4	L10	LS	Z
3888130	456681-001400	14,00	16,00	145	76	8	49	6
3888131	456681-001500	15,00	16,00	145	76	8	49	6
3888132	456681-001600	16,00	20,00	157	86	8	51	6
3888403	456681-001700	17,00	20,00	157	86	10	51	6
3888404	456681-001800	18,00	20,00	171	100	10	51	6
3888405	456681-001900	19,00	20,00	171	100	10	51	6
3888406	456681-002000	20,00	20,00	200	129	10	51	6

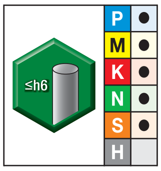
• Standard reamers listed are ground to achieve an H7 tolerance hole.
IT6 capability is available. Additional diameters and lengths made to order.

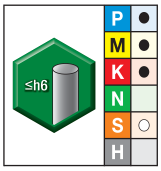






■ HSR Reamers with Straight Flutes for Blind Holes • K10F™/K10F-DCFD™ • 2–4mm

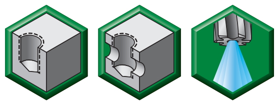


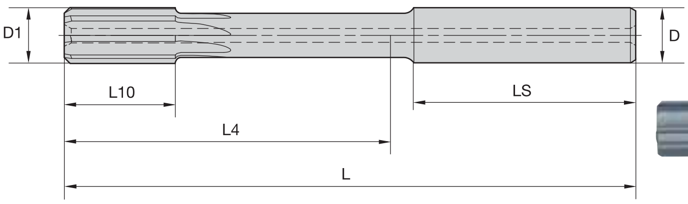


● first choice
○ alternate choice

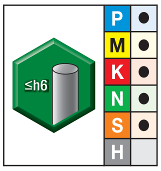
grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	L	L4	L10	LS	Z
2446025	050222-000200	2446371	450222-000200	2,00	3,00	48	15	6	28	4
2446029	050222-000300	2446372	450222-000300	3,00	3,00	48	15	8	28	4
2446031	050222-000400	2446415	450222-000400	4,00	4,00	54	21	8	28	4

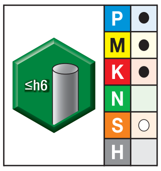
• Standard reamers listed are ground to achieve an H7 tolerance hole.
IT6 capability is available. Additional diameters and lengths made to order.





■ HSR Reamers with Straight Flutes for Blind Holes • K10F™/K10F-DCFD™ • 5–14mm

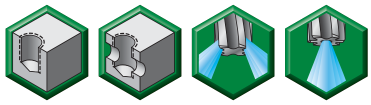


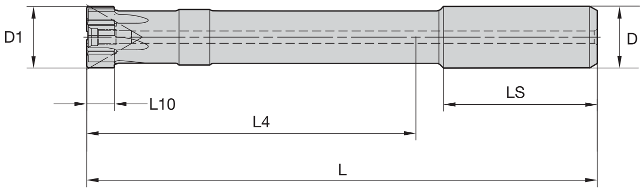


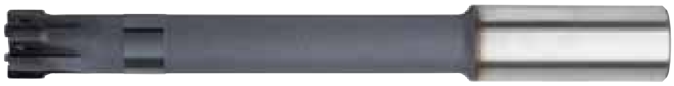
● first choice
○ alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	L	L4	L10	LS	Z
2437472	050270-000500	2441337	450270-000500	5,00	6,00	74	32	12	36	4
2437523	050270-000600	2441339	450270-000600	6,00	6,00	74	33	12	36	4
2437525	050270-000800	2441341	450270-000800	8,00	8,00	91	50	16	36	6
2437526	050270-001000	2441342	450270-001000	10,00	10,00	103	58	20	40	6
2437527	050270-001200	2441353	450270-001200	12,00	12,00	118	68	24	45	6
2437529	050270-001400	2441354	450270-001400	14,00	14,00	132	81	28	45	6

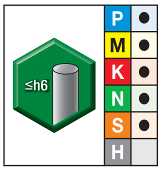
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.

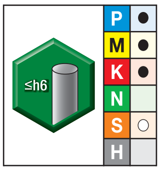






■ HSR Reamers with Straight Flutes for Blind Holes • K10F™/K10F-DCFD™ • 14–32mm

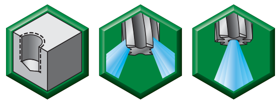


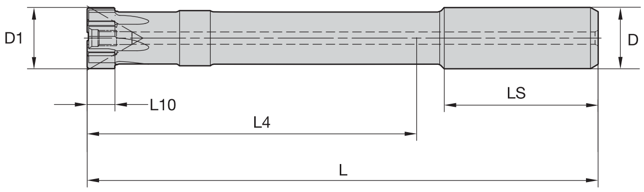


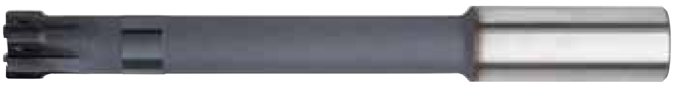
● first choice
○ alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	L	L4	L10	LS	Z
3055655	050280-001400	3084512	450280-001400	14,00	16,00	145	90	9	48	6
3055656	050280-001600	3084526	450280-001600	16,00	20,00	157	100	9	50	6
3055657	050280-001800	3084528	450280-001800	18,00	20,00	171	114	9	50	6
3056095	050280-002000	3077292	450280-002000	20,00	20,00	200	143	9	50	6
3056096	050280-002200	3084529	450280-002200	22,00	20,00	210	153	11	50	6
3056097	050280-002400	3084530	450280-002400	24,00	20,00	210	153	11	50	6
3056098	050280-002500	3084531	450280-002500	25,00	20,00	210	153	11	50	6
3056099	050280-002600	3084532	450280-002600	26,00	25,00	240	177	11	56	8
3056100	050280-002800	3084593	450280-002800	28,00	25,00	240	177	11	56	8
3056102	050280-003000	3084594	450280-003000	30,00	25,00	270	207	11	56	8
3056273	050280-003200	3084595	450280-003200	32,00	25,00	270	207	11	56	8

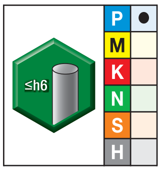
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.







■ HSR Reamers with Straight Flutes for Blind Holes • CERMET-DCFD™ • 14–20mm

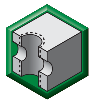


● first choice
○ alternate choice

grade CERMET-DCFD TiAlN

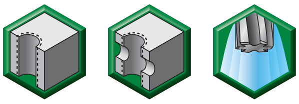
order #	catalogue #	D1	D	L	L4	L10	LS	Z
3888407	456680-001400	14,00	16,00	145	76	8	49	6
3888408	456680-001500	15,00	16,00	145	76	8	49	6
3888409	456680-001600	16,00	20,00	157	86	8	51	6
3888410	456680-001700	17,00	20,00	157	86	10	51	6
3888411	456680-001800	18,00	20,00	171	100	10	51	6
3888412	456680-001900	19,00	20,00	171	100	10	51	6
3888413	456680-002000	20,00	20,00	200	129	10	51	6

Series 050221 • Solid Carbide • Helical Flute • Grade K10™ • Metric

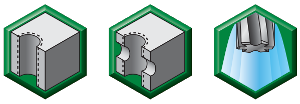



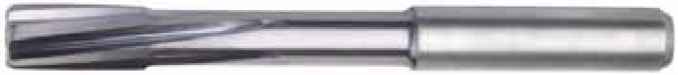
Material Group		Cutting Speed — vc Range — m/min (min)		(max)	Tool Diameter	Recommended Feed Rate per Rev 1,40–3,15	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70
P	1	20	–	30	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	2	20	–	20	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	3	10	–	20	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	4	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	5	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	6	10	–	10	mm/r	0,06–0,10	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23
M	1	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	2	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	3	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
K	1	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	2	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	3	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
N	1	30	–	30	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	2	30	–	40	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	3	30	–	40	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	4	30	–	30	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	5	20	–	30	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	6	30	–	40	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
S	1	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	2	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	3	10	–	20	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	4	10	–	20	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25

Series 050227 • Solid Carbide • Helical Flute • Grade K10F™ • Metric

Material Group											
		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev						
		min		max	Tool Diameter	1,40–3,15	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	2	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	3	30	–	30	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	4	20	–	30	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	5	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	6	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	10	–	10	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	20	–	30	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	20	–	30	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	20	–	30	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
N	1	70	–	90	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	80	–	100	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	80	–	100	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	4	70	–	90	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	5	60	–	80	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	6	90	–	110	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	10	–	10	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	3	20	–	30	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	4	20	–	30	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65

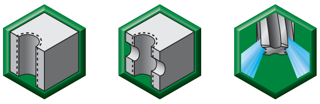
Series 450227 • Solid Carbide • Helical Flute • Grade K10F-DCFD™ • Metric

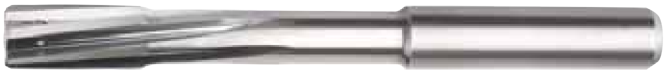




Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev						
		min		max	Tool Diameter	1,40–3,15	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	60	–	80	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	2	60	–	80	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	3	60	–	70	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	4	40	–	60	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	5	20	–	30	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	6	20	–	30	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	50	–	70	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	50	–	70	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	50	–	70	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50

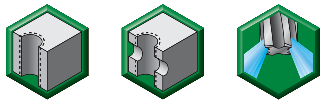
Series 050271 • Solid Carbide • Helical Flute • Grade K10F™ • Metric





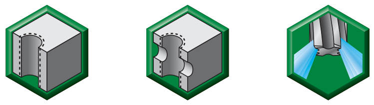
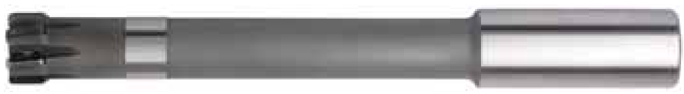
Material Group		Cutting Speed — vc Range — m/min min		max	Recommended Feed Rate per Rev Tool Diameter	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	50	–	70	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	2	40	–	60	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	3	40	–	60	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	4	30	–	40	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	5	20	–	30	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	6	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
N	1	130	–	150	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	140	–	160	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	140	–	160	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	4	130	–	150	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	5	120	–	140	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	6	150	–	170	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	3	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	4	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65

Series 450271 • Solid Carbide • Helical Flute • Grade K10F-DCFD™ • Metric

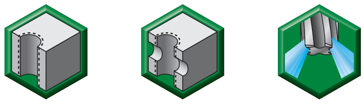
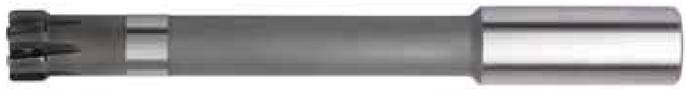


Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev					
		min		max	Tool Diameter	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	110	–	130	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	2	110	–	130	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	3	100	–	120	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	4	60	–	80	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	5	30	–	50	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	6	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	20	–	30	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	80	–	100	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	80	–	100	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	70	–	90	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	30	–	40	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	20	–	30	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50

Series 050281 • Uncoated • Carbide-Tipped • Helical Flute • Grade K10F™ • Metric

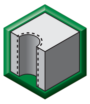
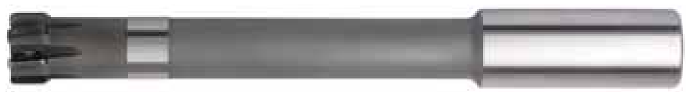
Material Group		Cutting Speed — vc Range — m/min 			 Recommended Feed Rate per Rev			
		min		max	Tool Diameter	12,70–15,00	15,00–20,00	20,00–32,00
P	1	50	–	70	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	2	40	–	60	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	3	40	–	60	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	4	30	–	40	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	5	20	–	30	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	6	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
M	1	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	2	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	3	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
K	1	30	–	50	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	30	–	50	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	30	–	40	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
N	1	130	–	150	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	140	–	160	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	140	–	160	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	4	130	–	150	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	5	120	–	140	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	6	150	–	170	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
S	1	10	–	20	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	3	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	4	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90

Series 450281 • Coated • Carbide-Tipped • Helical Flute • Grade K10F-DCFD™ • Metric

								
		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev			
Material Group		min		max	Tool Diameter	12,70–15,00	15,00–20,00	20,00–32,00
P	1	110	–	130	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	2	110	–	130	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	3	100	–	120	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	4	60	–	80	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	5	30	–	50	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	6	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
M	1	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	2	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	3	20	–	30	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
K	1	80	–	100	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	80	–	100	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	70	–	90	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
S	1	30	–	40	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	2	20	–	30	mm/r	0,30–0,50	0,30–0,60	0,35–0,65

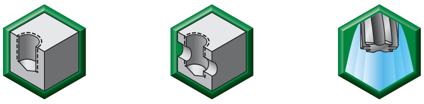
WIDIA

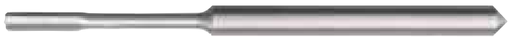
Series 456681 • Cermet-Tipped • Helical Flute • Grade CERMET-DCFD™ • Metric

							
		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev		
Material Group		min		max	Tool Diameter	12,70–15,00	15,00–20,00
P	1	110	–	130	mm/r	0,50–0,90	0,60–1,05
	2	110	–	130	mm/r	0,50–0,90	0,60–1,05
	3	100	–	120	mm/r	0,50–0,90	0,60–1,05
	4	60	–	80	mm/r	0,50–0,90	0,60–1,05
	5	30	–	50	mm/r	0,50–0,90	0,60–1,05
	6	30	–	40	mm/r	0,35–0,65	0,40–0,80

Hole Finishing

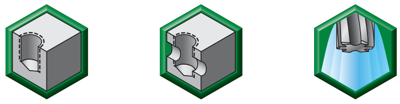
Series 050222 • Solid Carbide • Straight Flute • Grade K10F™ • Metric



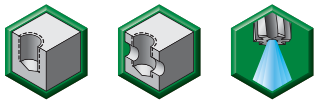


Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev		
		min		max	Tool Diameter	1,40–3,15	3,16–4,80
P	1	30	–	40	mm/r	0,20–0,30	0,20–0,40
	2	30	–	40	mm/r	0,20–0,30	0,20–0,40
	3	30	–	30	mm/r	0,20–0,30	0,20–0,40
	4	20	–	30	mm/r	0,20–0,30	0,20–0,40
	5	10	–	20	mm/r	0,20–0,30	0,20–0,40
	6	10	–	20	mm/r	0,15-0,30	0,20-0,30
M	1	10	–	20	mm/r	0,15–0,30	0,20–0,30
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30
	3	10	–	10	mm/r	0,15–0,30	0,20–0,30
K	1	20	–	30	mm/r	0,25–0,45	0,35–0,65
	2	20	–	30	mm/r	0,25–0,45	0,35–0,65
	3	20	–	30	mm/r	0,25–0,45	0,35–0,65
N	1	70	–	90	mm/r	0,25–0,45	0,35–0,65
	2	80	–	100	mm/r	0,25–0,45	0,35–0,65
	3	80	–	100	mm/r	0,25–0,45	0,35–0,65
	4	70	–	90	mm/r	0,25–0,45	0,35–0,65
	5	60	–	80	mm/r	0,25–0,45	0,35–0,65
	6	90	–	110	mm/r	0,25-0,45	0,35-0,65
S	1	10	–	20	mm/r	0,10–0,20	0,15–0,30
	2	10	–	10	mm/r	0,10–0,20	0,15–0,30
	3	20	–	30	mm/r	0,15–0,30	0,20–0,30
	4	20	–	30	mm/r	0,15-0,30	0,20-0,30

Series 450222 • Solid Carbide • Straight Flute • Grade K10F-DCFD™ • Metric

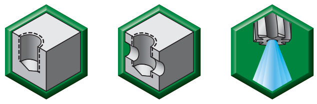
Material Group		 Cutting Speed — vc Range — m/min			 Recommended Feed Rate per Rev		
		min		max	Tool Diameter	1,40–3,15	3,16–4,80
P	1	60	–	80	mm/r	0,20–0,30	0,20–0,40
	2	60	–	80	mm/r	0,20–0,30	0,20–0,40
	3	50	–	70	mm/r	0,20–0,30	0,20–0,40
	4	40	–	60	mm/r	0,20–0,30	0,20–0,40
	5	20	–	30	mm/r	0,20–0,30	0,20–0,40
	6	20	–	30	mm/r	0,15–0,30	0,20–0,30
M	1	10	–	20	mm/r	0,15–0,30	0,20–0,30
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30
	3	10	–	20	mm/r	0,15–0,30	0,20–0,30
K	1	50	–	70	mm/r	0,25–0,45	0,35–0,65
	2	50	–	70	mm/r	0,25–0,45	0,35–0,65
	3	50	–	70	mm/r	0,25–0,45	0,35–0,65
S	1	10	–	20	mm/r	0,10–0,20	0,15–0,30
	2	10	–	20	mm/r	0,10–0,20	0,15–0,30

Series 050270 • Solid Carbide • Straight Flute • Grade K10F™ • Metric

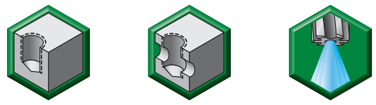
Material Group		Cutting Speed — vc Range — m/min 			Recommended Feed Rate per Rev 					
		min		max	Tool Diameter	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	50	–	70	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	2	40	–	60	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	3	40	–	60	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	4	30	–	40	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	5	20	–	30	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	6	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
N	1	130	–	150	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	140	–	160	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	140	–	160	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	4	130	–	150	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	5	120	–	140	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	6	150	–	170	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	3	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	4	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65

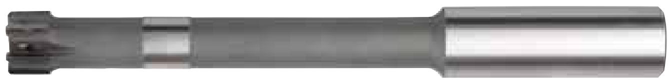
HSR™ Application Data • Series 450270

Series 450270 • Solid Carbide • Straight Flute • Grade K10F-DCFD™ • Metric

Material Group		Cutting Speed — vc Range — m/min 			Recommended Feed Rate per Rev 					
		min		max	Tool Diameter	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	110	–	130	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	2	110	–	130	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	3	100	–	120	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	4	60	–	80	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	5	30	–	50	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	6	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	20	–	30	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	80	–	100	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	80	–	100	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	70	–	90	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	30	–	40	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	20	–	30	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50

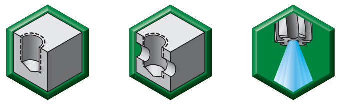
Series 050280 • Uncoated • Carbide-Tipped • Straight Flute • Grade K10F™ • Metric

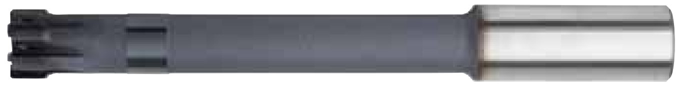




Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev			
		min		max	Tool Diameter	12,70–15,00	15,00–20,00	20,00–32,00
P	1	50	–	70	mm/r	0,50–0,90	0,60–1,05	0,60–1,20
	2	40	–	60	mm/r	0,50–0,90	0,60–1,05	0,60–1,20
	3	40	–	60	mm/r	0,50–0,90	0,60–1,05	0,60–1,20
	4	30	–	40	mm/r	0,50–0,90	0,60–1,05	0,60–1,20
	5	20	–	30	mm/r	0,50–0,90	0,60–1,05	0,60–1,20
	6	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
M	1	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	2	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	3	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
K	1	30	–	50	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	30	–	50	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	30	–	40	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
N	1	130	–	150	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	140	–	160	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	140	–	160	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	4	130	–	150	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	5	120	–	140	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	6	150	–	170	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
S	1	10	–	20	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	3	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	4	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90

Series 450280 • Coated • Carbide-Tipped • Straight Flute • Grade K10F-DCFD™ • Metric

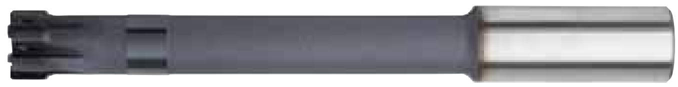




Material Group		Cutting Speed — vc Range — m/min min		max	Recommended Feed Rate per Rev Tool Diameter	12,70–15,00	15,00–20,00	20,00–32,00
P	1	110	–	130	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	2	110	–	130	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	3	100	–	120	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	4	60	–	80	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	5	30	–	50	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	6	30	–	40	mm/r	0,35-0,65	0,40-0,80	0,50-0,90
M	1	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	2	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	3	20	–	30	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
K	1	80	–	100	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	80	–	100	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	70	–	90	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
S	1	30	–	40	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	2	20	–	30	mm/r	0,30-0,50	0,30-0,60	0,35-0,65

HSR™ Application Data • Series 456680

Series 456680 • Cermet-Tipped • Straight Flute • Grade CERMET-DCFD™ • Metric



Material Group		Cutting Speed — vc Range — m/min min		max	Recommended Feed Rate per Rev Tool Diameter	12,70–15,00	15,00–20,00
P	1	110	–	130	mm/r	0,50–0,90	0,60–1,05
	2	110	–	130	mm/r	0,50–0,90	0,60–1,05
	3	100	–	120	mm/r	0,50–0,90	0,60–1,05
	4	60	–	80	mm/r	0,50–0,90	0,60–1,05
	5	30	–	50	mm/r	0,50–0,90	0,60–1,05
	6	30	–	40	mm/r	0,35–0,65	0,40–0,80

WIDIA™ TRM •
Top Ream Modular (Available as Semi-Standards)

WIDIA TRM

Primary Application

- Achieve solid carbide metal removal rates.
- Five sizes of standard straight shank bodies available to couple reaming heads from 20–42mm (.787–1.653").

Features and Benefits

- High-speed and high-performance ready.
- Unique proprietary coupling system enables same runout accuracy as monoblock systems (<3 microns).
- Comfortable radial clamping for quick exchanging even in narrow situations in the machine.
- No fixture for clamping or dismounting necessary.

Customisation

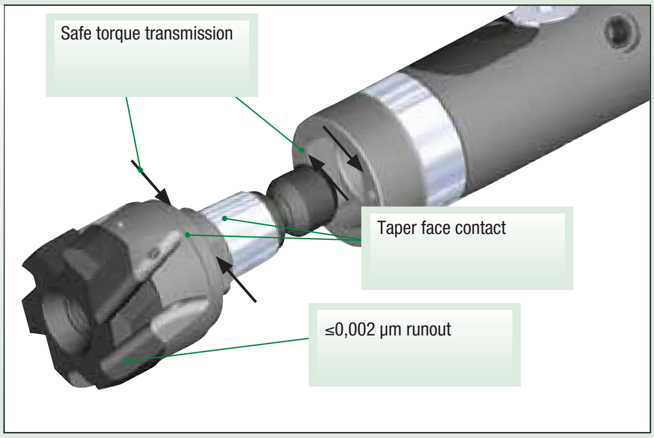
- Heads fully customisable as simple specials with different lead geometries, grades, coatings, and edge hones.
- Semi-finished heads on stock for shorter lead times.

Ordering Process

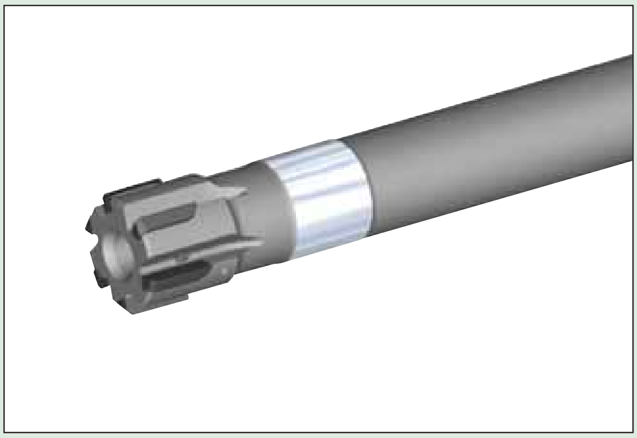
- Please contact your local Authorised Distributor for a quote.

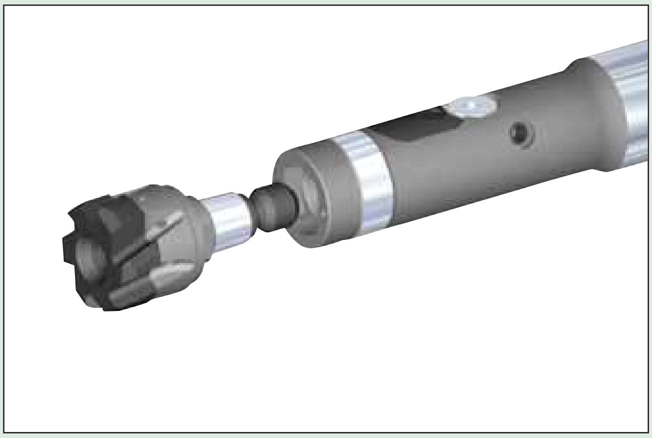
WST™ — WIDIA™ Short Taper

- Easy to handle.
- Fewer vibrations due to safe torque transmission.
- No head-to-body orientation adjustment necessary.
- Higher hole quality due to minimal runout and taper face contact.
- Easy to disassemble due to push out effect of head.



Special Design — Top Ream Tipped Tools





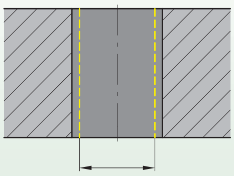
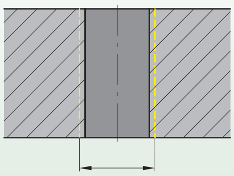
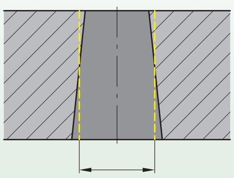
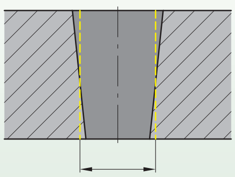
Regular Tipped

- 4–8 brazing joints depending on diameter (number of teeth).
- Less stiffness.
- More vibrations.
- Higher runout after thermal influence (e.g., coating, reconditioning, etc.).

WIDIA Top Ream

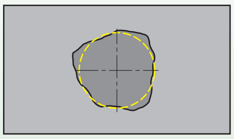
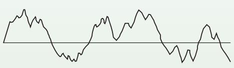
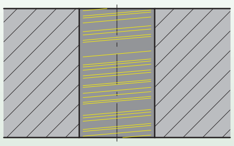
- Min 4x reconditionable.
- New reaming grade WU05PR™ holds bore surface finish more than 2x longer.
- Stronger brazing joint than conventional tipped reamers.
- Less influence of coating process on runout.

Reamer Troubleshooting

Problem	Cause	Possible Remedy
Hole diameter too large  Nom diameter	1. Reaming tool running out of centre. 2. Concentricity of pilot hole and ream machining unsatisfactory. 3. Built-up edge. 4. Unsuitable cooling lubricant. 5. Reaming tool diameter too large.	• Use equalising adaptor. • Re-align, use floating head. • Change cooling lubricant. • Change cutting speed. • Measure reamers and send for repairs.
Hole diameter too small  Nom diameter	1. Reamer worn. 2. Unsuitable cooling lubricant. 3. Reaming allowance too small.	• Replace and refit tool. • Change cooling lubricant. • Increase reaming allowance.
Conical hole profile wider towards drill runout  Nom diameter	1. Concentricity of pilot hole and reaming unsatisfactory. 2. Positioning accuracy of pilot hole to reaming.	• Re-align, use equalising adaptor. • Correct positioning accuracy.
Conical hole profile wider at drill entry point  Nom diameter	1. Concentricity of pilot hole and reaming unsatisfactory. 2. Reaming tool skim cutting with ledger.	• Re-align, use floating head. • Securely clamp reaming tool axially.

(continued)

Reamer Troubleshooting *(continued)*

Problem	Cause	Possible Remedy
Conical hole profile wider at drill entry point 	1. Reaming tool running out of centre. 2. Slanted cutting surface/asymmetrical cutting. 3. Workpiece twisted.	• Use equalising adaptor. • Spot face as drilling preparation. • Take the direction of impact into account when clamping the workpiece.
Surface quality does not meet specification 	1. Tool cutters worn. 2. Reaming tool running out of centre. 3. Incorrect technology data (cutting parameters). 4. Inadequate chip evacuation.	• Use equalising adaptor. • Re-align, use floating head. • Change cooling lubricant. • Change cutting speed. • Measure reamers and send for repairs.
Feed grooves 	1. Built-up edge.	• Change cooling lubricant. • Change cutting speed.

ROTAFLEX

The WIDIA™ line of Precision Hole Finishing ensures decreased vibration, increased productivity, and reduced calls for scheduled maintenance. You can count on consistent hole diameters, high speed and feed rates, and good surface quality at a great price.

- Easy adjustments and low initial investment.
- Roughing and precision finishing heads available.
- For roughing and fine finishing operations over a broad diameter range.

The newly developed RFX coupling eases assembly and disassembly and enhances stabililty

- Increased machine tool productivity and less vibration.
- Standard micro-adjustable cartridges for fine finishing operations.
- Internal coolant and spacious chip flutes.

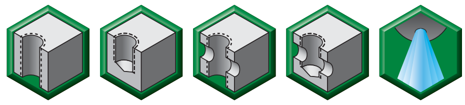
EXTREME **CHALLENGES.** EXTREME **RESULTS.**

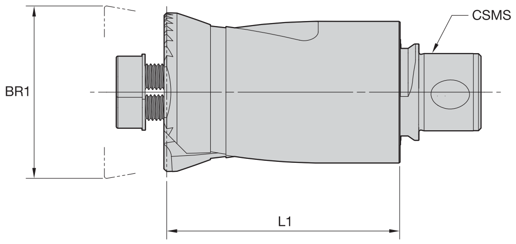
Advanced system uses the progressive RFX coupling and the latest technology WIDIA™ Victory™ ISO turning inserts

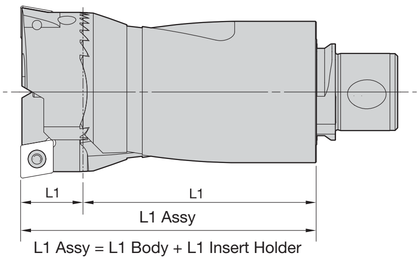
- High feed rates due to the proprietary front serration of the TCHS twin cutters.
- Internal coolant and spacious chip flutes ensure secure chip evacuation.
- High-precision adjustment of FBH and FBHBB Fine-Boring Heads with the axial and radial pre-loaded eccentric bushing instead of a threaded spindle.
- Higher rigidity with the new RFX bayonet-type coupling.
- Achieve unmatched tool life with WIDIA Victory grades.

WIDIA™

- Basic body shipped without insert holders.
- Order insert holder, slides, or micro-adjustable cartridges separately.



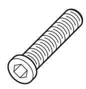


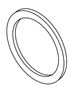


TCHS • RFX Shank Series

order number	catalogue number	BR1 bore range	L1	CSMS system size	kg
3861179	**RFX185TCHS022030**	22,500-30,000	27,7	RFX185	0,20
3861180	**RFX245TCHS030039**	30,000-39,000	37,7	RFX245	0,20
3861181	**RFX320TCHS039050**	39,000-50,000	48,7	RFX320	0,50
3861182	**RFX420TCHS050067**	50,000-67,000	68,2	RFX420	1,00
3861183	**RFX550TCHS067088**	67,000-88,000	90,7	RFX550	2,00
3861184	**RFX720TCHS088115**	88,000-115,000	113,7	RFX720	4,00

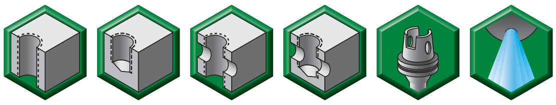
Spare Parts

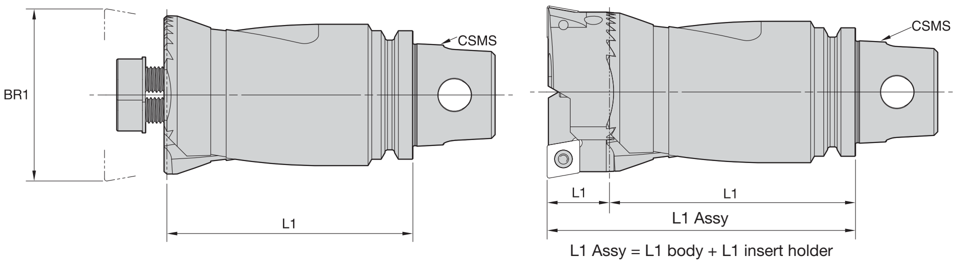




catalogue number	fixing screw	disc washer
RFX185TCHS022030	**12147602700**	**12147600100**
RFX245TCHS030039	**12147602300**	**12147603900**
RFX320TCHS039050	**12147602400**	**12147600200**
RFX420TCHS050067	**12147602500**	**12147604000**
RFX550TCHS067088	**12147602600**	**12147600300**
RFX720TCHS088115	**12147602800**	**12147600400**

- Basic body shipped without insert holders.
- Order insert holder, slides, or micro-adjustable cartridges separately.

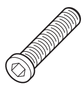
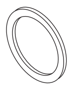




TCHS • KM™ Shank Series

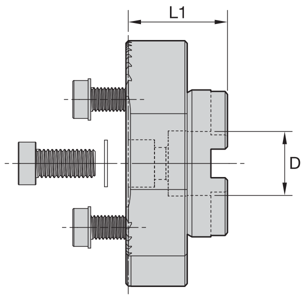
order number	catalogue number	BR1 bore range	L1	CSMS system size	kg
3861149	KM32TSTCHS022030	22,000-30,000	52,7	KM32TS	0,30
3861150	KM32TSTCHS030039	30,000-39,000	67,7	KM32TS	0,50
3861152	KM40TSTCHS030039	30,000-39,000	87,7	KM40TS	0,60
3861151	KM32TSTCHS039050	39,000-50,000	63,7	KM32TS	0,70
3861173	KM40TSTCHS039050	39,000-50,000	83,7	KM40TS	1,00
3861174	KM40TSTCHS050067	50,000-67,000	78,2	KM40TS	1,10
3861175	KM50TSTCHS050067	50,000-67,000	88,2	KM50TS	1,20
3861176	KM50TSTCHS067088	67,000-88,000	95,7	KM50TS	1,40
3861177	KM63TSTCHS067088	67,000-88,000	95,7	KM63TS	1,80
3861178	KM63TSTCHS088115	88,000-115,000	93,7	KM63TS	2,40

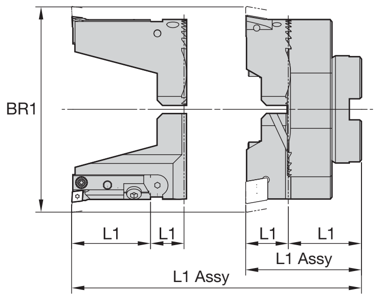
Spare Parts

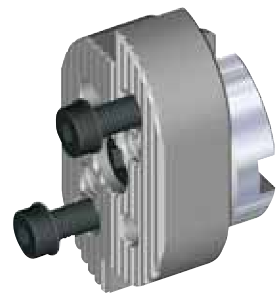



catalogue number	fixing screw	disc washer
KM32TSTCHS022030	12147602700	12147600100
KM32TSTCHS030039	12147602300	12147603900
KM32TSTCHS039050	12147602400	12147600200
KM40TSTCHS030039	12147602300	12147603900
KM40TSTCHS039050	12147602400	12147600200
KM40TSTCHS050067	12147602500	12147604000
KM50TSTCHS050067	12147602500	12147604000
KM50TSTCHS067088	12147602600	12147600300
KM63TSTCHS067088	12147602600	12147600300
KM63TSTCHS088115	12147602800	12147600400

- For use with shell mill adaptors; please order separately.
- Bridge body shipped without insert holder, slides, or micro-adjustable cartridges.
- Order insert holder separately for rough boring and slides for fine boring.
- Order micro-adjustable cartridges separately for fine boring.







L1 Assy = L1 bridge + L1 insert holder
L1 Assy = L1 bridge + L1 slide + L1 cartridge

Bridge Tool • Small

order number	catalogue number	BR1 bore range	D	L1	kg
2006019	12600208800	87.000-110.000	27	40,3	1,70
2005500	12600210900	109.000-133.000	27	40,3	1,90
2005553	12600213200	132.000-156.000	27	40,3	2,10
2005556	12600215500	155.000-179.000	27	40,3	2,30
2005560	12600217800	178.000-202.000	27	40,3	2,50

NOTE: Use of ISO cartridges SCLCL12CA12, STGCL12CA16, or SSRCL12CA12 is recommended.

Spare Parts

catalogue number	fixing screw	fixing screw	fixing screw	disc washer	disc washer
12600208800	–	12346233000	12147519100	12147600300	–
12600210900	12147613500	–	12147519100	12147600300	12147740200
12600213200	12147613500	–	12147519100	12147600300	12147740200
12600215500	12147613500	–	12147519100	12147600300	12147740200
12600217800	12147613500	–	12147519100	12147600300	12147740200

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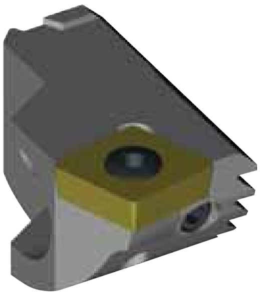
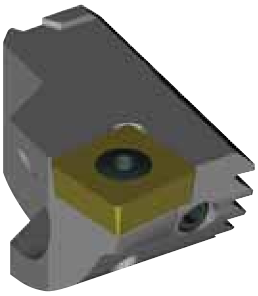
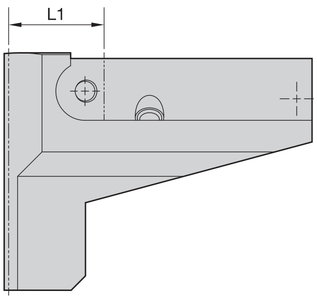
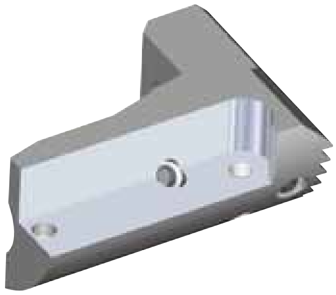




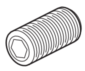
Insert Holder Reference Chart

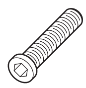
C-Style 70°	C-Style 90°	S-Style 80°	T-Style 90°
12625906700	12625706700	12626006700	12625806800

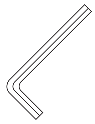




Slide for Micro-Adjustable Cartridges

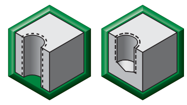


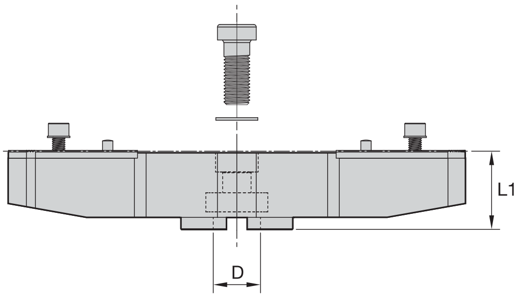


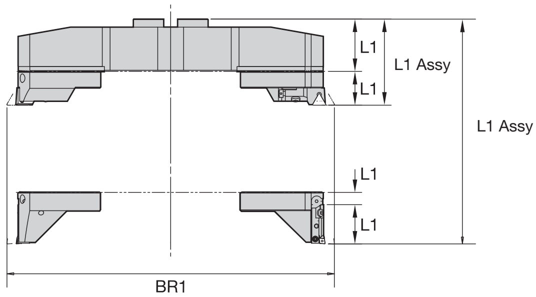


order number	catalogue number	L1	adjusting screw	fixing screw	hex wrench
3864647	SMAC087	19,2	12147665000	12147519100	12148041100

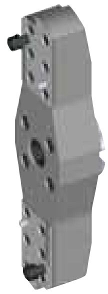
- For use with shell mill adaptors; please order separately.
- Bridge body shipped without ISO cartridges, slides, or micro-adjustable cartridges.
- Order ISO cartridges separately for rough boring.
- Order micro-adjustable cartridges separately for fine boring.







L1 Assy = L1 Bridge + L1 Insert Holder
L1 Assy = L1 Bridge + L1 Slide + L1 Cartridge

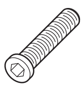
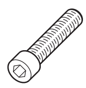
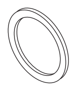
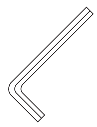


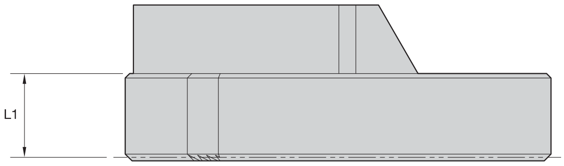
Bridge Tool • Large

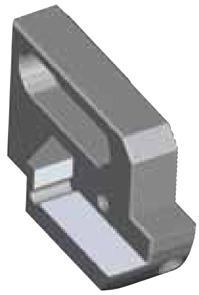
order number	catalogue number	BR1 bore range	D	L1	kg
2005574	**12600020000**	200.000-280.000	40	50,6	2,00
2005602	**12600027800**	278.000-360.000	40	50,6	2,80
2005656	**12600035800**	358.000-440.000	40	61,6	2,50
2005722	**12600043800**	438.000-520.000	40	61,6	3,50

NOTE: Use of ISO cartridges SCLCL12CA12, STGCL12CA16, or SSRCL12CA12 is recommended.

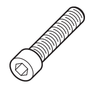
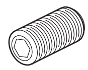
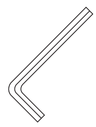
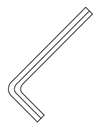
Spare Parts

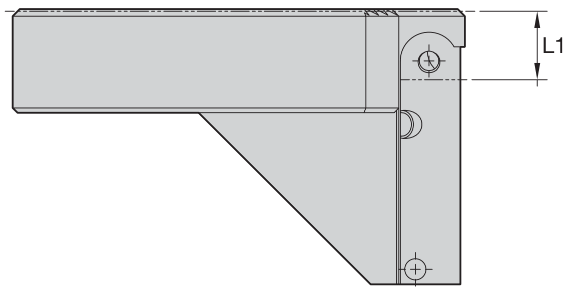
catalogue number	 fixing screw	 fixing screw	 disc washer	 hex wrench
12600020000	**12147739900**	**12147625400**	**12147600300**	**12147666700**
12600027800	**12147739900**	**12147625400**	**12147600300**	**12147666700**
12600035800	**12147739900**	**12147625400**	**12147600300**	**12147666700**
12600043800	**12147739900**	**12147625400**	**12147600300**	**12147666700**

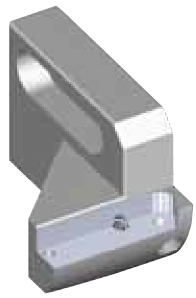




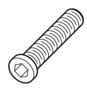
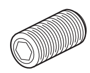
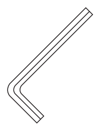
Slide for ISO Cartridges

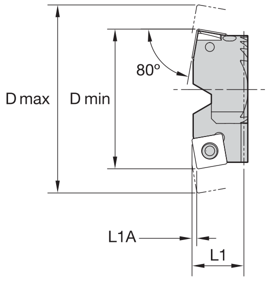
order number	catalogue number	L1	 fixing screw	 adjusting screw	 hex wrench	 hex wrench
2005576	12614020100	19,4	12147625200	12147739800	12148041300	12148041200

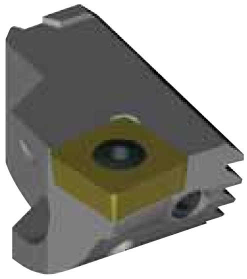




Slide for Micro-Adjustable Cartridges

order number	catalogue number	L1	 fixing screw	 adjusting screw	 hex wrench
3860905	SMAC200	13,9	12147519100	12147739800	12148041200

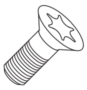
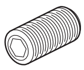
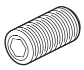
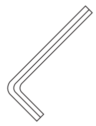


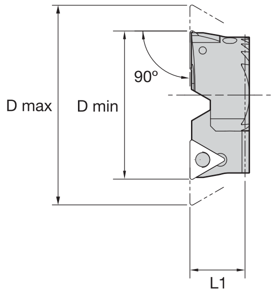


80° Lead Insert Holder • S-Style

order number	catalogue number	D min	D max	L1	L1A	gage insert
2005620	12626003000	30,00	39,00	12,35	1,30	SP..0703..
2005676	12626004000	39,00	50,00	16,30	1,50	SC../SP..09T3..
2005814	12626005000	50,00	67,00	21,80	2,10	SC../SP..1204..
2005941	12626006700	67,00	88,00	24,30	2,10	SC../SP..1204..

Spare Parts

catalogue number	 clamping screw	 adjusting screw	 adjusting screw	Nm	 Torx wrench	 hex wrench
12626003000	12148067200	12148069600	–	1,0	12148086600	12148040900
12626004000	12148038800	12148069600	–	3,0	12148082400	12148040900
12626005000	12148007200	12147602200	–	3,5	12148099400	12148041000
12626006700	12148007200	–	12147665000	3,5	12148099400	12148041100

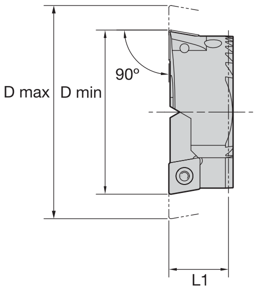


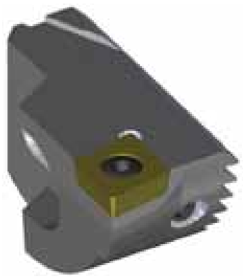
90° Lead Insert Holder • T-Style

order number	catalogue number	D min	D max	L1	gage insert
2005674	**12625804000**	39,00	50,00	16,30	TC../TP..1102..
2005802	**12625805100**	50,00	67,00	21,80	TC../TP..16T3..
2005939	**12625806800**	67,00	88,00	24,30	TC../TP..16T3..

Spare Parts

catalogue number	clamping screw	adjusting screw	adjusting screw	Nm	Torx wrench	hex wrench
12625804000	**12148068700**	**12148069600**	**–**	1,0	**12148086600**	**12148040900**
12625805100	**12148038800**	**12147602200**	**–**	3,0	**12148099400**	**12148041000**
12625806800	**12148038800**	**–**	**12147665000**	3,5	**12148099400**	**12148041100**

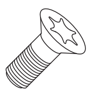
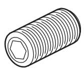
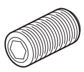
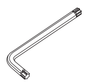
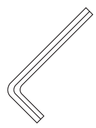


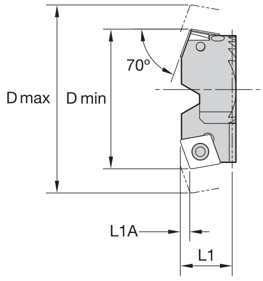


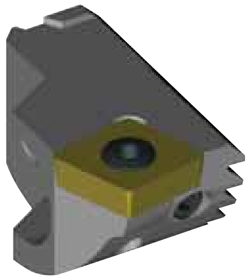
90° Lead Insert Holder • C-Style

order number	catalogue number	D min	D max	L1	gage insert
2005580	**12625702200**	22,50	30,00	12,05	CC../CP..0602..
2005618	**12625703000**	30,00	39,00	12,35	CC../CP..0602..
2005673	**12625704000**	39,00	50,00	16,30	CC../CP..09T3..
2005801	**12625705000**	50,00	67,00	21,80	CC../CP..1204..
2005938	**12625706700**	67,00	88,00	24,30	CC../CP..1204..
2006041	**12625708986**	88,00	115,00	36,30	CC../CP..1204..

Spare Parts

catalogue number	 clamping screw	 adjusting screw	 adjusting screw	Nm	 Torx wrench	 hex wrench
12625702200	**12148086600**	**12147579300**	**–**	1,0	**12148086600**	**12148046000**
12625703000	**12148086600**	**12148069600**	**–**	1,0	**12148086600**	**12148040900**
12625704000	**12148082400**	**12148069600**	**–**	3,0	**12148082400**	**12148040900**
12625705000	**12148099400**	**12147602200**	**–**	3,5	**12148099400**	**12148041000**
12625706700	**12148099400**	**–**	**12147665000**	3,5	**12148099400**	**12148041100**
12625708900	**12148099400**	**12148541600**	**–**	3,5	**12148099400**	**12148041100**

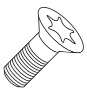
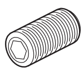
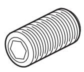
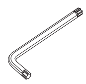
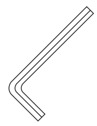




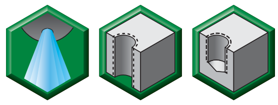
70° Lead Insert Holder • C-Style

order number	catalogue number	D min	D max	L1	L1A	gage insert
2005581	**12625902200**	22,50	30,00	12,35	1,60	CC../CP..0602..
2005619	**12625903000**	30,00	39,00	12,35	1,60	CC../CP..0602..
2005675	**12625904000**	39,00	50,00	16,30	2,30	CC../CP..09T3..
2005813	**12625905000**	50,00	67,00	21,80	3,10	CC../CP..1204..
2005940	**12625906700**	67,00	88,00	24,30	3,10	CC../CP..1204..
2006054	**12625908986**	88,00	115,00	36,30	3,10	CC../CP..1204..

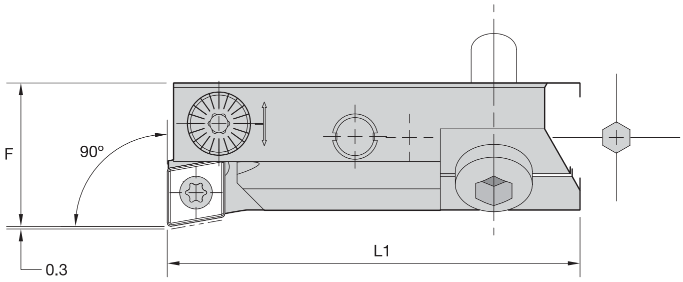
Spare Parts

catalogue number	 clamping screw	 adjusting screw	 adjusting screw	Nm	 Torx wrench	 hex wrench
12625902200	**12148068700**	**12147579300**	–	1,0	**12148086600**	**12148046000**
12625903000	**12148068700**	**12148069600**	–	1,0	**12148086600**	**12148040900**
12625904000	–	**12148069600**	–	3,0	**12148082400**	**12148040900**
12625905000	**12148007200**	**12147602200**	–	3,5	**12148099400**	**12148041000**
12625906700	**12148007200**	–	**12147665000**	3,5	**12148099400**	**12148041100**
12625908900	–	**12147602200**	–	3,5	**12148099400**	**12148041100**

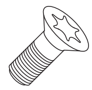
WIDIA



- All cartridges have internal coolant supply directed to the cutting edge.
- 0,01mm diameter adjustment within a range of 0,3mm.
- Radial adjustment without influence on axial position.
- Axial adjustment range of 1mm.



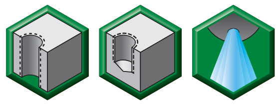
■ 90° Lead Micro-Adjustable Cartridge • C-Style

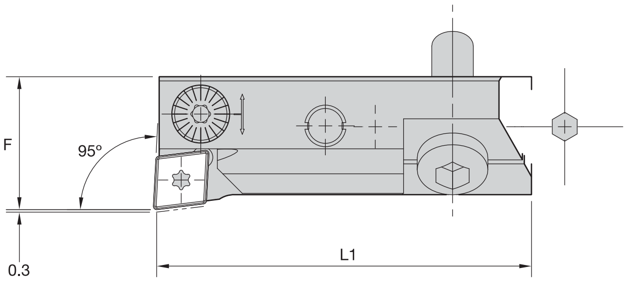



order number	catalogue number	F	L1	gage insert	insert clamping screw	Torx wrench	Nm
3860908	**MASCFCR09CA06F**	16,00	45,50	CC..0602..	**12148068700**	**12148086600**	1,0

Hole Finishing

- All cartridges have internal coolant supply directed to the cutting edge.
- 0,01mm diameter adjustment within a range of 0,3mm.
- Radial adjustment without influence on axial position.
- Axial adjustment range of 1mm.

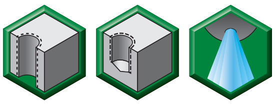


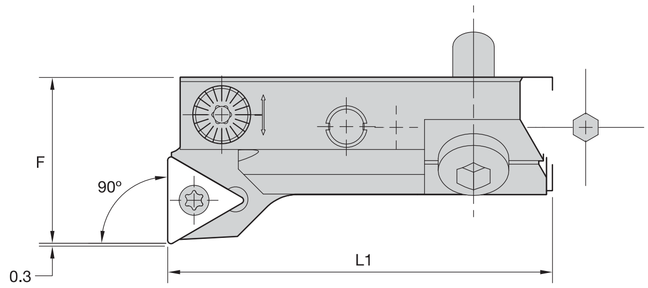


■ 95° Lead Micro-Adjustable Cartridge • C-Style

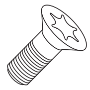
order number	catalogue number	F	L1	gage insert	insert clamping screw	Torx wrench	Nm
3860909	**MASCLCR09CA06F**	16,00	45,50	CC..0602..	**12148068700**	**12148086600**	1,0

- All cartridges have internal coolant supply directed to the cutting edge.
- 0,01mm diameter adjustment within a range of 0,3mm.
- Radial adjustment without influence on axial position.
- Axial adjustment range of 1mm.



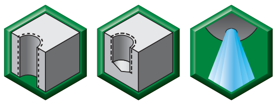


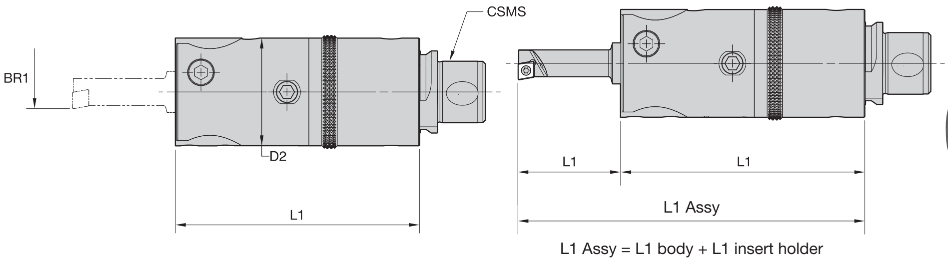
90° Lead Micro-Adjustable Cartridge • T-Style



order number	catalogue number	F	L1	gage insert	insert clamping screw	Torx wrench	Nm
3860910	**MASTFCR09CA11F**	20,00	45,50	TC..1102..	**12148068700**	**12148086600**	1,0

- 0,01mm diameter adjustment.
- Basic body shipped without boring bars.





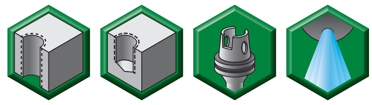
FBHBB • RFX Series Shank

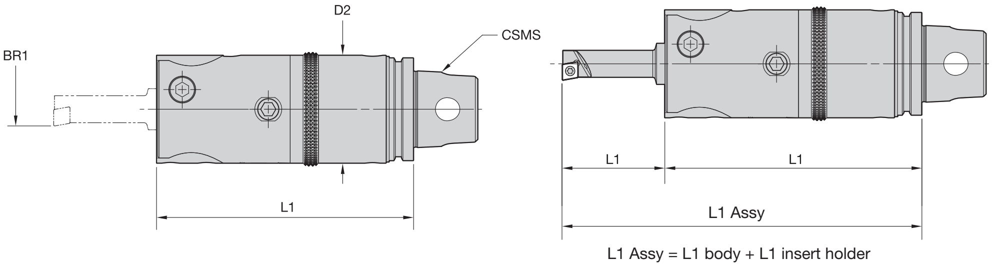
order number	catalogue number	BR1 bore range	D2	L1	CSMS system size	kg
3860906	RFX420FBHBB006022	6,000-22,000	42,00	95,00	RFX420	1,10

Spare Parts

catalogue number	front clamping screw 1	front clamping screw 2	adjustment locking screw	hex wrench	hex wrench
RFX420FBHBB006022	12148068700	12148042400	12147680500	12148041100	12148041300

- 0,01mm diameter adjustment.
- Basic body shipped without boring bars.

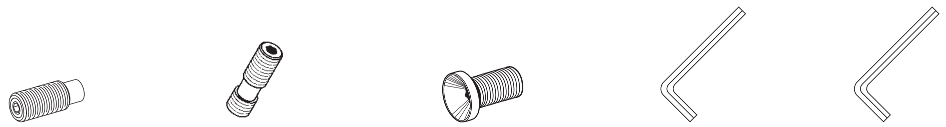




FBHBB KM-TS™ Series Shank

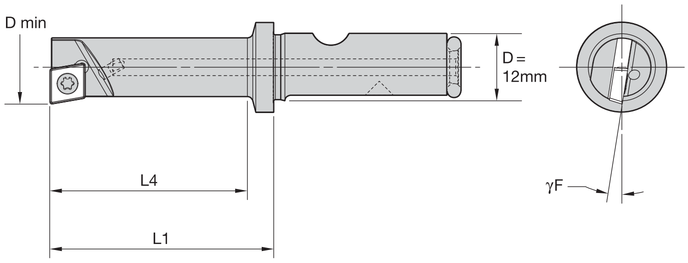
order number	catalogue number	BR1 bore range	D2	L1	CSMS system size	kg
3860907	KM40TSFBHBB006022	6,000-22,000	42,00	105,00	KM40TS	1,10

Spare Parts



catalogue number	front clamping screw 1	front clamping screw 2	adjustment locking screw	hex wrench	hex wrench
KM40TSFBHBB006022	12147617400	12148042400	12147680500	12148041100	12148041300

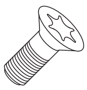
• All boring bars have internal coolant supply directed to the cutting edge.



Boring Bars for Precision Fine Boring Heads (FBHBB)

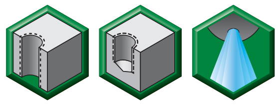
order number	catalogue number	D min	D max	L1	L4	γF°	kg
2005954	12627006200	6,00	8,00	30,00	24,00	-5.00	0,10
2006015	12627008200	8,00	10,00	30,00	25,00	-3.00	0,10
2005499	12627010200	10,00	13,00	35,00	30,00	-11.00	0,10
2005542	12627013200	13,00	16,00	40,00	35,00	-9.00	0,10
2005558	12627016200	16,00	19,00	45,00	40,00	-6.00	0,10
2005573	12627019300	19,00	22,00	55,00	55,00	-6.00	0,20

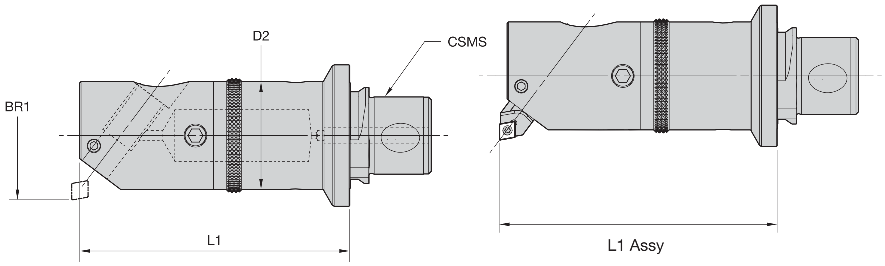
Spare Parts




catalogue number	gage insert	clamping screw	Torx wrench	Nm
12627006200	CP..04T1..	12148005800	12148005900	0,3
12627008200	CP..04T1..	12148005800	12148005900	0,3
12627010200	CC../CP..0602..	12148068700	12148086600	1,0
12627013200	CC../CP..0602..	12148068700	12148086600	1,0
12627016200	CC../CP..0602..	12148068700	12148086600	1,0
12627019300	CC../CP..0602..	12148068700	12148086600	1,0

- 0,01mm diameter adjustment.
- Basic body shipped without boring bars.

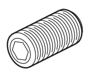
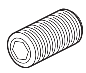
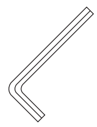
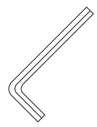




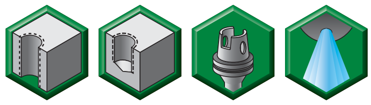
FBH • RFX Series Shank

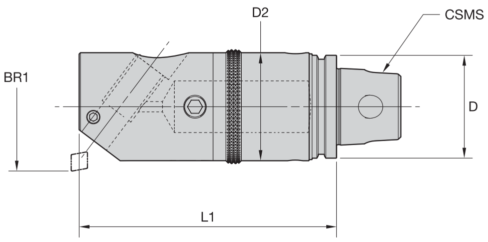
order number	catalogue number	BR1 bore range	D2	L1	L1 assy	CSMS system size	kg
3861143	RFX185FBH022029	22,000-29,000	18,50	55,00	56,00	RFX185	0,20
3861144	RFX245FBH029038	29,000-38,000	24,50	60,00	62,00	RFX245	0,20
3861145	RFX320FBH038050	38,000-50,000	32,00	75,00	77,00	RFX320	0,50
3861146	RFX420FBH050065	50,000-65,000	42,00	95,00	98,00	RFX420	1,10
3861147	RFX550FBH065088	65,000-88,000	55,00	115,00	120,00	RFX550	2,10
3861148	RFX720FBH088115	88,000-115,000	72,00	155,00	160,00	RFX720	4,90

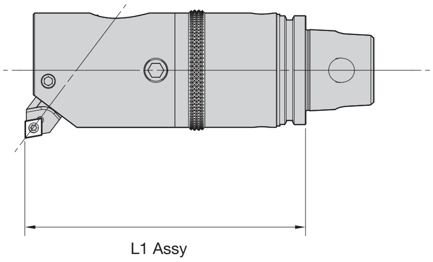
Spare Parts

catalogue number	 adjusting screw	adjustment locking screw	 fixing screw	wedge	 hex wrench	 hex wrench
RFX185FBH022029	12147620000	12147680200	12346292100	12147621100	12148041100	12148040900
RFX245FBH029038	12147620000	12147680300	12346292200	12147621200	12148041100	12148040900
RFX320FBH038050	12147620300	12147680400	12147622300	12147621300	12148041200	12148041000
RFX420FBH050065	12147620400	12147680500	12148575900	12147621400	12148041300	12148041100
RFX550FBH065088	12147620500	12147680600	12148087100	12147621500	12148041400	12148041100
RFX720FBH088115	12147620600	12147680700	12148087100	12147621600	12148079000	–

- 0,01mm diameter adjustment.
- Basic body shipped without boring bars.





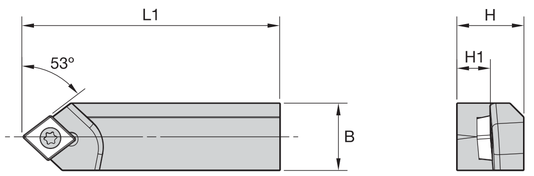


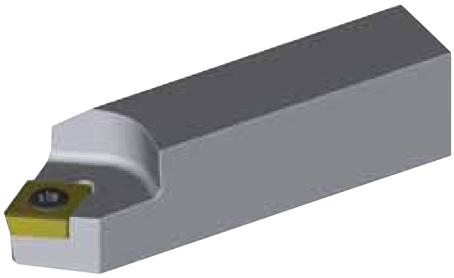
FBH • KM™ Series Shank

order number	catalogue number	BR1 bore range	D2	L1	L1 assy	CSMS system size	kg
3861123	**KM32TSFBH022029**	22,000-29,000	18,50	60,00	62,00	KM32TS	0,20
3861124	**KM32TSFBH029038**	29,000-38,000	24,50	70,00	72,00	KM32TS	0,20
3861125	**KM32TSFBH038050**	38,000-50,000	32,00	80,00	82,00	KM32TS	0,50
3861126	**KM40TSFBH029038**	29,000-38,000	24,50	90,00	92,00	KM40TS	0,50
3861127	**KM40TSFBH038050**	38,000-50,000	32,00	100,00	103,00	KM40TS	0,90
3861128	**KM40TSFBH050065**	50,000-65,000	42,00	105,00	108,00	KM40TS	1,10
3861129	**KM50TSFBH050065**	50,000-65,000	42,00	110,00	115,00	KM50TS	1,20
3861130	**KM50TSFBH065088**	65,000-88,000	55,00	125,00	130,00	KM50TS	1,70
3861131	**KM63TSFBH065088**	65,000-88,000	55,00	130,00	135,00	KM63TS	2,50
3861132	**KM63TSFBH088115**	88,000-115,000	63,00	130,00	135,00	KM63TS	2,00

Spare Parts

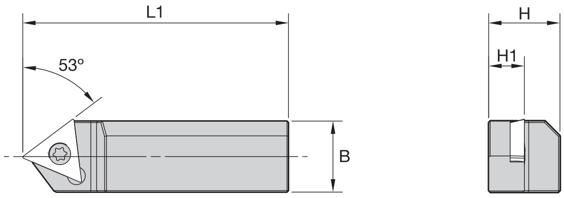
catalogue number	adjusting screw	adjustment locking screw	fixing screw	wedge	hex wrench	hex wrench
KM32TSFBH022029	**12147620000**	**12147680200**	**12346292100**	**12147621100**	**12148041100**	**12148040900**
KM32TSFBH029038	**12147620000**	**12147680300**	**12346292200**	**12147621200**	**12148041100**	**12148040900**
KM32TSFBH038050	**12147620300**	**12147680400**	**12147622300**	**12147621300**	**12148041200**	**12148041000**
KM40TSFBH029038	**12147620000**	**12147680300**	**12346292200**	**12147621200**	**12148041100**	**12148040900**
KM40TSFBH038050	**12147620300**	**12147680400**	**12147622300**	**12147621300**	**12148041200**	**12148041000**
KM40TSFBH050065	**12147620400**	**12147680500**	**12148575900**	**12147621400**	**12148041100**	**12148041300**
KM50TSFBH050065	**12147620400**	**12147680500**	**12148575900**	**12147621400**	**12148041100**	**12148041300**
KM50TSFBH065088	**12147620500**	**12147680600**	**12148087100**	**12147621500**	**12148041200**	**12148041400**
KM63TSFBH065088	**12147620500**	**12147680600**	**12148087100**	**12147621500**	**12148041200**	**12148041400**
KM63TSFBH088115	**12147620600**	**12147680700**	**12148087100**	**12147621600**	**12148041200**	**12148079000**

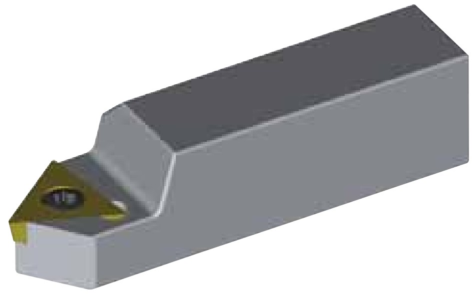




Precision Head Insert Holder • C-Style

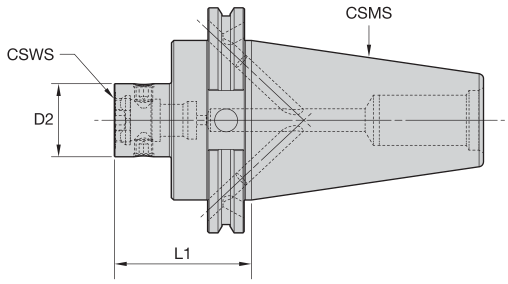
order number	catalogue number	D min	D max	L1	H	H1	B	gage insert	clamping screw	Torx wrench	Nm
2004781	**12627270300**	22,00	29,00	19,00	8,00	4,50	8,00	CC../CP..0602..	**12148068700**	**12148086600**	1,0
2004782	**12627275300**	29,00	38,00	27,00	8,00	4,50	8,00	CC../CP..0602..	**12148068700**	**12148086600**	1,0
2004133	**12627270700**	38,00	50,00	35,00	10,00	5,50	10,00	CC../CP..0602..	**12148068700**	**12148086600**	1,0
2004140	**12627276500**	50,00	65,00	46,00	12,00	6,50	12,00	CC../CP..0602..	**12148068700**	**12148086600**	1,0
2004161	**12627277700**	65,00	88,00	60,00	16,00	8,00	16,00	CC../CP..09T3..	**12148038800**	**12148082400**	3,0
2004177	**12627278700**	88,00	115,00	84,00	16,00	8,00	16,00	CC../CP..09T3..	**12148038800**	**12148082400**	3,0





Precision Head Insert Holder • T-Style

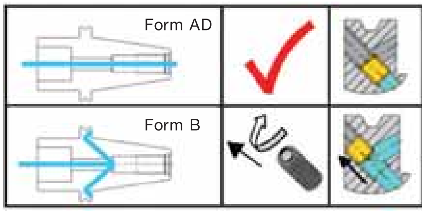
order number	catalogue number	D min	D max	L1	H	H1	B	gage insert	clamping screw	Torx wrench	Nm
2004134	**12627270800**	38,00	50,00	35,00	10,00	5,50	10,00	TC../TP..1102..	**12148068700**	**12148086600**	1,0
2004141	**12627276800**	50,00	65,00	46,00	12,00	6,50	12,00	TC../TP..1102..	**12148068700**	**12148086600**	1,0
2004162	**12627277800**	65,00	88,00	60,00	16,00	8,00	16,00	TC../TP..1102..	**12148038800**	**12148082400**	3,0
2004178	**12627278800**	86,00	115,00	84,00	16,00	8,00	16,00	TC../TP..1102..	**12148038800**	**12148082400**	3,0



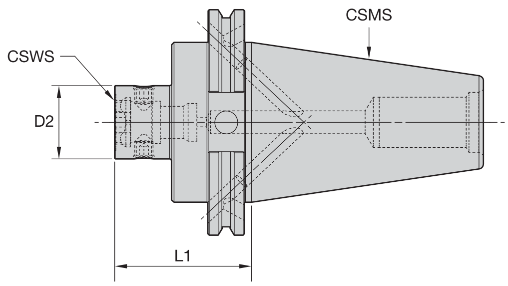
RFX • CV40 Taper Shank Form B/AD

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860896	**CV40BRFX185236**	CV40	RFX185	18,5	60,0	1,1	**RFX185LS**	**12148041100**	6,0
3860897	**CV40BRFX245236**	CV40	RFX245	24,5	60,0	1,1	**RFX245LS**	**12148041100**	8,0
3860898	**CV40BRFX320236**	CV40	RFX320	32,0	60,0	1,1	**RFX320LS**	**12148041200**	14,0
3860899	**CV40BRFX420236**	CV40	RFX420	42,0	60,0	1,1	**RFX420LS**	**12148041300**	16,0
3860900	**CV40BRFX550256**	CV40	RFX550	55,0	65,0	1,2	**RFX550LS**	**12148041400**	20,0

NOTE: Lock screws included. Order retention knobs separately.



40	(2x) MS2221S	2,5mm
50	(2x) MS1296S	3mm

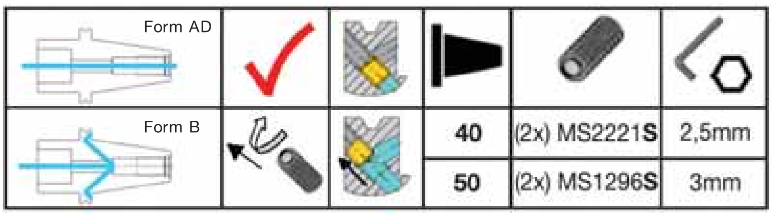


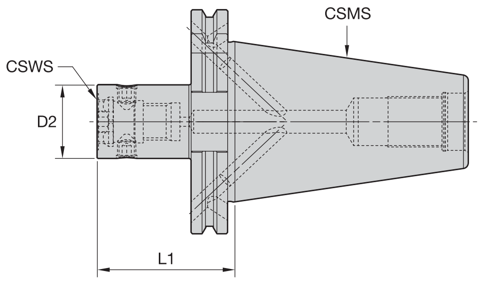
RFX • CV50 Taper Shank Form B/AD

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860901	**CV50BRFX320236**	CV50	RFX320	32,0	60,0	3,1	**RFX320LS**	**12148041200**	12,0
3860902	**CV50BRFX420236**	CV50	RFX420	42,0	60,0	3,2	**RFX420LS**	**12148041300**	20,0
3860903	**CV50BRFX550236**	CV50	RFX550	55,0	60,0	3,4	**RFX550LS**	**12148041400**	25,0
3860904	**CV50BRFX720276**	CV50	RFX720	72,0	70,0	3,6	**RFX720LS**	**12148041400**	25,0

NOTE: Lock screws included. Order retention knobs separately.

Hole Finishing

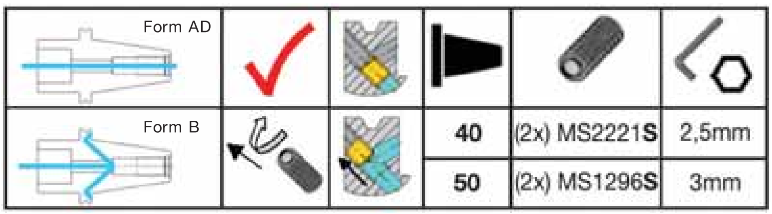


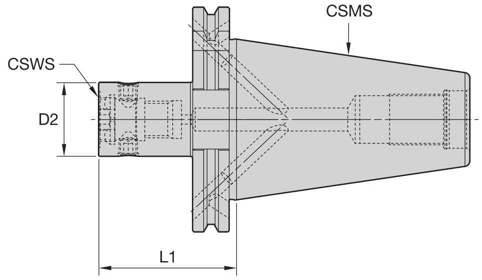


■ RFX • DV40 Taper Shank Form B/AD

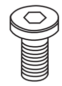
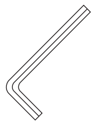
order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860696	**DV40BRFX185060M**	DV40	RFX185	18,5	60,0	1,1	**RFX185LS**	**12148041100**	6,0
3860697	**DV40BRFX245060M**	DV40	RFX245	24,5	60,0	1,1	**RFX245LS**	**12148041100**	8,0
3860698	**DV40BRFX320060M**	DV40	RFX320	32,0	60,0	1,1	**RFX320LS**	**12148041200**	14,0
3860699	**DV40BRFX420060M**	DV40	RFX420	42,0	60,0	1,1	**RFX420LS**	**12148041300**	16,0
3860700	**DV40BRFX550065M**	DV40	RFX550	55,0	65,0	1,2	**RFX550LS**	**12148041400**	20,0

NOTE: Lock screws included. Order retention knobs separately.



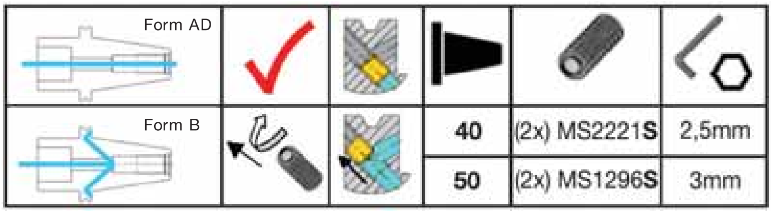


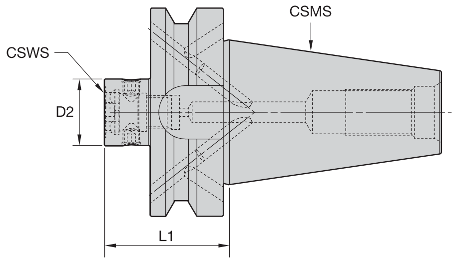
■ RFX • DV50 Taper Shank Form B/AD

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw 	hex wrench 	Nm
3860701	**DV50BRFX320060M**	DV50	RFX320	32,0	60,0	3,1	**RFX320LS**	**12148041200**	14,0
3860702	**DV50BRFX420060M**	DV50	RFX420	42,0	60,0	3,2	**RFX420LS**	**12148041300**	16,0
3860853	**DV50BRFX550060M**	DV50	RFX550	55,0	60,0	3,4	**RFX550LS**	**12148041400**	20,0
3860854	**DV50BRFX720065M**	DV50	RFX720	72,0	65,0	3,6	**RFX720LS**	**12148041400**	20,0

NOTE: Lock screws included. Order retention knobs separately.

Hole Finishing

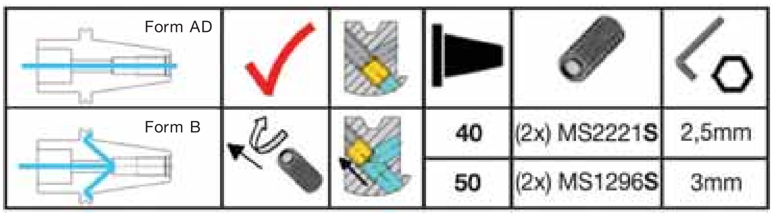


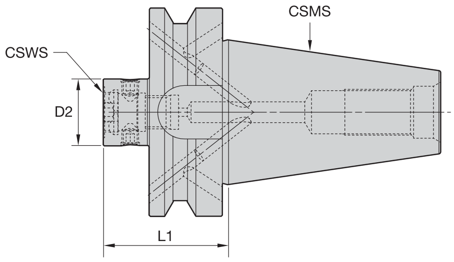


■ RFX • BT40 Taper Shank Form B/AD

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860676	**BT40BRFX185060M**	BT40	RFX185	18,5	60,0	1,0	**RFX185LS**	**12148041100**	8,0
3860677	**BT40BRFX245060M**	BT40	RFX245	24,5	60,0	1,1	**RFX245LS**	**12148041100**	8,0
3860678	**BT40BRFX320060M**	BT40	RFX320	32,0	60,0	1,1	**RFX320LS**	**12148041200**	12,0
3860679	**BT40BRFX420060M**	BT40	RFX420	42,0	60,0	1,2	**RFX420LS**	**12148041300**	20,0
3860680	**BT40BRFX550065M**	BT40	RFX550	55,0	65,0	1,3	**RFX550LS**	**12148041400**	25,0

NOTE: Lock screws included. Order retention knobs separately.

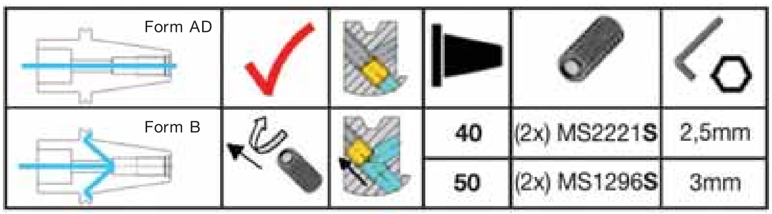


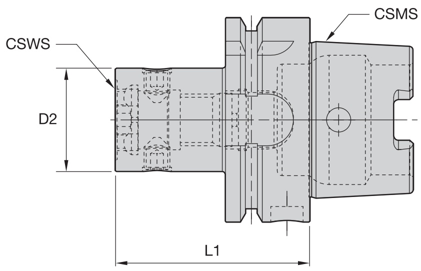


■ RFX • BT50 Taper Shank Form B/AD

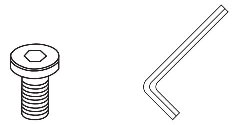
order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860681	**BT50BRFX320060M**	BT50	RFX320	32,0	60,0	3,5	**RFX320LS**	**12148041200**	14,0
3860682	**BT50BRFX420060M**	BT50	RFX420	42,0	60,0	3,9	**RFX420LS**	**12148041300**	16,0
3860693	**BT50BRFX550065M**	BT50	RFX550	55,0	65,0	4,2	**RFX550LS**	**12148041400**	25,0
3860694	**BT50BRFX720070M**	BT50	RFX720	72,0	70,0	4,5	**RFX720LS**	**12148041400**	25,0

NOTE: Lock screws included. Order retention knobs separately.



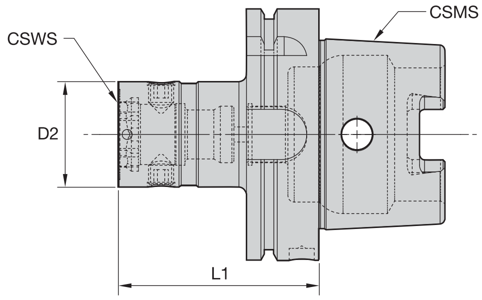


RFX • HSK63 Form A



order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860549	**HSK63ARFX185060M**	HSK63A	RFX185	18,5	60,0	0,7	**RFX185LS**	**12148041100**	6,0
3860550	**HSK63ARFX245060M**	HSK63A	RFX245	24,5	60,0	0,7	**RFX245LS**	**12148041100**	8,0
3860551	**HSK63ARFX320060M**	HSK63A	RFX320	32,0	60,0	0,8	**RFX320LS**	**12148041200**	14,0
3860552	**HSK63ARFX420070M**	HSK63A	RFX420	42,0	70,0	1,0	**RFX420LS**	**12148041300**	16,0
3860623	**HSK63ARFX550080M**	HSK63A	RFX550	55,0	80,0	1,4	**RFX550LS**	**12148041400**	20,0
3860624	**HSK63ARFX720095M**	HSK63A	RFX720	72,0	95,0	2,0	**RFX720LS**	**12148041400**	20,0

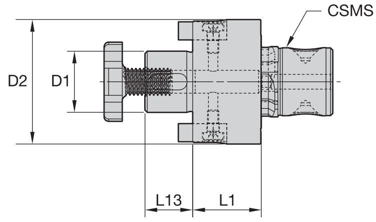
NOTE: Lock screws included. HSK coolant unit and wrench are available but must be ordered separately.



RFX • HSK100 Form A

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3881208	**HSK100ARFX420080M**	HSK100A	RFX420	42,0	80,0	1,0	**RFX420LS**	**12148041300**	20,0
3881209	**HSK100ARFX550090M**	HSK100A	RFX550	55,0	90,0	2,2	**RFX550LS**	**12148041400**	25,0
3881210	**HSK100ARFX720105M**	HSK100A	RFX720	72,0	105,0	2,5	**RFX720LS**	**12148041400**	25,0

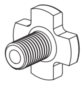
NOTE: Lock screws included. HSK coolant unit and wrench are available but must be ordered separately.



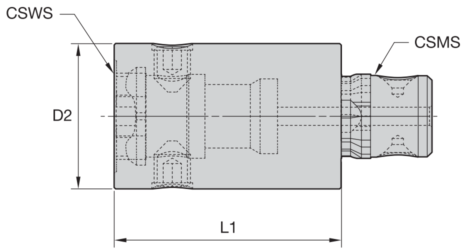
CS-RFX Adaptor • Lock Screw Design

order number	catalogue number	CSMS system size	D1	D2	L1	L13	kg
3860547	**RFX550CS27030M**	RFX550	27,0	55,0	30,0	21,0	0,9
3860548	**RFX720CS40035M**	RFX720	40,0	72,0	35,0	27,0	1,8

Spare Parts



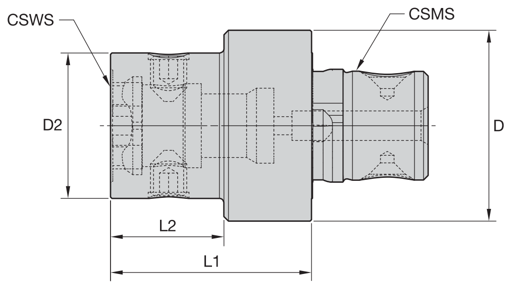
catalogue number	lock screw
RFX550CS27030M	**12147522400**
RFX720CS40035M	**KLS40M**



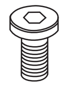
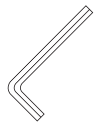
RFX Extensions

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860450	**RFX185RFX185030M**	RFX185	RFX185	18,5	30,0	0,1	**RFX185LS**	**12148041100**	6,0
3860451	**RFX245RFX245035M**	RFX245	RFX245	24,5	35,0	0,2	**RFX245LS**	**12148041100**	8,0
3860452	**RFX320RFX320050M**	RFX320	RFX320	32,0	50,0	0,3	**RFX320LS**	**12148041200**	14,0
3860473	**RFX420RFX420060M**	RFX420	RFX420	42,0	60,0	0,8	**RFX420LS**	**12148041300**	16,0
3860474	**RFX550RFX550090M**	RFX550	RFX550	55,0	90,0	1,6	**RFX550LS**	**12148041400**	20,0
3860475	**RFX720RFX720100M**	RFX720	RFX720	72,0	100,0	3,1	**RFX720LS**	**12148041400**	25,0

NOTE: Lock screws included.



RFX Reducers

order number	catalogue number	CSMS system size	CSWS system size	D	D2	L1	L2	kg	 lock screw	 hex wrench	Nm
3860419	**RFX320RFX185030M**	RFX320	RFX185	32,0	18,5	30,0	15,0	0,2	**RFX185LS**	**12148041100**	6,0
3860420	**RFX320RFX245040M**	RFX320	RFX245	32,0	24,5	40,0	25,0	0,2	**RFX245LS**	**12148041100**	8,0
3860421	**RFX420RFX185035M**	RFX420	RFX185	42,0	18,5	35,0	15,0	0,4	**RFX185LS**	**12148041100**	6,0
3860422	**RFX420RFX245045M**	RFX420	RFX245	42,0	24,5	45,0	25,0	0,4	**RFX245LS**	**12148041100**	8,0
3860443	**RFX420RFX320045M**	RFX420	RFX320	42,0	32,0	45,0	25,0	0,6	**RFX320LS**	**12148041200**	14,0
3860444	**RFX550RFX185040M**	RFX550	RFX185	55,0	18,5	40,0	15,0	0,7	**RFX185LS**	**12148041100**	6,0
3860445	**RFX550RFX245050M**	RFX550	RFX245	55,0	24,5	50,0	25,0	0,8	**RFX245LS**	**12148041100**	8,0
3860446	**RFX550RFX320050M**	RFX550	RFX320	55,0	32,0	50,0	25,0	0,8	**RFX320LS**	**12148041200**	14,0
3860447	**RFX550RFX420055M**	RFX550	RFX420	55,0	42,0	55,0	30,0	0,9	**RFX420LS**	**12148041300**	16,0
3860448	**RFX720RFX420060M**	RFX720	RFX420	72,0	42,0	60,0	30,0	1,6	**RFX420LS**	**12148041300**	16,0
3860449	**RFX720RFX550060M**	RFX720	RFX550	72,0	55,0	60,0	30,0	1,8	**RFX550LS**	**12148041400**	20,0

NOTE: Lock screws included.

Easy Access to Proven Metalworking Expertise!

WIDIA™ Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of WIDIA tooling.

Customer Application Support (CAS)

EXTREME **CHALLENGES.** EXTREME **RESULTS.**

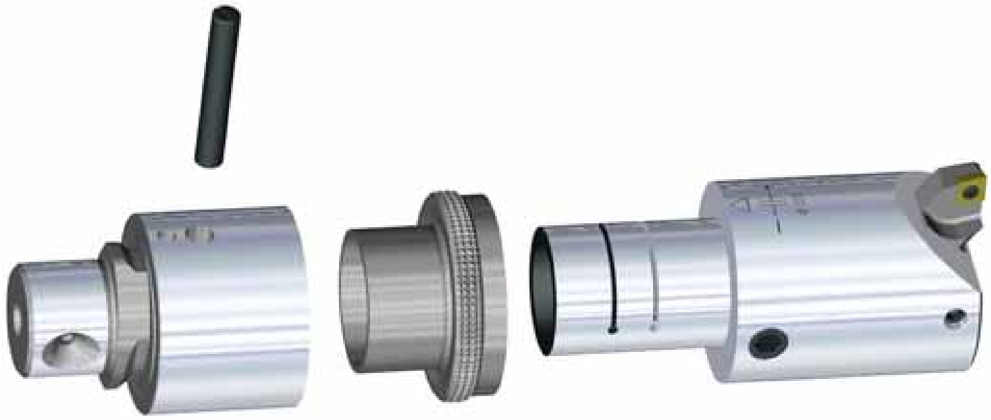
ORIGINATING COUNTRY	LANGUAGE	TEL	FAX	EMAIL
Australia	English	+61 001 724 539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Austria	German	0800 291630	0049 911 9735 429*	eu.techsupport@widia.com
Belgium	English / French	0800 80410	0049 911 9735 429*	eu.techsupport@widia.com
China	Chinese	+86 400 889 2237	+86 21 58999985 *	w-cn.techsupport@widia.com
Denmark	English	+45 808 89295	001 724 539 6830 *	na.techsupport@widia.com
Finland	English	0800 919413	001 724 539 6830 *	na.techsupport@widia.com
France	Frensh	+33 080 5540 379	0049 911 9735 429*	eu.techsupport@widia.com
Germany	German	0800 1015774	0911 9735 429*	eu.techsupport@widia.com
India	English	+91 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Israel	English	+972 1809 449907	001 724 539 6830 *	na.techsupport@widia.com
Italy	Italian	800 916568	02 89512146 *	eu.techsupport@widia.com
Japan	English	+81 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Korea (South)	English	+82 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Malaysia	English	+60 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Netherlands	English	0800 0201131	001 724 539 6830 *	na.techsupport@widia.com
New Zealand	English	+64 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Norway	English	800 10081	001 724 539 6830 *	na.techsupport@widia.com
Poland	Polish	00800 4411943	06166 56504*	eu.techsupport@widia.com
Russia (landline)	Russian	+7 8800 5556395	0048 6166 56504*	eu.techsupport@widia.com
Russia (cell phone)	Russian	+7 8005556395	0048 6166 56504*	eu.techsupport@widia.com
Singapore	English	+65 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
South Africa	English	+27 0800 981644	001 724 539 6830 *	na.techsupport@widia.com
Sweden	English	+46 020798794	001 724 539 6830 *	na.techsupport@widia.com
Taiwan	English	+886 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Thailand	English	+66 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
United Kingdom	English	+44 0800 028 2996	001 724 539 6830 *	na.techsupport@widia.com
Ukraine	Russian	+380 0800502665	0048 6166 56504*	eu.techsupport@widia.com
USA	English	888 539 5145	001 724 539 6830 *	na.techsupport@widia.com

Phone and fax numbers marked with * are not toll free.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

Design Principle



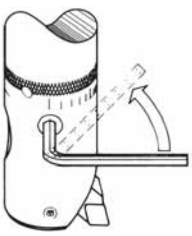
Basic adaptor   Eccentric bushing   Boring bar adaptor

Eccentric bushing for fine adjustment

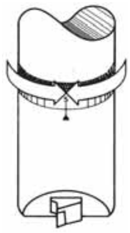
Regular fine boring heads have a threaded spindle as an adjustment mechanism. In this situation, spindle inaccuracy can cause backlash and require extra effort during setup. The ROTAFLEX eccentric bushing is easy to use, and machining forces are transmitted via a larger surface, ensuring a consistent diameter during machining.

After rough adjustment of the insert holder, the easy-to-read scale enables fine adjustment to reach precisely the diameter needed. Here, no parallax errors occur when reading the scale.

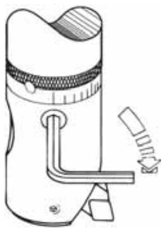
Adjustment



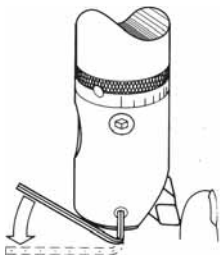
Unlock fine adjustment ring



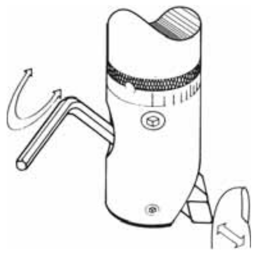
Set fine adjustment to zero



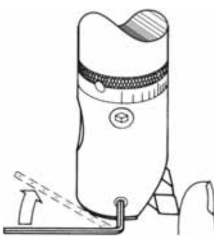
Lock fine adjustment ring



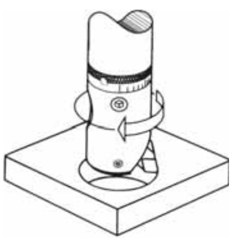
Unlock insert holder



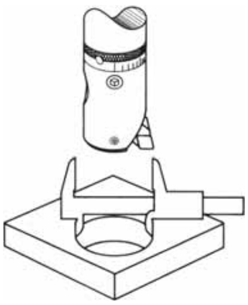
Coarse adjustment on pre-set equipment



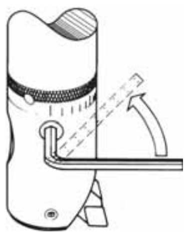
Lock insert holder



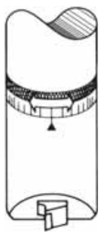
Control cut



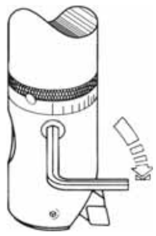
Measure



Unlock fine adjustment ring

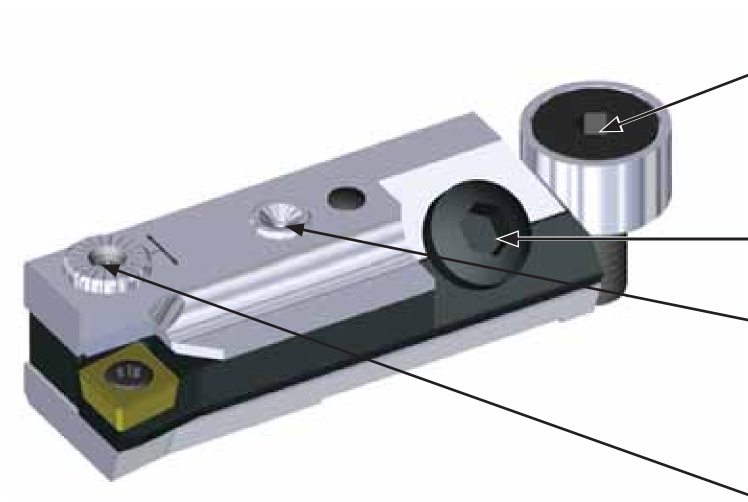


Readjust



Lock fine adjustment ring

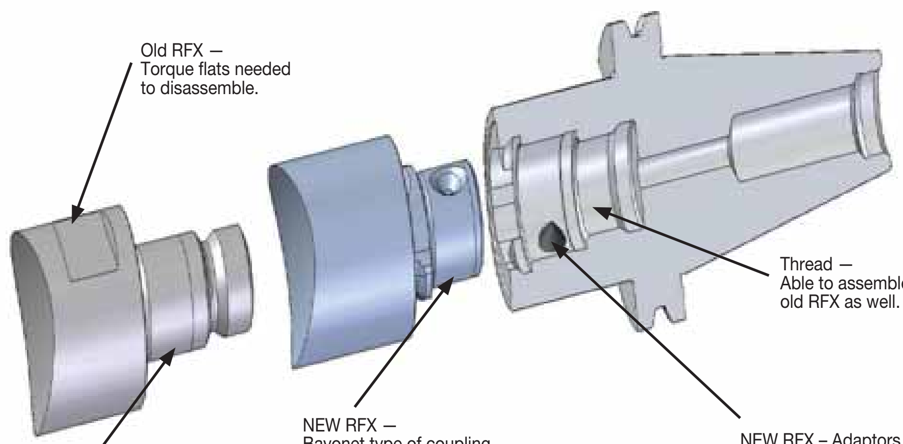
Application Hints • Micro-Adjustable Cartridges



Rotation speed max 10,000 RPM

Application Hints • RFX Coupling

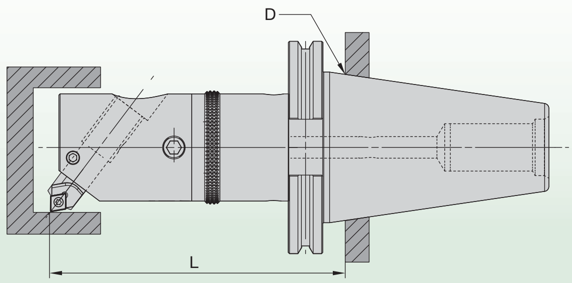
Old RFX screw-type coupling can be mounted into new RFX bayonet-type adaptors as well.

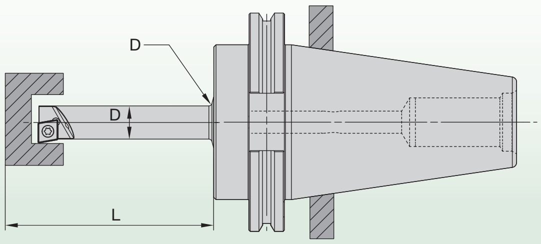


General Application Hints

- Identify your critical diameter (D).
- Identify the maximum distance cutting edge (L) to critical diameter.

Here are some examples:





Refer to this table for first investigation of application:

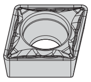
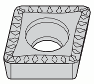
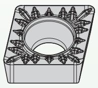
Type of Tooling	Stable	Unstable	Tests Necessary
Twin Cutter Solid Tools	<3,5 x D	3,5–6,5 x D	>6,5 x D
Twin Cutter Bridge Tools	<3,5 x D	3,5–6,5 x D	>6,5 x D
Fine-Boring Heads with Boring Bar (FBHBB)	<3,5 x D	3,5–5,0 x D	>5,0 x D
Fine-Boring Heads (FBH)	<3,5 x D	3,5–5,0 x D	>5,0 x D
Fine-Boring Bridge Tools	<3,5 x D	3,5–5,0 x D	>5,0 x D
	Function of the tool is expected without issues within recommended cutting data.	**Application may require reduced feeds and/or speeds compared to stable conditions.**	**Machining test may be required to identify cutting data.**

Causes of and remedies for rough and fine boring problems

It is generally assumed that the tools have been properly mounted as per the technical recommendations in this catalogue.

Problem	Cause	Possible Remedy
Vibration tendency	1. Overhang 2. Choice of insert 3. Cutting data	• Adjust L/D ratio • Select 90° lead angle on rough boring tools • Select inserts with positive geometry • Select inserts with smaller corner radius • Reduce depth of cut • Increase feed
Slight chatter marks on surface	1. Choice of insert 2. Cutting data 3. Machining environment	• Select 90° lead angle • Select ground inserts with small edge preparation • Select inserts with smaller corner radius • Increase feed • Increase coolant
Conical bores	1. Choice of insert 2. Cutting data 3. Machining environment	• Select a more wear-resistant insert grade • Increase cutting speed • Check whether all screws have been tightened to recommended torque

Inserts Overview

Geometry	Application	ANSI catalogue number	ISO catalogue number	P			M		K		S	
				WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WK05CT	WK20CT	WS10PT	WS25PT
	CCMT-FP • Fine Finishing	CCMT2151FP	CCMT060204FP	•	•		•	•		•	•	•
		CCMT3251FP	CCMT09T304FP	•	•		•	•		•	•	•
	CCMT-MU • Medium to Finishing	CCMT2152MU	CCMT060208MU					•		•		
		CCMT3251MU	CCMT09T304MU	•	•			•	•	•	•	•
		CCMT3252MU	CCMT09T308MU	•	•	•		•		•	•	•
		CCMT432MU	CCMT120408MU	•	•			•		•		•
	CCMT-MP • Roughing to Medium	CCMT2151MP	CCMT060204MP	•	•		•	•		•	•	
		CCMT3251MP	CCMT09T304MP	•	•		•	•		•	•	
		CCMT3252MP	CCMT09T308MP	•	•		•	•		•	•	
		CCMT432MP	CCMT120408MP	•	•		•	•		•	•	
		CCMT433MP	CCMT120412MP		•		•	•		•		

Hole Finishing Capabilities and Custom Solutions

With our state-of-the-art CNC equipment and engineering processes, we can design complex geometries for reaming and countersinking. Special countersinks for pre-working and finishing operations minimise machine time and rationalise production. Our custom solution reamers deliver proven performance in applications that demand high surface qualities, narrow fit, alignment tolerances, and long tool life.

Hole Finishing Custom Solution Tool Styles:

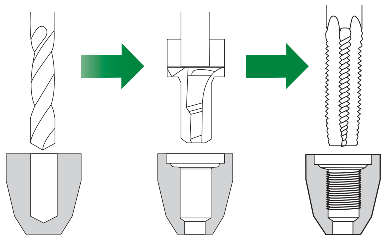
- Reaming
- Boring
- Countersinking
- PCD Round Tools

Hole Finishing Capabilities and Custom Solution Services

- Development, design, and production of different types of cutting tools for reaming, boring, and countersinking.
- Services provided by one engineering department fully integrated with all WIDIA™ focused factories.
- Capabilities with all common cutting materials such as high-speed steel (HSS-E), powdered metal, solid carbide, carbide-tipped, cermet, and PCD, with or without internal coolant.
- Complete tool competence from one source, from construction, application engineering, development, and production through tool reconditioning services.

Port Contour Cutters

- Each component has entry and exit points for the fluid involved called ports.
- Port shapes and forms are standardised.
- WIDIA™ offers porting tools to finish these ports in one-shot operations.



Standard Port	Available Cutters
JDS-G173.1	169-0XXX WITH GROOVE & 169-1XXX WITHOUT GROOVE & 269-0XXX WITH GROOVE & 269-1XXX WITHOUT GROOVE
AS5202	169-0XXX WITH GROOVE & 169-1XXX WITHOUT GROOVE & 269-0XXX WITH GROOVE & 269-1XXX WITHOUT GROOVE
ISO-6149-1	169-0XXX WITH GROOVE & 169-1XXX WITHOUT GROOVE & 269-0XXX WITH GROOVE & 269-1XXX WITHOUT GROOVE
SAE J2241/1	169-0XXX WITH GROOVE & 169-1XXX WITHOUT GROOVE & 269-0XXX WITH GROOVE & 269-1XXX WITHOUT GROOVE
NPTF/NPT	186, 187 & 287
MS 16142	163, 253, 263, 267, 367 & 467
CAT.IE2554	163, 253, 263, 267, 367 & 467
SAE J1926-1	163, 253, 263, 267, 367 & 467
BSPP/BSPF	265
AS1300	RCT SERIES/CUSTOM SOLUTION
MS33659	164, 264 & 268
AND10050	164, 264 & 268
ISO-1179-1	255 STD. LGHT. & 265 EXT. LGTH. REAMER
DIN-3852-2	225 SMALL, 235 LARGE & 245 EXT. LGTH. REAMER

Port Contour Cutters

CHALLENGE

- Dura-bar 65-45-12.
- Component: General cavity.
- Ream SAE#8.
- Surface finish below Ra 32 (inch).

SOLUTION

- Cermet-tipped port cutting tool.

CUTTING DATA

- 2100 RPM–20 IPM.
- Flood coolant.
- Machining centre.

RESULT

- Surface finish of 7–15 RA (inch).

BENEFIT

- Increase productivity by one-shot finishing of port.

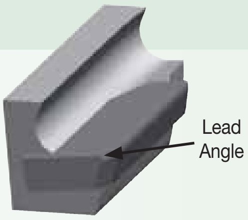
Reamer Custom Solutions

With our state-of-the-art equipment and engineering processes, we can design complex geometries for reaming and countersinking. Special countersinks for pre-working and finishing operations minimise machining time and rationalise production. Our custom solution reamers deliver proven performance in applications that demand high surface qualities, narrow fit, alignment tolerances, and long tool life.

Diameter

- 1,4–50mm (.055–1.968").
- Up to tolerance IT6 depending on application.
- Diameter steps.

Leads

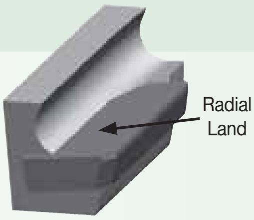


- 25–90° leads for smoother cutting or better positioning.
- Double leads for better surface quality.
- Radius leads for optimal CI machining.

Grades

- Various grades available tailored to your specific application.

Radial Land

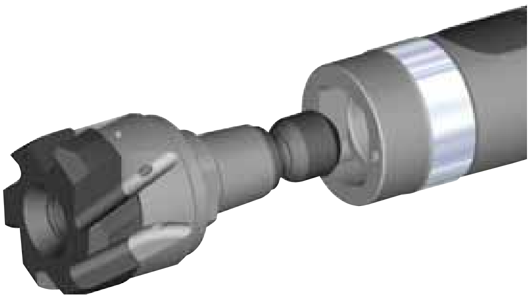


- Cylindrical for better guiding and form.
- Upsharp (no land) for best surface finishes and less passive forces.
- Narrow land to reduce forces.

TRM – TOP REAM MODULAR

CHALLENGE

- Tube holes Ø 25,25mm (.994").
- Tolerance range 100 µm.
- Alloy steel, long-chipping.
- Machining center with internal coolant.



SOLUTION

- Six cutting edges.
- Coated cermet.
- Standard 5 x D body clamped into hydraulic chuck.

CUTTING DATA

- vc = 90 m/min (295 SFM).
- f = 0,48 mm/rev (.019 IPR).

RESULT

- After more than 30 minutes only minor wear visible.

BENEFIT

- Reduction of machining time in total to less than 60 minutes per plate with 180 holes.
- Predictable tool life as only 2 µm diameter deviation after 30 minutes tool life.

PCD STEP REAMER

CHALLENGE

- Bearing bore Ø 130mm.
- Tolerance range 25 µm S6.
- Aluminium AlSi8Cu3.
- Varying depth of cut ca. 0,5–5mm.
- Machining centre with internal coolant.

SOLUTION

- PCD tipped, steel-based tool with HSK interface and internal coolant.
- Six effective cutting and chamfering teeth in positive cutting position.

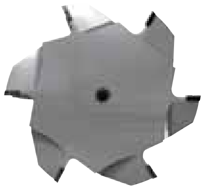
CUTTING DATA

- vc = 350 m/min (1.148 SFM).
- f = 0,60 mm/rev (.024 IPR).

RESULT

- Tool life increase versus previous solution.
- Surface finish Ra 0.2 µm.

Highly uneven flute design reduces vibrations.

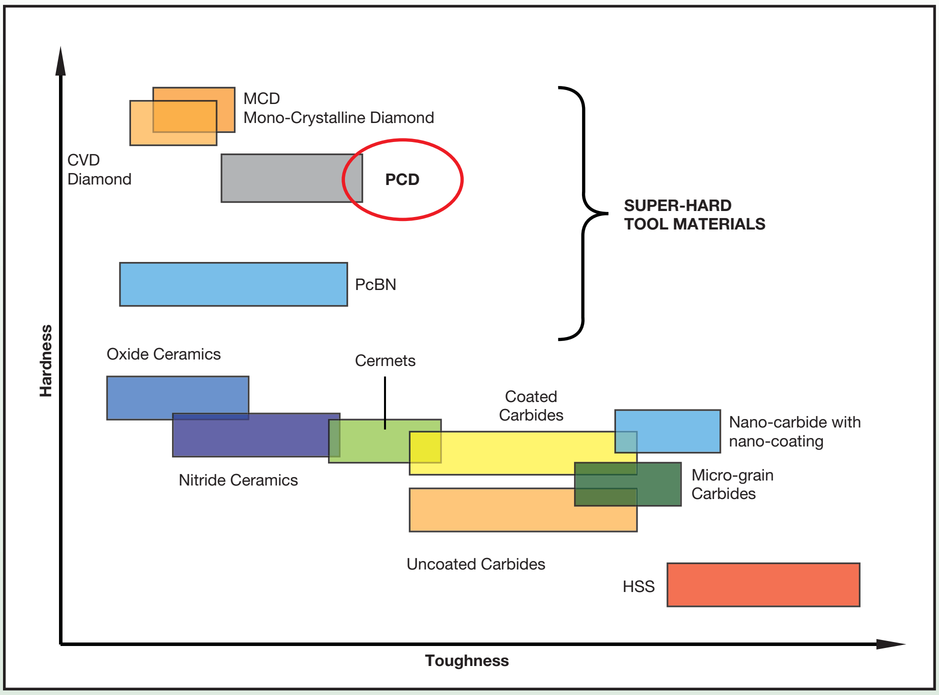


BENEFIT

- Secure process.
- Most productive solution at large diameter.
- Very long tool life.
- Reconditionable.

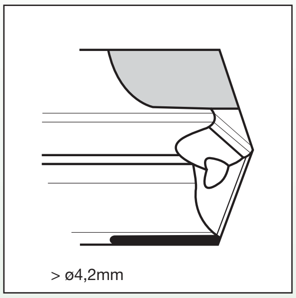
PCD • Round Tools for Holemaking

Cutting Materials • Hardness vs. Toughness



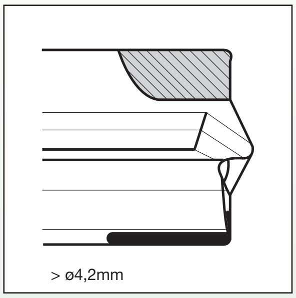
WIDIA™ PCD Drill-Pointed Geometries

Type: **CT**
Corner tipped



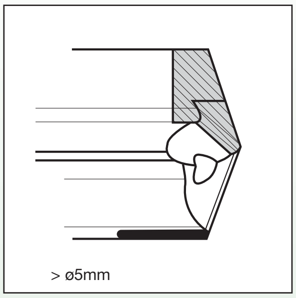
For general applications.

Type: **CTE**
Corner tipped with centre point



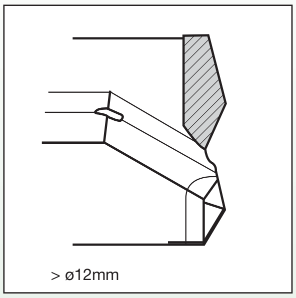
For precasted bores.

Type: **SW**
Sandwich



For highly abrasive materials.

Type: **MT**
For body = steel

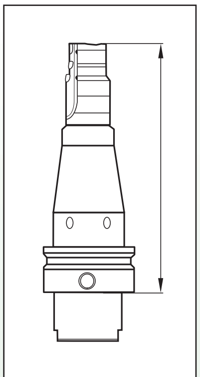


For breaking through the casting skin.

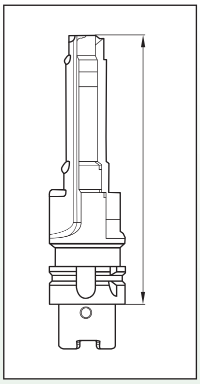
Non-Ferrous Materials

N2	Low-Silicon Aluminium Alloys (Hypoeutectic <12.2% Si) and Magnesium Alloys
N3	High-Silicon Aluminium Alloys (Hypereutectic >12.2% Si) and Magnesium Alloys
N4	Copper, Brass, Zinc-Based Materials
N5	Nylon, Plastics, Rubber, Phenolics, Resins, Fibreglass, Glass
N6	Carbon and Graphite Composites: Brush Alloys, Kevlar, Graphite
N7	MMCs — Aluminium Based Metal Matrix Composites

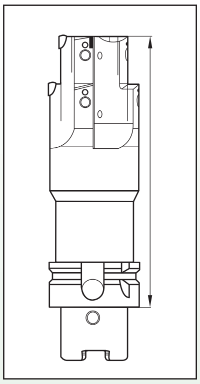
WIDIA™ PCD Styles for Reamers/CS



PKD ST —
Steel Shank



PKD STM —
Monoblock



PKD STMJ —
Adjustable
Cutting Edges

PKD SC —
Solid Carbide
Shank

Material	Coolant Style Grade	Coolant Style Grade	Coolant Style Grade
Al <7%	MQL, Emulsion	PCD SC PCD STM PCD STMU	WBK45U
Al <12%	MQL, Emulsion		WBK45U
Al <12%	Emulsion	PCD SC	WBK45U
Mg Alloys	Emulsion	PCD SC	WBK45U
CFK	Dry	PCD SC	WBK45U

Tapping

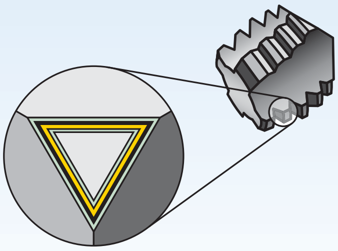
★ Good
★★ Better
★★★ Best

series	hole: through	hole: blind	thread: cutting	thread: forming	coolant: flood	coolant: through	size range min–max	grade/ coating	material: carbide	material: HSS-E-PM	material: HSS-E	material: HSS	chamfer: type	chamfer: form	helix angle	dimension
Spiral-Point and Left-Hand Spiral-Flute Taps																
GT20	X		X		X		M3–M42	GP6520, GM6515		X			plug	D	L15°	DIN 371, 374, 376
GT20	X		X		X		M24–M42	GP6520		X			plug	D	L15°	DIN 376, XL
GT21	X		X			X	M5–M14	GP6520, GM6515		X			plug	D	L15°	DIN 371, 376
GT10	X		X		X		M3–M20	WS32MG		X			plug	D	L8°	DIN 371, 376
GT14	X		X		X		M3–M12	WN35MG		X			plug	B	0°	DIN 371, 376
GT70	X		X		X		M3–M16	WN48EG		X			plug	B	0°	DIN 371, 376
GT00	X		X		X		M3–M20	WP31MG		X			plug	B	0°	DIN 371, 374, 376
VTSP060	X		X		X		#4–1"	WP49EG, WU41EG			X		plug	B	0°	DIN 371, 376
VTSP065	X		X		X		M2–M36	WP42EG, WU41EG, WP49EG, WU40EG			X		plug	B	0°	DIN 371, 374, 376
VTSP075	X		X		X		M3–M20	WU41EG, WU40EG			X		plug	B	0°	JIS
Spiral-Flute Taps																
GT30		X	X		X		M24–M42	GP6520		X			semi-bottom	C	45°	DIN 376, XL
GT30		X	X		X		M3–M42	GP6520, GM6515, GP6505		X			semi-bottom	C	45°	DIN 371, 374, 376
GT31		X	X			X	M5–M42	GP6520, GM6515		X			semi-bottom	C	45°	DIN371, 376
GT31		X	X			X	M24–M42	GP6520		X			semi-bottom	C	45°	DIN 376, XL
GT32		X	X		X		M5–M16	GP6520		X			bottoming	E	45°	DIN 371, 374, 376
GT33		X	X			X	M5–M16	GP6520		X			bottoming	E	45°	DIN 371, 374, 376
GT50		X	X		X		M24–M42	GP6520		X			semi-bottom	C	15°	DIN 376, XL
GT51		X	X			X	M24–M42	GP6520		X			semi-bottom	C	15°	DIN 376, XL
GT12		X	X		X		M3–M20	WS32MG		X			semi-bottom	C	10°	DIN 371, 376
GT16		X	X		X		M3–M12	WN35MG		X			semi-bottom	C	30°	DIN 371
GT80		X	X		X		M3–M20	WN48EG		X			semi-bottom	C	45°	DIN 371, 376

	P				M	K		N			S				H			
	1, 2, 3, 4, 6, 7	5, 9, 10, 11	12, 13.1	13.2	14.1, 14.2, 14.3, 14.4	15, 16	17, 18, 19, 20	21	22, 23, 24, 25	26, 27, 28	31, 32	33, 34, 35	36	37	38.1, 38.2, 40.1,40.2, 41.1	39.1, 41.2		
	Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Grey Cast Iron	Ductile Cast Iron	Wrought Aluminium	Cast Aluminium	Copper, Copper Alloys	Iron Based	Cobalt Based	Nickel Based	Titanium Alloys	Hardened Steels 49–55 HRC	Hardened Steels 56–68 HRC	page(s)	recommended cutting parameters
Spiral-Point and Left-Hand Spiral-Flute Taps *(continued)*																		
	★★★		★★★		★★★		★★	★	★		★★						Y4	Y85
	★★★		★★★		★★★		★★	★	★		★★						Y5	Y85
	★★★		★★★		★★★		★★	★	★		★★						Y6	Y85
												★★★	★★★				Y7	Y85
														★★★			Y8	Y85
								★★★	★	★							Y9	Y85
		★★★		★★★	★	★	★					★					Y10	Y85
	★★	★	★		★★	★	★★	★	★★	★★	★						Y11	Y86
	★★	★	★		★★	★	★★	★	★★	★★	★						Y14	Y86
	★★	★	★		★★	★	★★	★	★★	★★	★						Y17	Y86
Spiral-Flute Taps *(continued)*																		
	★★★		★★★		★★★		★★	★	★			★★					Y21	Y85
	★★★		★★★		★★★		★★	★	★			★★					Y20	Y85
	★★★		★★★		★★★		★★	★	★			★★					Y22	Y85
	★★★		★★★		★★★		★★	★	★			★★					Y23	Y85
	★★★		★★★		★★★		★★	★	★			★★					Y24	Y85
	★★★		★★★		★★★		★★	★	★			★★					Y25	Y85
	★★★		★★★				★★										Y26	Y85
	★★★		★★★				★★										Y28	Y85
												★★★	★★★				Y30	Y85
														★★★			Y31	Y85
								★★★									Y32	Y85

★ Good ★★ Better ★★★ Best series	hole: through	hole: blind	thread: cutting	thread: forming	coolant: flood	coolant: through	size range min–max	grade/coating	material: carbide	material: HSS-E-PM	material: HSS-E	material: HSS	chamfer: type	chamfer: form	helix angle	dimension
Spiral-Flute Taps *(continued)*																
GT02		X	X		X		M3–M20	WP31MG		X			semi-bottom	C	25°	DIN 371, 374, 376
GT04		X	X		X		M3–M20	WH36MG		X			semi-bottom	C	42°	DIN 371, 374, 376
VTSFT60		X	X		X		#4–1"	WP49EG, WU41EG			X		semi-bottom	C	45°	DIN 371, 376
VTSFT65		X	X		X		M2–M36	WP42EG, WU41EG, WP49EG, WU40EG			X		semi-bottom	C	45°	DIN 371, 374, 376
VTSFT65		X	X		X		M3–M20	WP49EG, WP42EG			X		bottoming	E	45°	DIN 371, 374, 376
VTSFT75		X	X		X		M3–M20	WU41EG, WU40EG			X		semi-bottom	C	45°	JIS
Straight-Flute Taps																
GX10	X	X	X		X		M3–M16	WH16PG	X				semi-bottom	C	0°	DIN 371, 374, 376
GX35		X	X			X	M6–M16	WK12PG	X				bottom	E	0°	HA6535
GX35		X	X			X	M6–M14	WK12PG	X				bottom	E	0°	DIN 371, 374, 376
GX47		X	X			X	M6–M10	WN14PG	X				bottoming	E	0°	DIN 371
GX47		X	X			X	M6–M16	WN14PG	X				bottom	E	0°	HA6535
GX50		X	X			X	M4–M14	WK12PG	X				semi-bottom	C	0°	DIN 371, DIN 376
GT40	X	X	X		X		M4–M22	GP6520		X			semi-bottom	C	0°	DIN 371, 374, 376
GT41	X	X	X			X	M4–M20	GP6520		X			semi-bottom	C	0°	DIN 371, 374, 376
GT42		X	X		X		M5–M20	GP6520		X			bottoming	E	0°	DIN 371, 374, 376
GT43		X	X			X	M5–M20	GP6520		X			bottoming	E	0°	DIN 371, 374, 376
GT06	X	X	X		X		M6–M16	WS32MG		X			semi-bottom	C	0°	DIN 371, 374, 376
Form Taps																
GX49		X		X		X	M6–M10	WN14PG	X				bottoming	E	—	DIN 374
GX49		X		X		X	M6–M12	WN14PG	X				bottoming	E	—	HA6535
GT22	X	X		X	X		M3–M16	WP31MG, WN38MG		X			semi-bottom	C	—	DIN 2174
GT23	X	X		X		X	M5–M16	WP31MG, WN38MG		X			semi-bottom	C	—	DIN 2174

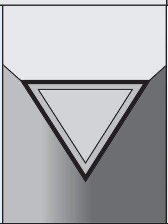
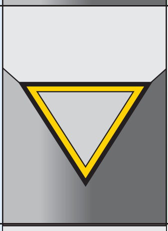
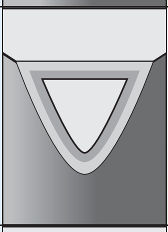
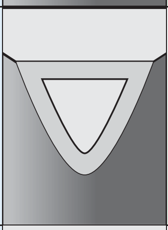
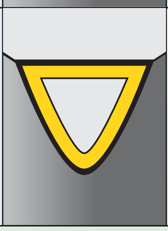
	P				M	K		N			S				H			
	1, 2, 3, 4, 6, 7	5, 9, 10, 11	12, 13.1	13.2	14.1, 14.2, 14.3, 14.4	15, 16	17, 18, 19, 20	21	22, 23, 24, 25	26, 27, 28	31, 32	33, 34, 35	36	37	38.1, 38.2, 40.1, 40.2, 41.1	39.1, 41.2		
	Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Grey Cast Iron	Ductile Cast Iron	Wrought Aluminium	Cast Aluminium	Copper, Copper Alloys	Iron Based	Cobalt Based	Nickel Based	Titanium Alloys	Hardened Steels 49–55 HRC	Hardened Steels 56–68 HRC	page(s)	recommended cutting parameters
Spiral-Flute Taps *(continued)*																		
		★★★		★★★	★	★	★					★					Y33	Y85
		★★★		★★★													Y34	Y85
	★★	★	★		★★	★	★★	★	★★	★★	★						Y35	Y86
	★★	★	★		★★	★	★★	★	★★	★★	★						Y38	Y86
	★★	★	★		★★	★	★★	★	★★	★★	★						Y41	Y86
	★★	★	★		★★	★	★★	★	★★	★★	★						Y42	Y86
Straight-Flute Taps *(continued)*																		
																★★★	Y46	Y84
						★★★	★★★										Y47	Y84
						★★★	★★★										Y48	Y84
									★★★								Y49	Y84
									★★★								Y50	Y84
						★★★	★★★										Y51	Y84
						★★★	★★★		★★★	★★							Y52	Y85
						★★★	★★★		★★★	★★							Y53	Y85
						★★★	★★★		★★★	★★							Y54	Y85
						★★★	★★★		★★★	★★							Y55	Y85
																★★★	Y56	Y85
Form Taps *(continued)*																		
								★★★	★★								Y60	Y84
								★★★	★★								Y61	Y84
	★★★							★★★	★★								Y62	Y85
	★★★							★★★	★★								Y63	Y85

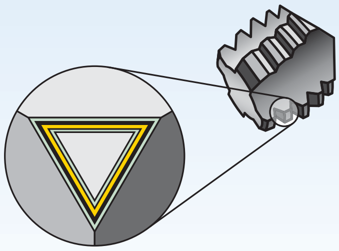


Coatings are designed for optimised tapping performance in specific materials.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WK12PG		PVD coated TiCN and fine grain carbide. Extraordinary wear resistance when tapping cast iron. High-temperature hardness allows long life at up to 4x faster speed than HSS-E-PM taps.	K	■	■	■						
WN14PG		Coated carbide, PVD two-layer coating over fine-grain carbide. Coating consists of low friction CrC/C over wear-resistant TiN. CrC/C resists galling of non-ferrous materials to the tap. Provides superior performance for tapping cast aluminium and other non-ferrous materials.	N	■	■	■						
WH16PG		Coated carbide, PVD two-layer coating with heat-resistant TiAlN base layer and low-friction MoS_2 top layer over carbide substrate. Use in hardened steel 55–63 HRC.	H				■	■	■			
GP6520		Coated HSS-E-PM, PVD heat- and wear-resistant high-vanadium cobalt powder metal HSS substrate coated with wear-resistant TiCN base layer. Use in steel, cast iron, and cast aluminium with silicon.	P				■	■	■			
			K					■	■	■		
GM6515		HSS-E-PM, PVD heat- and wear-resistant high-vanadium cobalt powder metal HSS substrate. Coating consists of low-friction CrC/C over wear-resistant TiN base layer. Use for tapping stainless steel and non-ferrous materials.	M				■	■	■			
			N					■	■	■		

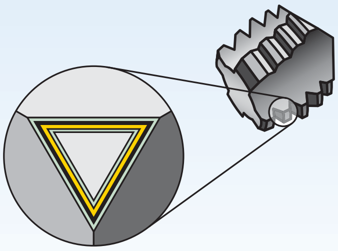


Coatings are designed for optimised tapping performance in specific materials.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟷ toughness

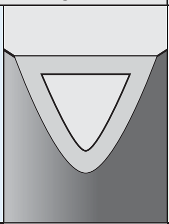
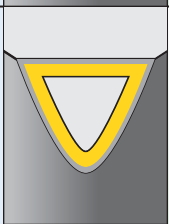
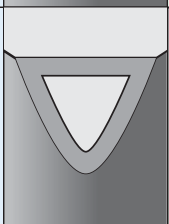
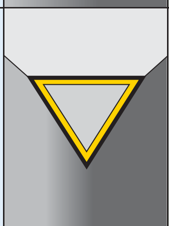
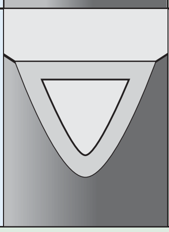
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WS34MG		Coated HSS-E-PM, PVD heat- and wear-resistant high-vanadium, high-cobalt powder metal HSS-E-PM substrate. Coating consists of low-friction CrC/C over wear-resistant TiN base layer. Use for tapping titanium and titanium alloys.	S					■	■	■		
WS30MG		Surface-treated HSS-E-PM: powder metal HSS-E-PM substrate with nitride surface treatment that provides wear resistance in non-ferrous materials including titanium. Limited use. Use for tapping titanium and titanium alloys.	S								■	■
WU32MG		Coated HSS-E-PM, PVD heat- and wear-resistant high-vanadium cobalt powder metal HSS substrate coated with wear-resistant TiCN base layer.	S				■	■	■			
WS39MG		Surface-treated HSS-E-PM powder metal HSS-E substrate with oxide/nitride surface treatment that provides wear resistance in nickel alloys.	S							■	■	■
WP31MG		Coated HSS-E-PM, PVD powder metal HSS-E substrate with TiN coating. Use for tapping steel 32–44 HRC and for forming threads in steel up to 32 HRC.	P						■	■	■	

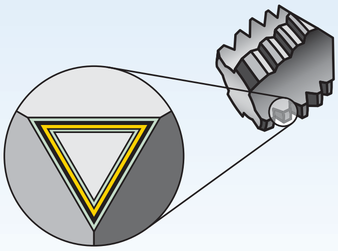


Coatings are designed for optimised tapping performance in specific materials.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ←→ toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WS32MG		Coated HSS-E-PM, PVD heat- and wear-resistant high-vanadium cobalt powder metal HSS substrate with high-hardness TiCN coating. Use when tapping heat-treated steel 44–55 HRC and cobalt- or nickel-based heat-resistant alloys.	S		■	■	■					
			H		■	■	■					
WN35MG		Coated HSS-E-PM, PVD powder metal HSS-E substrate with two-layer coating. TiN base layer and DLC top layer that resists galling of non-ferrous materials to the tap. Use for tapping titanium. Not recommended for steel.	S				■	■	■			
WN38MG		Coated HSS-E-PM, PVD powder metal HSS-E substrate with DLC coating. Use for form tapping aluminium. Not recommended for steel.	N					■	■	■		
WN44EG		High-vanadium HSS-E substrate with a coating consists of low friction CrC/C over wear-resistant TiN base layer. Use for tapping stainless steel and non-ferrous materials.	N							■	■	■
WP42EG		Coated HSS-E substrate with TiCN PVD layer. Use in multiple applications, including steel, stainless steel, ductile cast iron, and cast aluminium. WP42EG is more abrasion-resistant than WU41EG.	P							■	■	■
			M							■	■	■
			K							■	■	■
			N							■	■	■



Coatings are designed for optimised tapping performance in specific materials.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WU41EG		Coated HSS-E substrate with TiN PVD layer. Use in multiple applications, including steel, stainless steel, ductile cast iron, and cast aluminium.	P									
			M									
			K									
			N									
WP49EG		HSS-E substrate with black oxide surface treatment. Use in a variety of materials, including steel, stainless steel, and ductile iron. Not recommended for non-ferrous materials.	P									
			M									
			K									
WU40EG		Uncoated HSS-E grade with bright surface. Use in easy-to-machine, general-purpose applications.	P									
			M									
			K									
			N									
WN48EG		Coated HSS-E, PVD lower vanadium HSS-E substrate with DLC coating. Use for tapping non-ferrous materials with low cutting temperatures like wrought aluminium. Not recommended for steel.										
			N									

Tapping Portfolio

Spiral-Point and Left-Hand Spiral-Flute

WIDIA-GTD™ offers a wide range of options for tapping through holes in:

- Steel and steel alloys.
- Stainless steel.
- Cast iron.
- Wrought and cast aluminium.
- Nickel-based alloys.
- Titanium alloys.

High-Performance Victory™ HSS-E-PM Taps

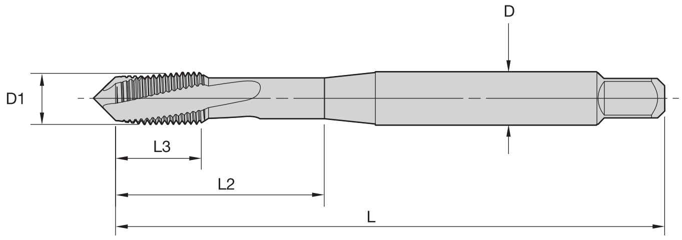
- Left-hand spiral flutes to push chips ahead in through holes.
- Manufactured from powdered metal high-speed steel coated for thread cutting in various applications.
- Offer performance advantages over conventional high-speed steel taps.
- Long tap life at up to 50% higher tapping speed than HSS taps.
- PVD coatings offer outstanding thermal stability, hot hardness, oxidation resistance, and low coefficient of friction.
- Low runout of thread and chamfer.
- Excellent chip control.
- Reliable performance.
- Exceptional thread quality.

Multipurpose VariTap™

- Unique spiral-point geometry provides low tapping torque while pushing chips ahead of the tap in through holes.
- Manufactured from high-vanadium HSS-E to provide long and consistent life.
- Ideal for customers who have a variety of materials to machine.
- Geometry designed to allow tapping of a wide variety of ductile materials: carbon and alloy steels, stainless steels, ductile iron, and cast aluminium.
- Wide range of inch and metric standard sizes, pitch diameter limits, classes of fit, chamfer styles, and coatings.

WIDIA VICTORY

- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.

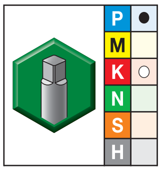


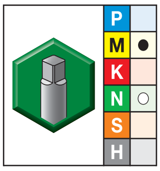
Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

GT20 • Form D Plug Chamfer • Metric DIN 371, 374, and 376 • For Steel and Stainless Steel

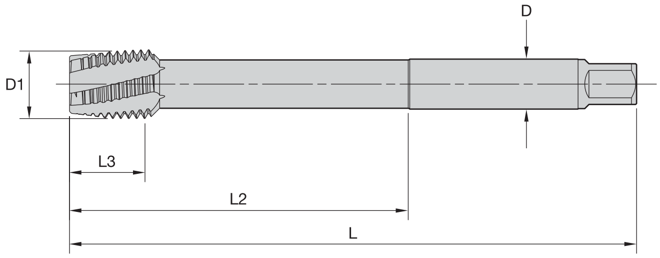


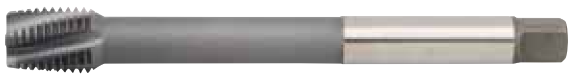


● first choice
○ alternate choice

grade GP6520 TiCN		grade GM6515 TiN+CrC/C		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
3955084	GT205094	3955047	GT205077	M3 X 0,5	56	8	18	3,5	2	DIN 371	6HX
3955085	GT205095	3955048	GT205078	M4 X 0,7	63	10	21	4,5	2	DIN 371	6HX
3955086	GT205096	3955049	GT205079	M5 X 0,8	70	10	25	6,0	2	DIN 371	6HX
3955087	GT205097	3955050	GT205080	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
3955124	GT205104	3955077	GT205087	M8 X 1	90	13	35	6,0	3	DIN 374	6HX
3955088	GT205098	3955051	GT205081	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
3955125	GT205105	3955078	GT205088	M10 X 1	90	10	35	7,0	3	DIN 374	6HX
3955126	GT205106	3955079	GT205089	M10 X 1,25	100	15	39	7,0	3	DIN 374	6HX
3955089	GT205099	3955052	GT205082	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
3955127	GT205107	3955080	GT205090	M12 X 1,5	100	15	39	9,0	3	DIN 374	6HX
3955090	GT205100	3955073	GT205083	M12 X 1,75	110	18	44	9,0	3	DIN 376	6HX
3955128	GT205108	3955081	GT205091	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
3955091	GT205101	3955074	GT205084	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
3955129	GT205109	3955082	GT205092	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
3955092	GT205102	3955075	GT205085	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
3955130	GT205110	3955083	GT205093	M18 X 1,5	110	15	50	14,0	4	DIN 374	6HX
3955123	GT205103	3955076	GT205086	M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX
4033723	GT205111	–		M24 X 3	160	30	77	18,0	5	DIN 376	6HX
4033725	GT205113	–		M30 X 3,5	180	35	91	22,0	5	DIN 376	6HX
4033726	GT205114	–		M33 X 3,5	180	35	100	25,0	5	DIN 376	6HX
4033728	GT205116	–		M36 X 4	200	40	110	28,0	6	DIN 376	6HX
4033730	GT205118	–		M42 X 4,5	200	45	120	32,0	6	DIN 376	6HX

- GP6520 TiCN for steel and cast iron.

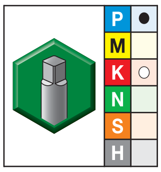




Shank Tolerance	
D mm	**tolerance h6**
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

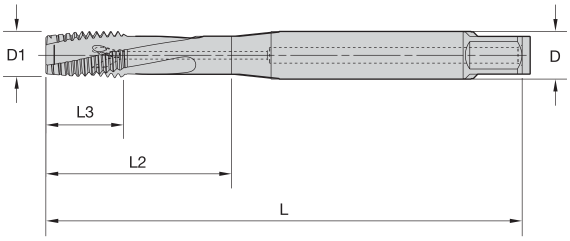
■ GT20 • Form D Plug Chamfer • Larger Sizes • Metric Extra Long • For Steel and Cast Iron

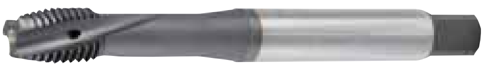


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions						
order #	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**D**	**number of flutes**	**class of fit**
4033765	**GT205122**	M24 X 3	200	30	120	18,0	5	6HX
4033767	**GT205124**	M30 X 3,5	250	35	150	22,0	5	6HX
4033768	**GT205125**	M33 X 3,5	250	35	150	25,0	5	6HX
4033770	**GT205127**	M36 X 4	250	40	150	28,0	6	6HX
4033772	**GT205129**	M42 X 4,5	300	45	180	32,0	6	6HX

- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.





Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

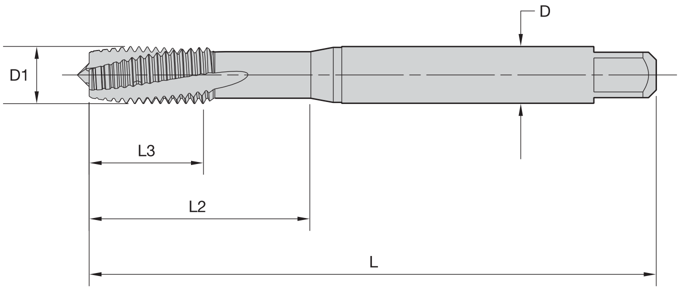
GT21 • Form D Plug Chamfer • Through Coolant • Metric DIN 371 and 376 • For Steel and Stainless Steel

GP6520: P ●, K ○
GM6515: M ●, N ○

● first choice
○ alternate choice

grade GP6520 TiCN		grade GM6515 TiN+CrC/C		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
3955054	GT215007	3955038	GT215001	M5 X 0,8	70	10	25	6,0	2	DIN 371	6HX
3955055	GT215008	3955039	GT215002	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
3955056	GT215009	3955040	GT215003	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
3955057	GT215010	3955041	GT215004	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
3955058	GT215011	3955042	GT215005	M12 X 1,75	110	18	44	9,0	3	DIN 376	6HX
3955059	GT215012	3955053	GT215006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX

- WS32MG TiCN for nickel and nickel alloys.



Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

■ GT10 • Form D Plug Chamfer • Metric DIN 371 and 376 • For Nickel and Nickel Alloys

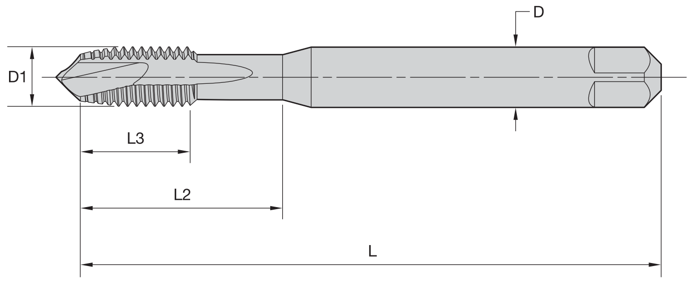
P	
M	
K	
N	
S	●
H	

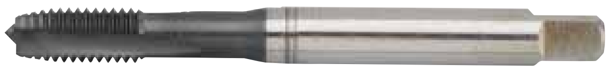
● first choice
○ alternate choice

grade WS32MG TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4160100	GT105001	M3 X 0,5	56	11	18	3,5	2	DIN 371	6HX
4160101	GT105002	M4 X 0,7	63	13	21	4,5	3	DIN 371	6HX
4160102	GT105003	M5 X 0,8	70	15	25	6,0	3	DIN 371	6HX
4160103	GT105004	M6 X 1	80	17	30	6,0	3	DIN 371	6HX
4160104	GT105005	M8 X 1,25	90	20	35	8,0	3	DIN 371	6HX
4160105	GT105006	M10 X 1,5	100	22	39	10,0	3	DIN 371	6HX
4160106	GT105007	M12 X 1,75	110	24	—	9,0	3	DIN 376	6HX
4160107	GT105008	M14 X 2	110	26	—	11,0	3	DIN 376	6HX
4160108	GT105009	M16 X 2	110	27	—	12,0	3	DIN 376	6HX
4160109	GT105010	M20 X 2,5	140	32	—	16,0	3	DIN 376	6HX

- WN35MG TiN/DLC for titanium and titanium alloys.

HSS-E-PM 3.5–5 DIN 371 DIN 376 6HX M





Shank Tolerance	
D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

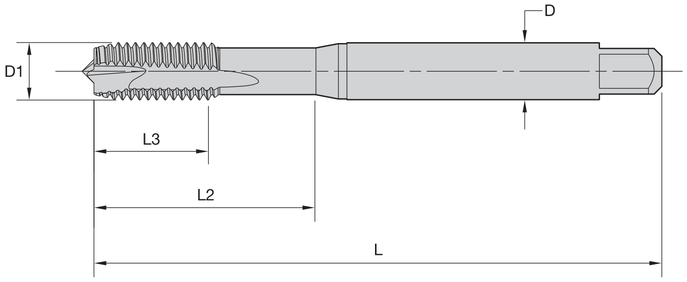
GT14 • Form B Plug Chamfer • Metric DIN 371 and 376 • For Titanium and Titanium Alloys

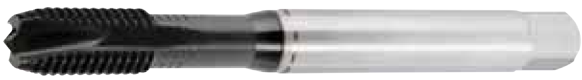
P	
M	
K	
N	
S	●
H	

● first choice
○ alternate choice

grade WN35MG TiN/DLC		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4160093	GT145001	M3 X 0,5	56	11	18	3,5	3	DIN 371	6HX
4160094	GT145002	M4 X 0,7	63	13	21	4,5	3	DIN 371	6HX
4160095	GT145003	M5 X 0,8	70	15	25	6,0	3	DIN 371	6HX
4160096	GT145004	M6 X 1	80	17	30	6,0	3	DIN 371	6HX
4160097	GT145005	M8 X 1,25	90	20	35	8,0	3	DIN 371	6HX
4160098	GT145006	M10 X 1,5	100	22	39	10,0	3	DIN 371	6HX
4160099	GT145007	M12 X 1,75	110	24	—	9,0	3	DIN 376	6HX

• WN48EG DLC for aluminium.





Shank Tolerance	
D mm	tolerance h9
1–3	+0, -0,025
3,5–6	+0, -0,030
7–10	+0, -0,036
11–18	+0, -0,043

WIDIA VICTORY

GT70 • Form B Plug Chamfer • Metric DIN 371 and 376 • For Aluminium

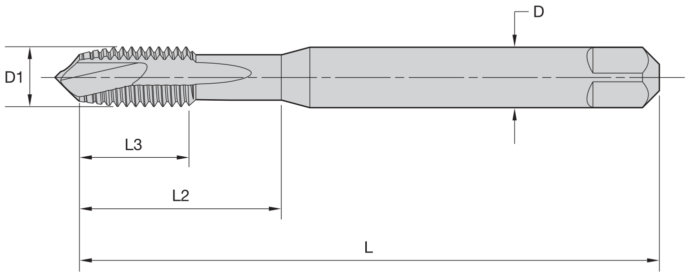
P	
M	
K	
N	●
S	
H	

● first choice
○ alternate choice

grade WN48EG DLC		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4160036	GT705001	M3 X 0,5	56	11	18	3,5	2	DIN 371	6H
4160037	GT705002	M4 X 0,7	63	13	21	4,5	2	DIN 371	6H
4160038	GT705003	M5 X 0,8	70	15	25	6,0	2	DIN 371	6H
4160039	GT705004	M6 X 1	80	17	30	6,0	2	DIN 371	6H
4160040	GT705005	M8 X 1,25	90	20	35	8,0	2	DIN 371	6H
4160041	GT705006	M10 X 1,5	100	22	39	10,0	2	DIN 371	6H
4160042	GT705007	M12 X 1,75	110	24	–	9,0	3	DIN 376	6H
4160063	GT705008	M16 X 2	110	27	–	12,0	3	DIN 376	6H

- WP31MG TiN for steel 32–44 HRC.

HSS-E-PM 3.5–5 DIN 371 DIN 374 DIN 376 6HX M MF



Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

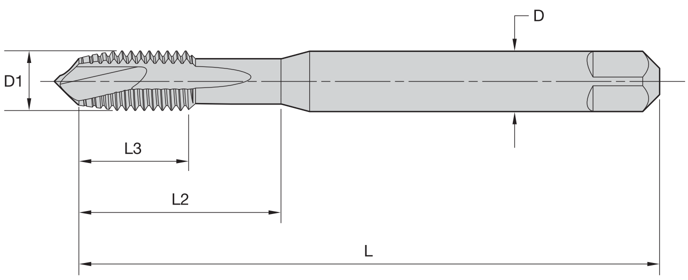
GT00 • Form B Plug Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel

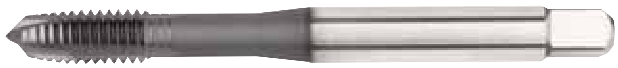
P	●
M	
K	
N	
S	○
H	

● first choice
○ alternate choice

grade WP31MG TiN order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4153679	GT005001	M3 X 0,5	56	11	18	3,5	2	DIN 371	6HX
4153680	GT005002	M4 X 0,7	63	13	21	4,5	2	DIN 371	6HX
4153681	GT005003	M5 X 0,8	70	15	25	6,0	2	DIN 371	6HX
4153682	GT005004	M6 X 1	80	17	30	6,0	3	DIN 371	6HX
4153760	GT005012	M8 X 1	90	17	—	6,0	3	DIN 374	6HX
4153753	GT005005	M8 X 1,25	90	20	35	8,0	3	DIN 371	6HX
4153761	GT005013	M10 X 1	90	18	—	7,0	3	DIN 374	6HX
4153762	GT005014	M10 X 1,25	100	22	—	7,0	3	DIN 374	6HX
4153754	GT005006	M10 X 1,5	100	22	39	10,0	3	DIN 371	6HX
4153763	GT005015	M12 X 1,25	100	22	—	9,0	3	DIN 374	6HX
4153764	GT005016	M12 X 1,5	100	22	—	9,0	3	DIN 374	6HX
4153755	GT005007	M12 X 1,75	110	24	—	9,0	3	DIN 376	6HX
4153765	GT005017	M14 X 1,5	100	22	—	11,0	3	DIN 374	6HX
4153756	GT005008	M14 X 2	110	26	—	11,0	3	DIN 376	6HX
4153766	GT005018	M16 X 1,5	100	22	—	12,0	4	DIN 374	6HX
4153757	GT005009	M16 X 2	110	27	—	12,0	4	DIN 376	6HX
4153758	GT005010	M18 X 2	125	30	—	14,0	4	DIN 376	6HX
4153759	GT005011	M20 X 2,5	140	32	—	16,0	4	DIN 376	6HX

- WU41EG TiN
- WP49EG oxide





Shank Tolerance	
D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

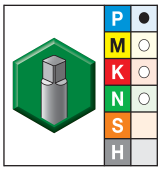
VT-SPO • Form B Plug Chamfer • Machine Screw and Fractional • DIN 371 and 376

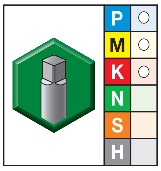
● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5472633	VTSPO6005	5387704	VTSPO6005	4 - 40	56	8	18	3,5	2	DIN 371	2B
5472635	VTSPO6007	5387707	VTSPO6007	5 - 40	56	9	20	4,0	2	DIN 371	2B
5472636	VTSPO6008	5387708	VTSPO6008	6 - 32	56	9	20	4,0	2	DIN 371	2B
5472638	VTSPO6010	5387760	VTSPO6010	6 - 40	56	9	20	4,0	2	DIN 371	2B
5472639	VTSPO6011	5387761	VTSPO6011	8 - 32	63	11	21	4,5	2	DIN 371	2B
5472641	VTSPO6013	5387763	VTSPO6013	10 - 24	70	12	25	6,0	2	DIN 371	2B
5472644	VTSPO6014	5387764	VTSPO6014	10 - 32	70	12	25	6,0	2	DIN 371	2B
5472646	VTSPO6016	5387766	VTSPO6016	1/4 - 20	80	15	30	7,0	3	DIN 371	2B
5472647	VTSPO6017	5387767	VTSPO6017	1/4 - 28	80	15	30	7,0	3	DIN 371	2B
5472649	VTSPO6019	5387769	VTSPO6019	5/16 - 18	90	15	35	8,0	3	DIN 371	2B
5472650	VTSPO6020	5387770	VTSPO6020	5/16 - 24	90	15	35	8,0	3	DIN 371	2B
5472652	VTSPO6022	5387772	VTSPO6022	3/8 - 16	100	19	39	10,0	3	DIN 371	2B
5472653	VTSPO6023	5387773	VTSPO6023	3/8 - 24	100	19	39	10,0	3	DIN 371	2B
5472655	VTSPO6025	5387776	VTSPO6025	7/16 - 14	100	18	41	8,0	3	DIN 376	2B
5472656	VTSPO6026	5387777	VTSPO6026	7/16 - 20	100	18	41	8,0	3	DIN 376	2B
5472658	VTSPO6028	5387779	VTSPO6028	1/2 - 13	110	23	47	9,0	3	DIN 376	2B
5472659	VTSPO6029	5387780	VTSPO6029	1/2 - 20	110	23	47	9,0	3	DIN 376	2B
5472661	VTSPO6031	5387782	VTSPO6031	9/16 - 12	110	25	53	11,0	3	DIN 376	2B
5472662	VTSPO6032	5387783	VTSPO6032	9/16 - 18	110	25	53	11,0	3	DIN 376	2B
5472663	VTSPO6033	5387784	VTSPO6033	5/8 - 11	110	24	51	12,0	3	DIN 376	2B

(continued)

(VT-SPO • Form B Plug Chamfer • Machine Screw and Fractional • DIN 371 and 376 — continued)



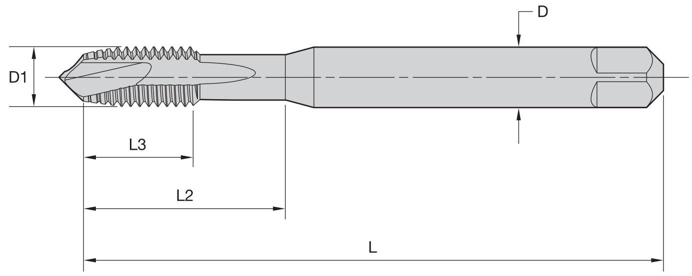


● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5472664	VTSPO6034	5387785	VTSPO6034	5/8 - 18	110	24	51	12,0	3	DIN 376	2B
5472665	VTSPO6035	5387786	VTSPO6035	3/4 - 10	140	30	64	16,0	3	DIN 376	2B
5472666	VTSPO6036	5387787	VTSPO6036	3/4 - 16	140	30	64	16,0	3	DIN 376	2B
5472667	VTSPO6037	5387788	VTSPO6037	7/8 - 9	140	34	71	18,0	3	DIN 376	2B
5472668	VTSPO6038	5387789	VTSPO6038	7/8 - 14	140	34	71	18,0	3	DIN 376	2B
5472669	VTSPO6039	5387790	VTSPO6039	1 - 8	160	38	81	18,0	3	DIN 376	2B
5472670	VTSPO6040	5387791	VTSPO6040	1 - 12	160	38	81	18,0	3	DIN 376	2B

- WU41EG TiN
- WP49EG oxide

HSS-E | 3–5 | DIN 371 | DIN 376 | 3B | UNJC | UNJF



Shank Tolerance	
D mm	**tolerance h9**
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

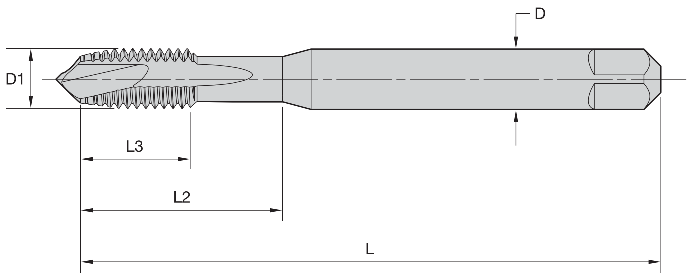
VT-SPO • Form B Plug Chamfer • UNJC/UNJF • Inch DIN 371 and 376

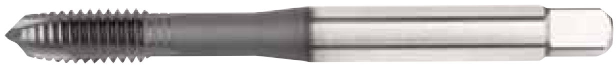
	grade WU41EG TiN	grade WP49EG Oxide
P	●	○
M	○	○
K	○	○
N	○	
S		
H		

● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions							
order #	**catalogue #**	**order #**	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**D**	**number of flutes**	**dimension standard**	**class of fit**
5472634	VTSPO6006	5387705	VTSPO6006	4 - 40	56	8	18	3,5	2	DIN 371	3B
5472637	VTSPO6009	5387709	VTSPO6009	6 - 32	56	9	20	4,0	2	DIN 371	3B
5472640	VTSPO6012	5387762	VTSPO6012	8 - 32	63	11	21	4,5	2	DIN 371	3B
5472645	VTSPO6015	5387765	VTSPO6015	10 - 32	70	12	25	6,0	2	DIN 371	3B
5472648	VTSPO6018	5387768	VTSPO6018	1/4 - 28	80	15	30	7,0	3	DIN 371	3B
5472651	VTSPO6021	5387771	VTSPO6021	5/16 - 24	90	15	35	8,0	3	DIN 371	3B
5472654	VTSPO6024	5387774	VTSPO6024	3/8 - 24	100	19	39	10,0	3	DIN 371	3B
5472657	VTSPO6027	5387778	VTSPO6027	7/16 - 20	100	18	41	8,0	3	DIN 376	3B
5472660	VTSPO6030	5387781	VTSPO6030	1/2 - 20	110	23	47	9,0	3	DIN 376	3B

- WU40EG bright
- WU41EG TiN
- WP42EG TiCN
- WP49EG oxide





Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376

	grade WP42EG TiCN	grade WU41EG TiN	grade WP49EG Oxide	grade WU40EG Bright
P	●	●	○	○
M	●	○	○	○
K	●	○	○	○
N	●	○		○
S				
H				

● first choice
○ alternate choice

grade WP42EG TiCN order #	grade WP42EG TiCN catalogue #	grade WU41EG TiN order #	grade WU41EG TiN catalogue #	grade WP49EG Oxide order #	grade WP49EG Oxide catalogue #	grade WU40EG Bright order #	grade WU40EG Bright catalogue #	metric dimensions D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5366647	VTSPO6505	5366646	VTSPO6505	5366648	VTSPO6505	5366649	VTSPO6505	M2 X 0,4	45	7	13	2,8	2	DIN 371	6H
	–		–	5366660	VTSPO6506		–	M2 X 0,4	45	7	13	2,8	2	DIN 371	6G
	–		–	5366661	VTSPO6507		–	M2,2 X 0,45	45	7	13	2,8	2	DIN 371	6H
	–	5366662	VTSPO6508	5366663	VTSPO6508	5366664	VTSPO6508	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6H
	–		–	5366665	VTSPO6509		–	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6G
	–		–	5368602	VTSPO6545	5368603	VTSPO6545	M3 X 0,35	56	8	–	2,2	2	DIN 374	6H
	–	5368514	VTSPO6525	5368515	VTSPO6525	5368516	VTSPO6525	M3 X 0,5	56	8	–	2,2	2	DIN 376	6H
	–		–	5366670	VTSPO6511		–	M3 X 0,5	56	8	18	3,5	2	DIN 371	6G
5366667	VTSPO6510	5366666	VTSPO6510	5366668	VTSPO6510	5366669	VTSPO6510	M3 X 0,5	56	8	18	3,5	2	DIN 371	6H
	–	5366671	VTSPO6512	5366673	VTSPO6512	5366674	VTSPO6512	M3,5 X 0,6	56	9	20	4,0	2	DIN 371	6H
	–		–	5368604	VTSPO6546	5368605	VTSPO6546	M4 X 0,5	63	10	21	2,8	2	DIN 374	6H
	–	5368517	VTSPO6526	5368518	VTSPO6526	5368519	VTSPO6526	M4 X 0,7	63	10	21	2,8	2	DIN 376	6H
	–		–	5366679	VTSPO6514		–	M4 X 0,7	63	11	21	4,5	2	DIN 371	6G
5366676	VTSPO6513	5366675	VTSPO6513	5366677	VTSPO6513	5366678	VTSPO6513	M4 X 0,7	63	11	21	4,5	2	DIN 371	6H
	–		–	5368606	VTSPO6547	5368607	VTSPO6547	M5 X 0,5	70	12	25	3,5	2	DIN 374	6H
	–	5368540	VTSPO6527	5368541	VTSPO6527	5368542	VTSPO6527	M5 X 0,8	70	12	25	3,5	2	DIN 376	6H
	–		–	5366685	VTSPO6516		–	M5 X 0,8	70	12	25	6,0	2	DIN 371	6G
5366681	VTSPO6515	5366680	VTSPO6515	5366682	VTSPO6515	5366684	VTSPO6515	M5 X 0,8	70	12	25	6,0	2	DIN 371	6H
	–		–	5368608	VTSPO6548	5368609	VTSPO6548	M6 X 0,5	80	12	30	4,5	3	DIN 374	6H
	–		–	5368610	VTSPO6549	5368611	VTSPO6549	M6 X 0,75	80	12	30	4,5	3	DIN 374	6H
	–	5368543	VTSPO6528	5368544	VTSPO6528	5368545	VTSPO6528	M6 X 1	80	12	30	4,5	3	DIN 376	6H
5366687	VTSPO6517	5366686	VTSPO6517	5366688	VTSPO6517	5366689	VTSPO6517	M6 X 1	80	12	30	6,0	3	DIN 371	6H
	–		–	5366690	VTSPO6518		–	M6 X 1	80	12	30	6,0	3	DIN 371	6G
	–		–	5368612	VTSPO6550	5368613	VTSPO6550	M7 X 0,75	80	12	30	5,5	3	DIN 374	6H

(continued)

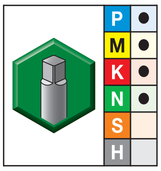
(VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376 — continued)

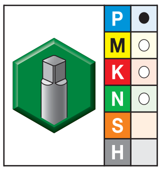
● first choice
○ alternate choice

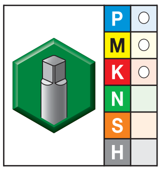
grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions							
P ● M ● K ● N ● S H		P ● M ○ K ○ N ○ S H		P ○ M ○ K ○ N S H		P ○ M ○ K ○ N ○ S H									
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5366693	VTSPO6519	5366692	VTSPO6519	5366695	VTSPO6519	5366696	VTSPO6519	M7 X 1	80	12	30	7,0	3	DIN 371	6H
	–		–	5366697	VTSPO6520		–	M7 X 1	80	12	30	7,0	3	DIN 371	6G
	–		–	5368614	VTSPO6551	5368615	VTSPO6551	M8 X 0,75	80	12	30	6,0	3	DIN 374	6H
	–		–	5368616	VTSPO6552	5368617	VTSPO6552	M8 X 1	90	15	35	6,0	3	DIN 374	6H
	–	5368546	VTSPO6529	5368547	VTSPO6529	5368548	VTSPO6529	M8 X 1,25	90	15	35	6,0	3	DIN 376	6H
5366700	VTSPO6521	5366698	VTSPO6521	5366701	VTSPO6521	5366703	VTSPO6521	M8 X 1,25	90	15	35	8,0	3	DIN 371	6H
	–		–	5366704	VTSPO6522		–	M8 X 1,25	90	15	35	8,0	3	DIN 371	6G
	–		–	5368618	VTSPO6553	5368619	VTSPO6553	M10 X 0,75	90	15	35	7,0	3	DIN 374	6H
	–		–	5368620	VTSPO6554	5368621	VTSPO6554	M10 X 1	90	15	35	7,0	3	DIN 374	6H
	–		–	5368622	VTSPO6555	5368623	VTSPO6555	M10 X 1,25	100	18	39	7,0	3	DIN 374	6H
	–		–	5366709	VTSPO6524		–	M10 X 1,5	100	18	39	10,0	3	DIN 371	6G
5366706	VTSPO6523	5366705	VTSPO6523	5366707	VTSPO6523	5366708	VTSPO6523	M10 X 1,5	100	18	39	10,0	3	DIN 371	6H
	–	5368549	VTSPO6530	5368550	VTSPO6530	5368551	VTSPO6530	M10 X 1,5	100	18	39	7,0	3	DIN 376	6H
	–		–	5368624	VTSPO6556	5368625	VTSPO6556	M11 X 1	90	15	36	8,0	3	DIN 374	6H
	–		–	5368626	VTSPO6557	5368627	VTSPO6557	M12 X 1	100	21	39	9,0	3	DIN 374	6H
	–		–	5368628	VTSPO6558	5368629	VTSPO6558	M12 X 1,25	100	21	39	9,0	3	DIN 374	6H
	–		–	5368630	VTSPO6559	5368631	VTSPO6559	M12 X 1,5	100	21	39	9,0	3	DIN 374	6H
	–		–	5368556	VTSPO6532		–	M12 X 1,75	110	21	44	9,0	3	DIN 376	6G
5368553	VTSPO6531	5368552	VTSPO6531	5368554	VTSPO6531	5368555	VTSPO6531	M12 X 1,75	110	21	44	9,0	3	DIN 376	6H
	–		–	5368632	VTSPO6560	5368633	VTSPO6560	M14 X 1	100	21	47	11,0	3	DIN 374	6H
	–		–	5368634	VTSPO6561	5368635	VTSPO6561	M14 X 1,25	100	21	47	11,0	3	DIN 374	6H
	–		–	5368636	VTSPO6562	5368637	VTSPO6562	M14 X 1,5	100	21	47	11,0	3	DIN 374	6H
5368558	VTSPO6533	5368557	VTSPO6533	5368559	VTSPO6533	5368560	VTSPO6533	M14 X 2	110	24	52	11,0	3	DIN 376	6H
	–		–	5368561	VTSPO6534		–	M14 X 2	110	24	52	11,0	3	DIN 376	6G
	–		–	5368638	VTSPO6563	5368639	VTSPO6563	M16 X 1	100	21	46	12,0	3	DIN 374	6H
	–		–	5368640	VTSPO6564	5368641	VTSPO6564	M16 X 1,5	100	21	46	12,0	3	DIN 374	6H
5368563	VTSPO6535	5368562	VTSPO6535	5368565	VTSPO6535	5368566	VTSPO6535	M16 X 2	110	24	51	12,0	3	DIN 376	6H
	–		–	5368567	VTSPO6536		–	M16 X 2	110	24	51	12,0	3	DIN 376	6G
	–		–	5368642	VTSPO6565	5368643	VTSPO6565	M18 X 1	110	21	50	14,0	3	DIN 374	6H
	–		–	5368683	VTSPO6566	5368684	VTSPO6566	M18 X 1,5	110	21	50	14,0	3	DIN 374	6H
	–		–	5368685	VTSPO6567	5368686	VTSPO6567	M18 X 2	125	30	58	14,0	3	DIN 374	6H
5368569	VTSPO6537	5368568	VTSPO6537	5368570	VTSPO6537	5368571	VTSPO6537	M18 X 2,5	125	30	58	14,0	3	DIN 376	6H
	–		–	5368687	VTSPO6568	5368688	VTSPO6568	M20 X 1	125	24	56	16,0	3	DIN 374	6H
	–		–	5368689	VTSPO6569	5368690	VTSPO6569	M20 X 1,5	125	24	56	16,0	3	DIN 374	6H
	–		–	5368691	VTSPO6570	5368692	VTSPO6570	M20 X 2	140	30	64	16,0	3	DIN 374	6H
5368573	VTSPO6538	5368572	VTSPO6538	5368574	VTSPO6538	5368575	VTSPO6538	M20 X 2,5	140	30	64	16,0	3	DIN 376	6H

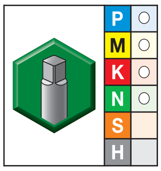
(continued)

(VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376 — continued)





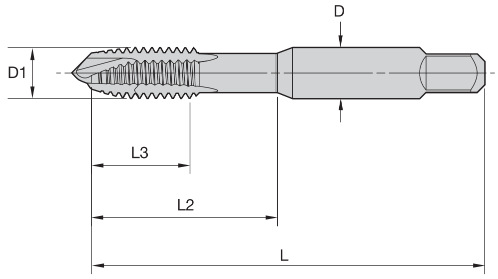




● first choice
○ alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions							
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
–		–		5368693	VTSPO6571	5368694	VTSPO6571	M22 X 1,5	125	24	62	18,0	3	DIN 374	6H
–		–		–		5368695	VTSPO6572	M22 X 2	140	30	70	18,0	3	DIN 374	6H
5368577	VTSPO6539	5368576	VTSPO6539	5368578	VTSPO6539	5368579	VTSPO6539	M22 X 2,5	140	30	70	18,0	3	DIN 376	6H
–		–		5368696	VTSPO6573	5368697	VTSPO6573	M24 X 1,5	140	28	67	18,0	3	DIN 374	6H
–		–		–		5368698	VTSPO6574	M24 X 2	140	30	67	18,0	3	DIN 374	6H
5368581	VTSPO6540	5368580	VTSPO6540	5368582	VTSPO6540	5368583	VTSPO6540	M24 X 3	160	36	77	18,0	3	DIN 376	6H
–		5368584	VTSPO6541	5368585	VTSPO6541	5368586	VTSPO6541	M27 X 3	160	36	82	20,0	4	DIN 376	6H
–		–		–		5368699	VTSPO6575	M30 X 2	150	28	80	22,0	4	DIN 374	6H
–		5368587	VTSPO6542	5368588	VTSPO6542	5368589	VTSPO6542	M30 X 3,5	180	42	91	22,0	4	DIN 376	6H
–		–		5368600	VTSPO6543	–		M33 X 3,5	180	42	100	25,0	4	DIN 376	6H
–		–		5368601	VTSPO6544	–		M36 X 4	200	48	110	28,0	4	DIN 376	6H

- WU40EG bright
- WU41EG TiN



Shank Tolerance	
D mm	**tolerance h9**
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

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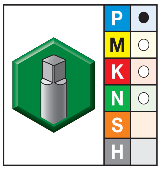
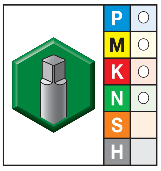




● first choice
○ alternate choice

grade WU41EG TiN		grade WU40EG Bright		metric dimensions							
order #	**catalogue #**	**order #**	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**D**	**number of flutes**	**dimension standard**	**tap class**
5387861	VTSPO7505	5387859	VTSPO7505	M3 X 0,5	46	11	19	4,0	2	JIS	ISO 2
5387865	VTSPO7506	5387863	VTSPO7506	M4 X 0,7	52	13	21	5,0	2	JIS	ISO 2
5387869	VTSPO7507	5387867	VTSPO7507	M5 X 0,8	60	16	24	5,5	2	JIS	ISO 2
5387873	VTSPO7508	5387871	VTSPO7508	M6 X 1	62	19	29	6,0	3	JIS	ISO 2
5387877	VTSPO7509	5387875	VTSPO7509	M8 X 1,25	70	22	37	6,2	3	JIS	ISO 2
5387881	VTSPO7510	5387879	VTSPO7510	M10 X 1,5	75	24	41	7,0	3	JIS	ISO 2
–		5387883	VTSPO7511	M12 X 1,25	82	29	48	8,5	3	JIS	ISO 2
–		5387887	VTSPO7513	M12 X 1,5	82	29	48	8,5	3	JIS	ISO 2
–		5387885	VTSPO7512	M12 X 1,75	82	29	48	8,5	3	JIS	ISO 2
–		5387891	VTSPO7515	M14 X 1,5	88	30	48	10,5	3	JIS	ISO 2
–		5387889	VTSPO7514	M14 X 2	88	30	48	10,5	3	JIS	ISO 2
–		5387895	VTSPO7517	M16 X 1,5	95	32	52	12,5	3	JIS	ISO 2
–		5387893	VTSPO7516	M16 X 2	95	32	52	12,5	3	JIS	ISO 2
–		5387898	VTSPO7518	M18 X 2,5	100	37	55	14,0	3	JIS	ISO 2
–		5387900	VTSPO7519	M20 X 2,5	105	37	60	15,0	3	JIS	ISO 2

Spiral Flute

WIDIA-GTD™ offers a wide range of options for tapping blind holes in:

- Steel and steel alloys.
- Stainless steel.
- Cast iron.
- Wrought and cast aluminium.
- Nickel-based alloys.
- Titanium alloys.

High-Performance Victory™ HSS-E-PM Taps

- Optimised spiral-flute designs enable deep blind holes to be threaded.
- Manufactured from powdered metal high-speed steel coated for thread cutting in various applications.
- Offer performance advantages over conventional high-speed steel taps.
- Long tap life at up to 50% higher tapping speed than HSS taps.
- PVD coatings offer outstanding thermal stability, hot hardness, oxidation resistance, and low coefficient of friction.
- Low runout of thread and chamfer.
- Excellent chip control.
- Reliable performance.
- Exceptional thread quality.

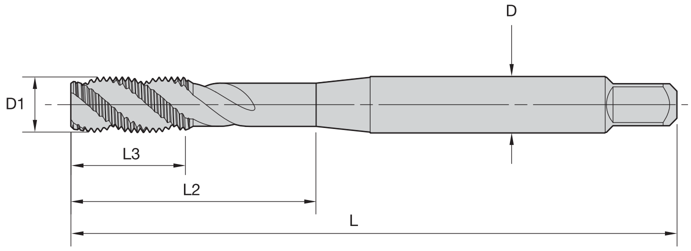
Multipurpose VariTap™

- Spiral-flute geometry optimised to provide efficient chip ejection in blind holes.
- Manufactured from high-vanadium HSS-E to provide long and consistent life.
- Ideal for customers who have a variety of materials to machine.
- Geometry designed to allow tapping of a wide variety of ductile materials: carbon and alloy steels, stainless steels, ductile iron, and cast aluminium.
- Wide range of inch and metric standard sizes, pitch diameter limits, classes of fit, chamfer styles, and coatings.

WIDIA GTD

- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.
- GP6505 oxide for steel.

HSS-E-PM | 2–3 | 45° | DIN 371 | DIN 374 | DIN 376 | 6HX | M | MF



Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

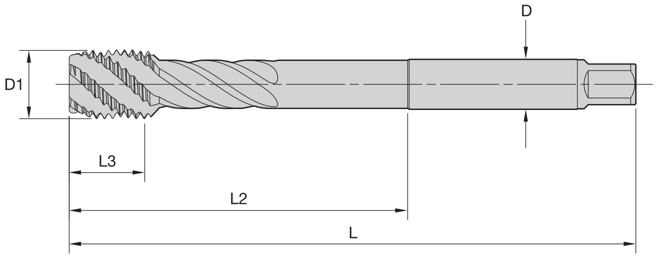
GT30 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Steel and Stainless Steel

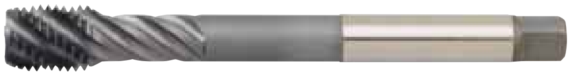
	grade GP6520 TiCN	grade GP6505 Oxide	grade GM6515 TiN+CrC/C
P	●	○	
M		○	●
K	○		
N			○
S			
H			

● first choice
○ alternate choice

grade GP6520 TiCN		grade GP6505 Oxide		grade GM6515 TiN+CrC/C		metric dimensions							
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
3954929	GT305097	4035066	GT305116	3955098	GT305148	M3 X 0,5	56	8	18	3,5	3	DIN 371	6HX
3954930	GT305098	4035067	GT305117	3955099	GT305079	M4 X 0,7	63	10	21	4,5	3	DIN 371	6HX
3954931	GT305099	4035068	GT305118	3955100	GT305080	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
3954932	GT305100	4035069	GT305119	3955101	GT305081	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
3955031	GT305109	–		3955110	GT305090	M8 X 1	90	13	35	6,0	3	DIN 374	6HX
3955023	GT305101	4035070	GT305120	3955102	GT305082	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
3955032	GT305110	–		3955111	GT305091	M10 X 1	90	10	35	7,0	3	DIN 374	6HX
3955033	GT305111	–		3955112	GT305092	M10 X 1,25	100	15	39	7,0	3	DIN 374	6HX
3955024	GT305102	4035071	GT305121	3955103	GT305083	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
3955034	GT305112	–		3955113	GT305093	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
3955025	GT305103	4035072	GT305122	3955104	GT305084	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
3955035	GT305113	–		3955114	GT305094	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
3955026	GT305104	4035073	GT305123	3955105	GT305085	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
3955036	GT305114	–		3955115	GT305095	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
3955027	GT305105	4035074	GT305124	3955106	GT305086	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
3955037	GT305115	–		3955116	GT305096	M18 X 1,5	110	15	50	14,0	4	DIN 374	6HX
3955028	GT305106	–		3955107	GT305087	M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
3955029	GT305107	–		3955108	GT305088	M22 X 2,5	140	25	70	18,0	4	DIN 376	6HX
3955030	GT305108	–		3955109	GT305089	M24 X 3	160	30	77	18,0	5	DIN 376	6HX
4033733	GT305161	–		–		M24 X 3	160	30	77	18,0	5	DIN 376	6HX
4033735	GT305163	–		–		M30 X 3,5	180	35	91	22,0	5	DIN 376	6HX
4033736	GT305164	–		–		M33 X 3,5	180	35	100	25,0	5	DIN 376	6HX
4033738	GT305166	–		–		M36 X 4	200	40	110	28,0	5	DIN 376	6HX
4033740	GT305168	–		–		M42 X 4,5	200	45	120	32,0	5	DIN 376	6HX

- GP6520 TiCN for steel and cast iron.





Shank Tolerance

D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

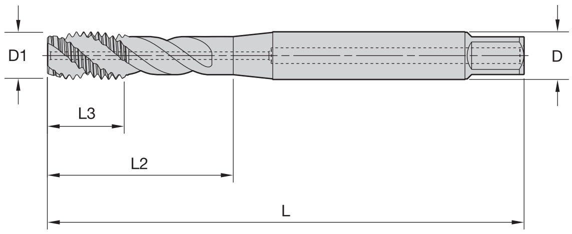
GT30 • Form C Semi-Bottoming Chamfer • Larger Sizes • Metric Extra Long • For Steel and Cast Iron

P	●
M	
K	○
N	
S	
H	

● first choice
○ alternate choice

grade GP6520 TiCN order #	catalogue #	metric dimensions D1 size	L	L3	L2	D	number of flutes	class of fit
4033776	GT305151	M24 X 3	200	30	120	18,0	5	6HX
4033778	GT305153	M30 X 3,5	250	35	150	22,0	5	6HX
4033779	GT305154	M33 X 3,5	250	35	150	25,0	5	6HX
4033781	GT305156	M36 X 4	250	40	150	28,0	5	6HX
4033783	GT305158	M42 X 4,5	300	45	180	32,0	5	6HX

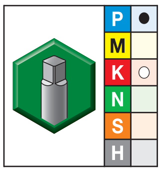
- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.

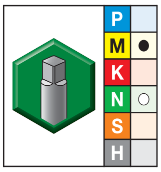


Shank Tolerance	
D mm	**tolerance h6**
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

GT31 • Form C Semi-Bottoming Chamfer • Through Coolant • Metric DIN 371 and 376 • For Steel and Stainless Steel

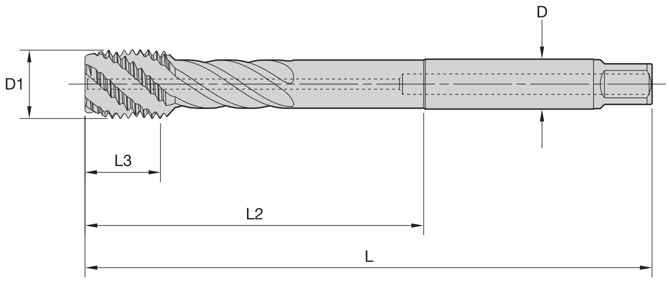


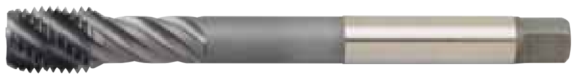


● first choice
○ alternate choice

grade GP6520 TiCN		grade GM6515 TiN+CrC/C		metric dimensions							
order #	**catalogue #**	**order #**	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**D**	**number of flutes**	**dimension standard**	**class of fit**
3955349	GT315007	3955343	GT315001	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
3955350	GT315008	3955344	GT315002	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
3955351	GT315009	3955345	GT315003	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
3955352	GT315010	3955346	GT315004	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
3955373	GT315011	3955347	GT315005	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
3955374	GT315012	3955348	GT315006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
5143530	GT315033	–		M16 X 2	110	20	51	12,0	4	DIN 376	6HX
5143531	GT315034	–		M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
5143532	GT315035	–		M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX
4033744	GT315025	–		M24 X 3	160	30	77	18,0	5	DIN 376	6HX
4033746	GT315027	–		M30 X 3,5	180	35	91	22,0	5	DIN 376	6HX
4033747	GT315028	–		M33 X 3,5	180	35	100	25,0	5	DIN 376	6HX
4033749	GT315030	–		M36 X 4	200	40	110	28,0	5	DIN 376	6HX
4033751	GT315032	–		M42 X 4,5	200	45	120	32,0	5	DIN 376	6HX

- GP6520 TiCN for steel and cast iron.





Shank Tolerance

D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

GT31 • Form C Semi-Bottoming Chamfer • Through Coolant • Larger Sizes • Metric Extra Long • For Steel and Cast Iron

P	●
M	
K	○
N	
S	
H	

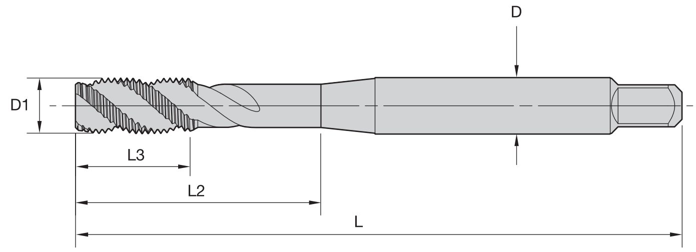
● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
4033787	GT315014	M24 X 3	200	30	120	18,0	5	6HX
4033789	GT315016	M30 X 3,5	250	35	150	22,0	5	6HX
4033790	GT315017	M33 X 3,5	250	35	150	25,0	5	6HX
4033792	GT315019	M36 X 4	250	40	150	28,0	5	6HX
4033794	GT315021	M42 X 4,5	300	45	180	32,0	5	6HX

WIDIA GTD

- GP6520 TiCN for steel.

HSS-E-PM 1,5–2 45° DIN 371 DIN 374 DIN 376 6HX M MF



Shank Tolerance	
D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

GT32 • Form E Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Steel

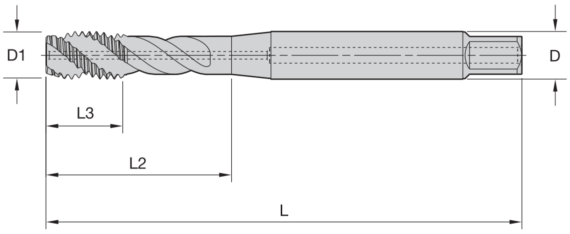
P	●
M	
K	○
N	
S	
H	

● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4153906	GT325001	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4153907	GT325002	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
4153908	GT325003	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
4153909	GT325004	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
4153912	GT325007	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4153910	GT325005	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
4153953	GT325008	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4153911	GT325006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
4153954	GT325009	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX

- GP6520 TiCN for steel.

HSS-E-PM | 1,5–2 | 45° | DIN 371 | DIN 374 | DIN 376 | 6HX | M | MF



Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

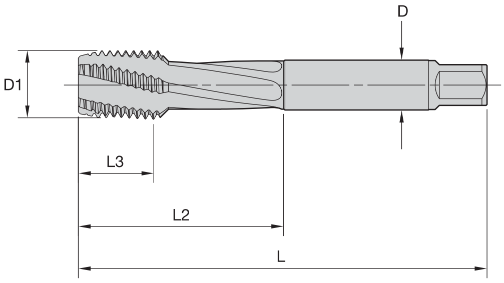
■ GT33 • Form E Bottoming Chamfer • Through Coolant • Metric DIN 371, 374, and 376 • For Steel

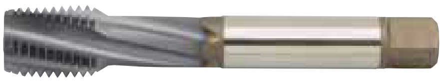
P	●
M	
K	○
N	
S	
H	

● first choice
○ alternate choice

grade GP6520 TiCN order #	catalogue #	metric dimensions D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4153955	GT335001	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4153956	GT335002	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
4153957	GT335003	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
4153958	GT335004	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
4153961	GT335007	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4153959	GT335005	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
4153962	GT335008	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4153960	GT335006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
4153963	GT335009	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX

- GP6520 TiCN for steel and cast iron.





Shank Tolerance

D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

■ GT50 • Form C Semi-Bottoming Chamfer • Larger Sizes • Metric DIN 376 • For Steel and Cast Iron

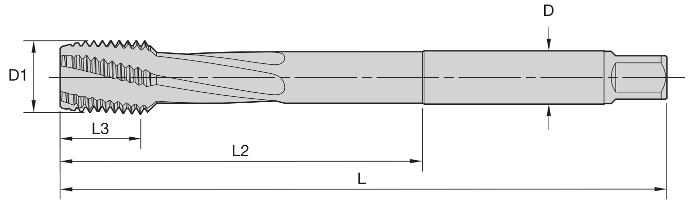
P	●
M	
K	○
N	
S	
H	

● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4154254	**GT505001**	M24 X 3	160	30	77	18,0	4	DIN 376	6HX
4154255	**GT505002**	M30 X 3,5	180	35	91	22,0	5	DIN 376	6HX
4154256	**GT505003**	M33 X 3,5	180	35	100	25,0	5	DIN 376	6HX
4154257	**GT505004**	M36 X 4	200	40	110	28,0	5	DIN 376	6HX
4154258	**GT505005**	M42 X 4,5	200	45	120	32,0	6	DIN 376	6HX

- GP6520 TiCN for steel and cast iron.

HSS-E-PM 2–3 15° 6HX M



Shank Tolerance	
D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

GT50 • Form C Semi-Bottoming Chamfer • Larger Sizes • Metric Extra Long • For Steel and Cast Iron

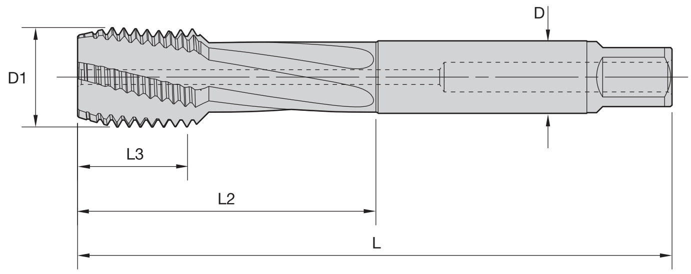
P ● M K ○ N S H

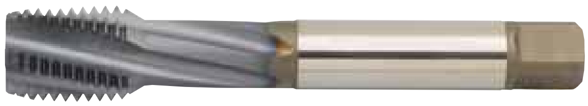
● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
4154259	GT505006	M24 X 3	200	30	120	18,0	4	6HX
4154260	GT505007	M30 X 3,5	250	35	150	22,0	5	6HX
4154261	GT505008	M33 X 3,5	250	35	150	25,0	5	6HX
4154262	GT505009	M36 X 4	250	40	150	28,0	5	6HX
4154263	GT505010	M42 X 4,5	300	45	180	32,0	6	6HX

- GP6520 TiCN for steel and cast iron.

HSS-E-PM 2–3 15° DIN 376 6HX M





Shank Tolerance

D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

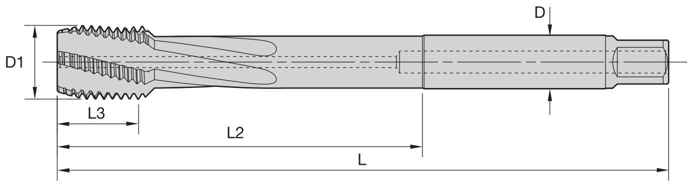
GT51 • Form C Semi-Bottoming Chamfer • Through Coolant • Larger Sizes • Metric DIN 376 • For Steel and Cast Iron

P	●
M	
K	○
N	
S	
H	

● first choice
○ alternate choice

grade GP6520 TiCN order #	catalogue #	metric dimensions D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4154264	GT515001	M24 X 3	160	30	77	18,0	4	DIN 376	6HX
4154265	GT515002	M30 X 3,5	180	35	91	22,0	5	DIN 376	6HX
4154266	GT515003	M33 X 3,5	180	35	100	25,0	5	DIN 376	6HX
4154267	GT515004	M36 X 4	200	40	110	28,0	5	DIN 376	6HX
4154268	GT515005	M42 X 4,5	200	45	120	32,0	6	DIN 376	6HX

- GP6520 TiCN for tapping steel and cast iron.



Shank Tolerance

D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

GT51 • Form C Semi-Bottoming Chamfer • Through Coolant • Larger Sizes • Metric Extra Long • For Steel and Cast Iron

P	●
M	
K	○
N	
S	
H	

● first choice
○ alternate choice

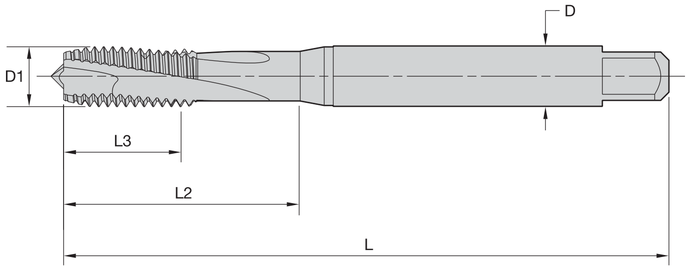
grade GP6520 TiCN order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
4154269	GT515006	M24 X 3	200	30	120	18,0	4	6HX
4154270	GT515007	M30 X 3,5	250	35	150	22,0	5	6HX
4154271	GT515008	M33 X 3,5	250	35	150	25,0	5	6HX
4154272	GT515009	M36 X 4	250	40	150	28,0	5	6HX
4154273	GT515010	M42 X 4,5	300	45	180	32,0	6	6HX

(metric dimensions: D1 size, L, L3, L2, D)

WIDIA GTD

- WS32MG TiCN for nickel and nickel alloys.

HSS-E-PM 2–3 10° DIN 371 DIN 376 6HX M



Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

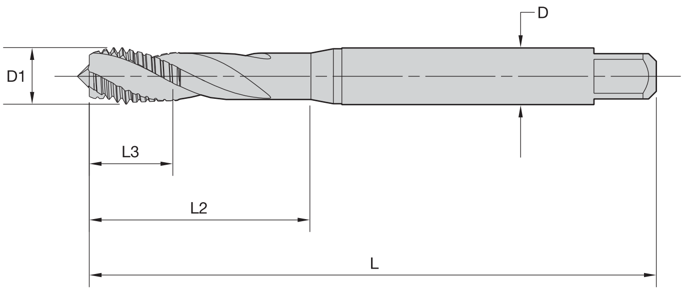
GT12 • Form C Semi-Bottoming Chamfer • Metric DIN 371 and 376 • For Nickel and Nickel Alloys

P M K N S ● H

● first choice
○ alternate choice

grade WS32MG TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4159636	GT125001	M3 X 0,5	56	11	18	3,5	2	DIN 371	6HX
4159637	GT125002	M4 X 0,7	63	13	21	4,5	3	DIN 371	6HX
4159638	GT125003	M5 X 0,8	70	15	25	6,0	3	DIN 371	6HX
4159639	GT125004	M6 X 1	80	17	30	6,0	3	DIN 371	6HX
4159640	GT125005	M8 X 1,25	90	20	35	8,0	3	DIN 371	6HX
4159641	GT125006	M10 X 1,5	100	22	39	10,0	3	DIN 371	6HX
4159642	GT125007	M12 X 1,75	110	24	—	9,0	3	DIN 376	6HX
4159663	GT125008	M14 X 2	110	26	—	11,0	3	DIN 376	6HX
4159664	GT125009	M16 X 2	110	27	—	12,0	3	DIN 376	6HX
4159665	GT125010	M20 X 2,5	140	32	—	16,0	3	DIN 376	6HX

- WN35MG TiN/DLC for titanium and titanium alloys.



Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

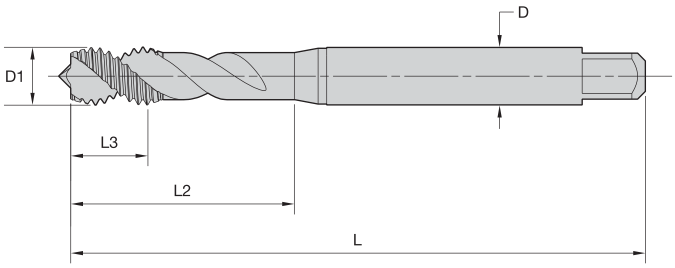
■ GT16 • Form C Semi-Bottoming Chamfer • Metric DIN 371 • For Titanium and Titanium Alloys

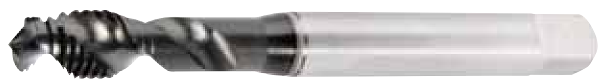
P	
M	
K	
N	
S	●
H	

● first choice
○ alternate choice

grade WN35MG TiN/DLC order #	catalogue #	metric dimensions D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4160437	**GT165001**	M3 X 0,5	56	6	18	3,5	3	DIN 371	6HX
4160438	**GT165002**	M4 X 0,7	63	7	21	4,5	3	DIN 371	6HX
4160439	**GT165003**	M5 X 0,8	70	8	25	6,0	3	DIN 371	6HX
4160440	**GT165004**	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
4160441	**GT165005**	M8 X 1,25	90	14	35	8,0	3	DIN 371	6HX
4160442	**GT165006**	M10 X 1,5	100	16	39	10,0	3	DIN 371	6HX
4160523	**GT165007**	M12 X 1,75	110	18	44	12,0	3	DIN 371	6HX

- WN48EG DLC for aluminium.



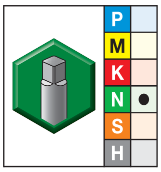


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
3,5–6	+0, -0,030
7–10	+0, -0,036
11–18	+0, -0,043

WIDIA VICTORY

■ GT80 • Form C Semi-Bottoming Chamfer • Metric DIN 371 and 376 • For Aluminium

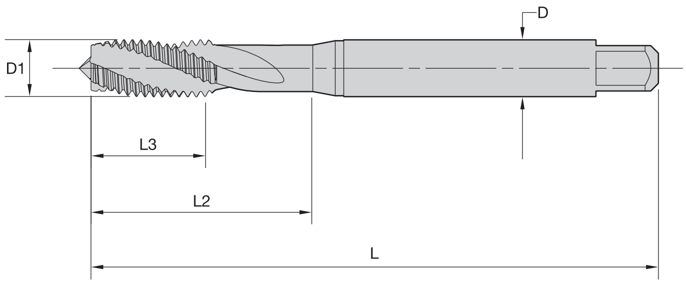


● first choice
○ alternate choice

grade WN48EG DLC		metric dimensions							
order #	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**D**	**number of flutes**	**dimension standard**	**class of fit**
4160054	**GT805001**	M3 X 0,5	56	6	18	3,5	2	DIN 371	6H
4160055	**GT805002**	M4 X 0,7	63	7	21	4,5	2	DIN 371	6H
4160056	**GT805003**	M5 X 0,8	70	8	25	6,0	2	DIN 371	6H
4160057	**GT805004**	M6 X 1	80	10	30	6,0	2	DIN 371	6H
4160058	**GT805005**	M8 X 1,25	90	14	35	8,0	2	DIN 371	6H
4160059	**GT805006**	M10 X 1,5	100	16	39	10,0	2	DIN 371	6H
4160060	**GT805007**	M12 X 1,75	110	18	—	9,0	3	DIN 376	6H
4160061	**GT805008**	M16 X 2	110	22	—	12,0	3	DIN 376	6H
4160062	**GT805009**	M20 X 2,5	140	25	—	16,0	3	DIN 376	6H

- WP31MG TiN
  for steel 32–44 HRC.

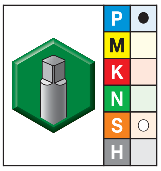
HSS-E-PM | 2–3 | 25° | DIN 371 | DIN 374 | DIN 376 | 6H | M | MF



Shank Tolerance	
D mm	**tolerance h9**
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

GT02 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel



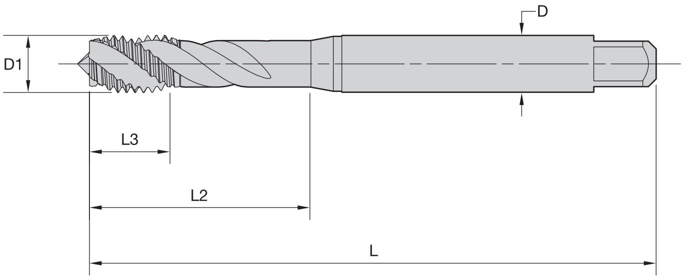
● first choice
○ alternate choice

grade WP31MG TiN		metric dimensions							
order #	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**D**	**number of flutes**	**dimension standard**	**class of fit**
4152638	GT025001	M3 X 0,5	56	11	18	3,5	3	DIN 371	6H
4152639	GT025002	M4 X 0,7	63	13	21	4,5	3	DIN 371	6H
4152640	GT025003	M5 X 0,8	70	15	25	6,0	3	DIN 371	6H
4152641	GT025004	M6 X 1	80	17	30	6,0	3	DIN 371	6H
4152709	GT025012	M8 X 1	90	17	–	6,0	3	DIN 374	6H
4152642	GT025005	M8 X 1,25	90	20	35	8,0	3	DIN 371	6H
4152710	GT025013	M10 X 1	90	18	–	7,0	3	DIN 374	6H
4152711	GT025014	M10 X 1,25	100	22	–	7,0	3	DIN 374	6H
4152703	GT025006	M10 X 1,5	100	22	39	10,0	3	DIN 371	6H
4152712	GT025015	M12 X 1,25	100	22	–	9,0	3	DIN 374	6H
4152713	GT025016	M12 X 1,5	100	22	–	9,0	3	DIN 374	6H
4152704	GT025007	M12 X 1,75	110	24	44	12,0	3	DIN 376	6H
4152714	GT025017	M14 X 1,5	100	22	–	11,0	3	DIN 374	6H
4152705	GT025008	M14 X 2	110	26	52	11,0	3	DIN 376	6H
4152715	GT025018	M16 X 1,5	100	22	–	12,0	3	DIN 374	6H
4152706	GT025009	M16 X 2	110	27	–	12,0	3	DIN 376	6H
4152707	GT025010	M18 X 2	125	30	–	14,0	4	DIN 376	6H
4152708	GT025011	M20 X 2,5	140	32	–	16,0	4	DIN 376	6H

WIDIA GTD™

- WH36MG TiAlN/MoS_2 for steel 32–44 HRC (3 x D).

HSS-E-PM | 2–3 | 42° | DIN 371 | DIN 374 | DIN 376 | 6H | M | MF



Shank Tolerance	
D mm	**tolerance h9**
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

GT04 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel

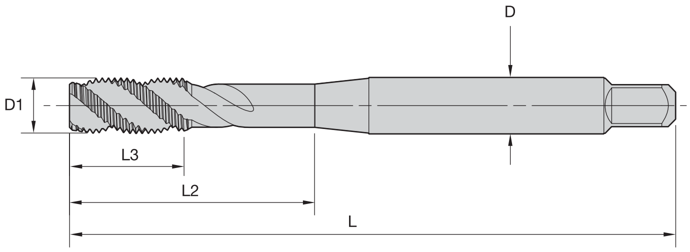
P	●
M	
K	
N	
S	○
H	

● first choice
○ alternate choice

grade WH36MG TiN+MoS_2		metric dimensions							
order #	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**D**	**number of flutes**	**dimension standard**	**class of fit**
4158471	GT045001	M3 X 0,5	56	6	18	3,5	3	DIN 371	6H
4158472	GT045002	M4 X 0,7	63	7	21	4,5	3	DIN 371	6H
4158763	GT045003	M5 X 0,8	70	8	25	6,0	3	DIN 371	6H
4158764	GT045004	M6 X 1	80	10	30	6,0	3	DIN 371	6H
4158772	GT045012	M8 X 1	90	10	—	6,0	3	DIN 374	6H
4158765	GT045005	M8 X 1,25	90	14	35	8,0	3	DIN 371	6H
4158773	GT045013	M10 X 1	90	10	—	7,0	3	DIN 374	6H
4158774	GT045014	M10 X 1,25	100	16	—	7,0	3	DIN 374	6H
4158766	GT045006	M10 X 1,5	100	16	39	10,0	3	DIN 371	6H
4158775	GT045015	M12 X 1,25	100	15	—	9,0	4	DIN 374	6H
4158776	GT045016	M12 X 1,5	100	15	—	9,0	4	DIN 374	6H
4158767	GT045007	M12 X 1,75	110	18	—	9,0	4	DIN 376	6H
4158777	GT045017	M14 X 1,5	100	15	—	11,0	4	DIN 374	6H
4158768	GT045008	M14 X 2	110	20	—	11,0	4	DIN 376	6H
4158778	GT045018	M16 X 1,5	100	15	—	12,0	4	DIN 374	6H
4158769	GT045009	M16 X 2	110	22	—	12,0	4	DIN 376	6H
4158770	GT045010	M18 X 2,5	125	25	—	14,0	4	DIN 376	6H
4158771	GT045011	M20 X 2,5	140	25	—	16,0	4	DIN 376	6H

- WU41EG TiN.
- WP49EG oxide.

HSS-E 2–3 45° DIN 371 DIN 376 2B UNC UNF



Shank Tolerance	
D mm	**tolerance h9**
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SFT • Form C Semi-Bottoming Chamfer • Machine Screw and Fractional • DIN 371 and 376

grade WU41EG TiN: P ● M ○ K ○ N ○ S H

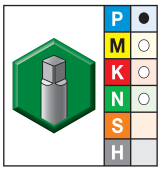
grade WP49EG Oxide: P ○ M ○ K ○ N S H

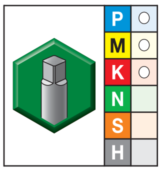
● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5472587	VTSFT6005	5387487	VTSFT6005	4 - 40	56	8	18	3,5	2	DIN 371	2B
5472589	VTSFT6007	5387489	VTSFT6007	5 - 40	56	9	20	4,0	2	DIN 371	2B
5472600	VTSFT6008	5387640	VTSFT6008	6 - 32	56	9	20	4,0	2	DIN 371	2B
5472602	VTSFT6010	5387642	VTSFT6010	6 - 40	56	9	20	4,0	2	DIN 371	2B
5472603	VTSFT6011	5387643	VTSFT6011	8 - 32	63	11	21	4,5	3	DIN 371	2B
5472605	VTSFT6013	5387645	VTSFT6013	10 - 24	70	12	25	6,0	3	DIN 371	2B
5472606	VTSFT6014	5387646	VTSFT6014	10 - 32	70	12	25	6,0	3	DIN 371	2B
5472608	VTSFT6016	5387648	VTSFT6016	1/4 - 20	80	15	30	7,0	3	DIN 371	2B
5472609	VTSFT6017	5387649	VTSFT6017	1/4 - 28	80	15	30	7,0	3	DIN 371	2B
5472611	VTSFT6019	5387651	VTSFT6019	5/16 - 18	90	15	35	8,0	3	DIN 371	2B
5472612	VTSFT6020	5387652	VTSFT6020	5/16 - 24	90	15	35	8,0	3	DIN 371	2B
5472614	VTSFT6022	5387654	VTSFT6022	3/8 - 16	100	19	39	10,0	3	DIN 371	2B
5472615	VTSFT6023	5387655	VTSFT6023	3/8 - 24	100	19	39	10,0	3	DIN 371	2B
5472617	VTSFT6025	5387657	VTSFT6025	7/16 - 14	100	18	41	8,0	3	DIN 376	2B
5472618	VTSFT6026	5387658	VTSFT6026	7/16 - 20	100	18	41	8,0	3	DIN 376	2B
5472620	VTSFT6028	5387670	VTSFT6028	1/2 - 13	110	23	40	9,0	3	DIN 376	2B
5472621	VTSFT6029	5387671	VTSFT6029	1/2 - 20	110	23	40	9,0	3	DIN 376	2B
5472623	VTSFT6031	5387673	VTSFT6031	9/16 - 12	110	25	32	11,0	3	DIN 376	2B
5472624	VTSFT6032	5387674	VTSFT6032	9/16 - 18	110	25	32	11,0	3	DIN 376	2B
5472625	VTSFT6033	5387675	VTSFT6033	5/8 - 11	110	24	35	12,0	3	DIN 376	2B

(continued)

(VT-SFT • Form C Semi-Bottoming Chamfer • Machine Screw and Fractional • DIN 371 and 376 — continued)

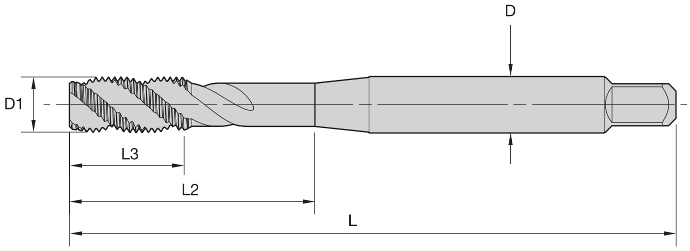




● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5472626	**VTSFT6034**	**5387676**	**VTSFT6034**	5/8 - 18	110	24	35	12,0	3	DIN 376	2B
5472627	**VTSFT6035**	**5387677**	**VTSFT6035**	3/4 - 10	140	30	46	16,0	4	DIN 376	2B
5472628	**VTSFT6036**	**5387678**	**VTSFT6036**	3/4 - 16	140	30	46	16,0	4	DIN 376	2B
5472629	**VTSFT6037**	**5387679**	**VTSFT6037**	7/8 - 9	140	34	35	18,0	4	DIN 376	2B
5472630	**VTSFT6038**	**5387700**	**VTSFT6038**	7/8 - 14	140	34	35	18,0	4	DIN 376	2B
5472631	**VTSFT6039**	**5387701**	**VTSFT6039**	1 - 8	160	38	41	18,0	4	DIN 376	2B
5472632	**VTSFT6040**	**5387702**	**VTSFT6040**	1 - 12	160	38	41	18,0	4	DIN 376	2B

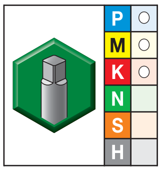
- WP49EG oxide



Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

■ VT-SFT • Form C Semi-Bottoming Chamfer • UNJC/UNJF • Inch DIN 371 and 376



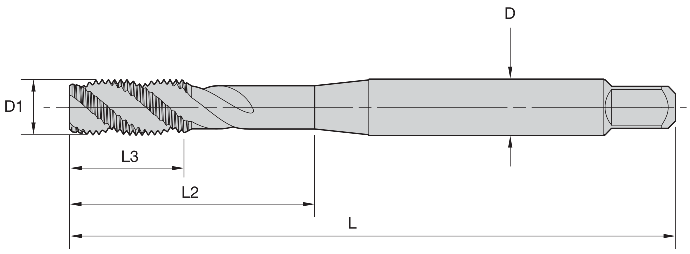
● first choice
○ alternate choice

grade WP49EG Oxide		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5387488	VTSFT6006	4 - 40	56	8	18	3,5	2	DIN 371	3B
5387641	VTSFT6009	6 - 32	56	9	20	4,0	2	DIN 371	3B
5387644	VTSFT6012	8 - 32	63	11	21	4,5	3	DIN 371	3B
5387647	VTSFT6015	10 - 32	70	12	25	6,0	3	DIN 371	3B
5387650	VTSFT6018	1/4 - 28	80	15	30	7,0	3	DIN 371	3B
5387653	VTSFT6021	5/16 - 24	90	15	35	8,0	3	DIN 371	3B
5387656	VTSFT6024	3/8 - 24	100	19	39	10,0	3	DIN 371	3B
5387659	VTSFT6027	7/16 - 20	100	18	41	8,0	3	DIN 376	3B
5387672	VTSFT6030	1/2 - 20	110	23	40	9,0	3	DIN 376	3B

WIDIA GTD

- WP42EG TiCN
- WU41EG TiN
- WP49EG oxide
- WU40EG bright

HSS-E | 2–3 | 45° | DIN 371 | DIN 374 | DIN 376 | 6G | 6H | M | MF



Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376

	WP42EG	WU41EG	WP49EG	WU40EG
P	●	●	○	○
M	●	○	○	○
K	●	○	○	○
N	●	○		○
S				
H				

● first choice
○ alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions							
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5368703	VTSFT6506	5368702	VTSFT6506	5368704	VTSFT6506	5368705	VTSFT6506	M2 X 0,4	45	7	13	2,8	2	DIN 371	6H
–		–		5368706	VTSFT6507	–		M2 X 0,4	45	7	13	2,8	2	DIN 371	6G
–		–		5368707	VTSFT6508	–		M2,2 X 0,45	45	7	13	2,8	2	DIN 371	6H
–		5368708	VTSFT6509	5368709	VTSFT6509	5368720	VTSFT6509	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6H
–		–		5368721	VTSFT6510	–		M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6G
–		–		5402138	VTSFT6545	–		M3 X 0,35	56	8	–	2,2	2	DIN 374	6H
–		–		5368726	VTSFT6512	–		M3 X 0,5	56	8	18	3,5	2	DIN 371	6G
–		–		5402227	VTSFT6525	5402228	VTSFT6525	M3 X 0,5	56	8	–	2,2	2	DIN 376	6H
5368723	VTSFT6511	5368722	VTSFT6511	5368724	VTSFT6511	5368725	VTSFT6511	M3 X 0,5	56	8	18	3,5	2	DIN 371	6H
–		5368727	VTSFT6513	5368728	VTSFT6513	5368729	VTSFT6513	M3,5 X 0,6	56	9	20	4,0	2	DIN 371	6H
–		–		5402139	VTSFT6546	5402180	VTSFT6546	M4 X 0,5	63	10	21	2,8	3	DIN 374	6H
–		–		5368734	VTSFT6515	–		M4 X 0,7	63	11	21	4,5	3	DIN 371	6G
–		–		5402229	VTSFT6526	5402250	VTSFT6526	M4 X 0,7	63	10	21	2,8	3	DIN 376	6H
5368731	VTSFT6514	5368730	VTSFT6514	5368732	VTSFT6514	5368733	VTSFT6514	M4 X 0,7	63	11	21	4,5	3	DIN 371	6H
–		–		5402181	VTSFT6547	5402182	VTSFT6547	M5 X 0,5	70	12	25	3,5	3	DIN 374	6H
–		–		5368739	VTSFT6517	–		M5 X 0,8	70	12	25	6,0	3	DIN 371	6G
–		–		5402251	VTSFT6527	5402252	VTSFT6527	M5 X 0,8	70	12	25	3,5	3	DIN 376	6H
5368736	VTSFT6516	5368735	VTSFT6516	5368737	VTSFT6516	5368738	VTSFT6516	M5 X 0,8	70	12	25	6,0	3	DIN 371	6H
–		–		5402183	VTSFT6548	–		M6 X 0,5	80	12	30	4,5	3	DIN 374	6H
–		–		5402185	VTSFT6549	5402184	VTSFT6549	M6 X 0,75	80	12	30	4,5	3	DIN 374	6H

(continued)

(VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 — continued)

	grade WP42EG	grade WU41EG	grade WP49EG	grade WU40EG
P	●	●	○	○
M	●	○	○	○
K	●	○	○	○
N	●	○		○
S				
H				

● first choice
○ alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions							
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5368741	VTSFT6518	5368740	VTSFT6518	5368742	VTSFT6518	5368743	VTSFT6518	M6 X 1	80	12	30	6,0	3	DIN 371	6H
–		–		5402253	VTSFT6528	5402254	VTSFT6528	M6 X 1	80	12	30	4,5	3	DIN 376	6H
–		–		5368744	VTSFT6519	–		M6 X 1	80	12	30	6,0	3	DIN 371	6G
–		–		5368745	VTSFT6520	5368746	VTSFT6520	M7 X 1	80	12	30	7,0	3	DIN 371	6H
–		–		5402186	VTSFT6550	5402187	VTSFT6550	M8 X 0,75	80	12	30	6,0	3	DIN 374	6H
5402188	VTSFT6551	–		5402189	VTSFT6551	5402190	VTSFT6551	M8 X 1	90	15	35	6,0	3	DIN 374	6H
–		–		5368752	VTSFT6522	–		M8 X 1,25	90	15	35	8,0	3	DIN 371	6G
–		–		5402255	VTSFT6529	5402256	VTSFT6529	M8 X 1,25	90	15	35	6,0	3	DIN 376	6H
5368749	VTSFT6521	5368748	VTSFT6521	5368750	VTSFT6521	5368751	VTSFT6521	M8 X 1,25	90	15	35	8,0	3	DIN 371	6H
–		–		–		5402191	VTSFT6552	M10 X 0,75	90	15	35	7,0	3	DIN 374	6H
–		–		5402192	VTSFT6553	5402193	VTSFT6553	M10 X 1	90	15	35	7,0	3	DIN 374	6H
5402194	VTSFT6554	–		5402195	VTSFT6554	5402196	VTSFT6554	M10 X 1,25	100	18	39	7,0	3	DIN 374	6H
5368754	VTSFT6523	5368753	VTSFT6523	5368755	VTSFT6523	5368756	VTSFT6523	M10 X 1,5	100	18	39	10,0	3	DIN 371	6H
–		–		5368757	VTSFT6524	–		M10 X 1,5	100	18	39	10,0	3	DIN 371	6G
–		–		5402257	VTSFT6530	5402258	VTSFT6530	M10 X 1,5	100	18	39	7,0	3	DIN 376	6H
–		–		5402197	VTSFT6555	5402198	VTSFT6555	M12 X 1	100	21	39	9,0	3	DIN 374	6H
–		–		5402199	VTSFT6556	5402200	VTSFT6556	M12 X 1,25	100	21	39	9,0	3	DIN 374	6H
5402201	VTSFT6557	–		5402202	VTSFT6557	5402203	VTSFT6557	M12 X 1,5	100	21	39	9,0	3	DIN 374	6H
–		–		5402263	VTSFT6532	–		M12 X 1,75	110	21	44	9,0	3	DIN 376	6G
5402260	VTSFT6531	5402259	VTSFT6531	5402261	VTSFT6531	5402262	VTSFT6531	M12 X 1,75	110	21	44	9,0	3	DIN 376	6H
–		–		–		5402204	VTSFT6558	M14 X 1	100	21	47	11,0	3	DIN 374	6H
–		–		–		5402205	VTSFT6559	M14 X 1,25	100	21	47	11,0	3	DIN 374	6H
5402206	VTSFT6560	–		5402207	VTSFT6560	5402208	VTSFT6560	M14 X 1,5	100	21	47	11,0	3	DIN 374	6H
–		–		5402268	VTSFT6534	–		M14 X 2	110	24	52	11,0	3	DIN 376	6G
5402265	VTSFT6533	5402264	VTSFT6533	5402266	VTSFT6533	5402267	VTSFT6533	M14 X 2	110	24	52	11,0	3	DIN 376	6H
–		–		–		5402209	VTSFT6561	M16 X 1	100	21	46	12,0	3	DIN 374	6H
–		–		5402210	VTSFT6562	5402211	VTSFT6562	M16 X 1,5	100	21	46	12,0	3	DIN 374	6H
–		–		5402272	VTSFT6536	–		M16 X 2	110	24	51	12,0	3	DIN 376	6G
–		5402269	VTSFT6535	5402270	VTSFT6535	5402271	VTSFT6535	M16 X 2	110	24	51	12,0	3	DIN 376	6H
–		–		–		5402212	VTSFT6563	M18 X 1	110	21	50	14,0	4	DIN 374	6H
–		–		5402214	VTSFT6564	5402213	VTSFT6564	M18 X 1,5	110	21	50	14,0	4	DIN 374	6H
–		–		–		5402215	VTSFT6565	M18 X 2	125	30	58	14,0	4	DIN 374	6H
–		5402273	VTSFT6537	5402274	VTSFT6537	5402275	VTSFT6537	M18 X 2,5	125	30	58	14,0	4	DIN 376	6H
–		–		–		5402216	VTSFT6566	M20 X 1	125	24	56	16,0	4	DIN 374	6H
–		–		5402217	VTSFT6567	5402218	VTSFT6567	M20 X 1,5	125	24	56	16,0	4	DIN 374	6H
–		–		–		5402219	VTSFT6568	M20 X 2	140	30	64	16,0	4	DIN 374	6H
–		5402276	VTSFT6538	5402277	VTSFT6538	5402278	VTSFT6538	M20 X 2,5	140	30	64	16,0	4	DIN 376	6H
–		–		5402220	VTSFT6569	5402221	VTSFT6569	M22 X 1,5	125	24	62	18,0	4	DIN 374	6H
–		–		–		5402222	VTSFT6570	M22 X 2	140	30	70	18,0	4	DIN 374	6H
–		5402279	VTSFT6539	5402280	VTSFT6539	5402281	VTSFT6539	M22 X 2,5	140	30	70	18,0	4	DIN 376	6H

(continued)

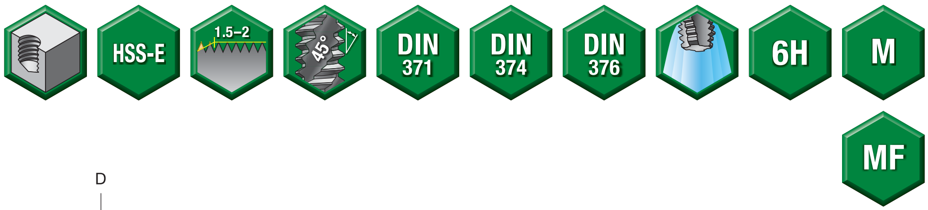
(VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 — continued)

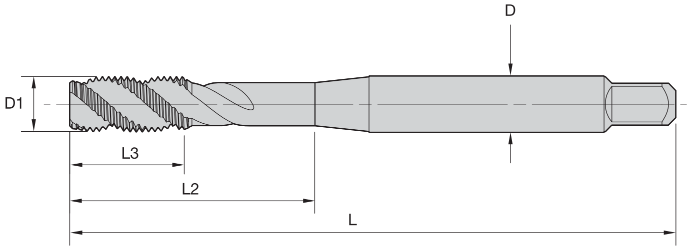
	grade WP42EG TiCN	grade WU41EG TiN	grade WP49EG Oxide	grade WU40EG Bright
P	●	●	○	○
M	●	○	○	○
K	●	○	○	○
N	●	○		○
S				
H				

● first choice
○ alternate choice

grade WP42EG TiCN order #	catalogue #	grade WU41EG TiN order #	catalogue #	grade WP49EG Oxide order #	catalogue #	grade WU40EG Bright order #	catalogue #	metric dimensions D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
–		–		5402223	VTSFT6571	5402224	VTSFT6571	M24 X 1,5	140	28	67	18,0	4	DIN 374	6H
–		–		–		5402225	VTSFT6572	M24 X 2	140	28	67	18,0	4	DIN 374	6H
–		5402282	VTSFT6540	5402283	VTSFT6540	5402284	VTSFT6540	M24 X 3	160	36	77	18,0	4	DIN 376	6H
–		5402285	VTSFT6541	5402286	VTSFT6541	5402287	VTSFT6541	M27 X 3	160	36	82	20,0	4	DIN 376	6H
–		–		–		5402226	VTSFT6573	M30 X 2	150	28	80	22,0	2	DIN 374	6H
–		5402288	VTSFT6542	5402289	VTSFT6542	5402290	VTSFT6542	M30 X 3,5	180	42	91	22,0	4	DIN 376	6H
–		–		5402291	VTSFT6543	5402292	VTSFT6543	M33 X 3,5	180	42	100	25,0	4	DIN 376	6H
–		–		5402293	VTSFT6544	5402294	VTSFT6544	M36 X 4	200	48	110	28,0	5	DIN 376	6H

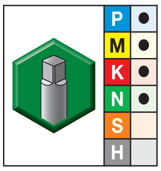
- WP42EG TiCN
- WP49EG oxide

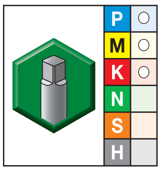




Shank Tolerance	
D mm	**tolerance h9**
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SFT • Form E Bottoming Chamfer • Metric DIN 371, 374, and 376



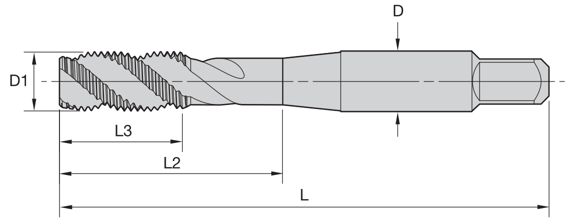


● first choice
○ alternate choice

grade WP42EG TiCN		grade WP49EG Oxide		metric dimensions							
order #	**catalogue #**	**order #**	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**D**	**number of flutes**	**dimension standard**	**class of fit**
5387434	VTSFT6574	5387435	VTSFT6574	M3 X 0,5	56	8	18	3,5	2	DIN 371	6H
5387436	VTSFT6575	5387437	VTSFT6575	M4 X 0,7	63	11	21	4,5	3	DIN 371	6H
5387438	VTSFT6576	5387439	VTSFT6576	M5 X 0,8	70	12	25	6,0	3	DIN 371	6H
5387460	VTSFT6577	5387461	VTSFT6577	M6 X 1	80	12	30	6,0	3	DIN 371	6H
5387475	VTSFT6585	5387476	VTSFT6585	M8 X 1	90	15	35	6,0	3	DIN 374	6H
5387462	VTSFT6578	5387463	VTSFT6578	M8 X 1,25	90	15	35	8,0	3	DIN 371	6H
5387477	VTSFT6586	5387478	VTSFT6586	M10 X 1,25	100	18	39	7,0	3	DIN 374	6H
5387464	VTSFT6579	5387465	VTSFT6579	M10 X 1,5	100	18	39	10,0	3	DIN 371	6H
5387479	VTSFT6587	5387481	VTSFT6587	M12 X 1,5	100	21	39	9,0	3	DIN 374	6H
5387466	VTSFT6580	5387467	VTSFT6580	M12 X 1,75	110	21	44	9,0	3	DIN 376	6H
5387482	VTSFT6588	5387483	VTSFT6588	M14 X 1,5	100	21	47	11,0	3	DIN 374	6H
5387468	VTSFT6581	5387469	VTSFT6581	M14 X 2	110	24	52	11,0	3	DIN 376	6H
	–	5387470	VTSFT6582	M16 X 2	110	24	51	12,0	3	DIN 376	6H
5387471	VTSFT6583	5387472	VTSFT6583	M18 X 2,5	125	30	58	14,0	4	DIN 376	6H
5387473	VTSFT6584	5387474	VTSFT6584	M20 X 2,5	140	30	64	16,0	4	DIN 376	6H

WIDIA GTD

- WU41EG TiN
- WU40EG bright



Shank Tolerance	
D mm	**tolerance h9**
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SFT • Form C Semi-Bottoming Chamfer • Metric • JIS

	grade WU41EG TiN	grade WU40EG Bright
P	●	○
M	○	○
K	○	○
N	○	○
S		
H		

● first choice
○ alternate choice

grade WU41EG TiN		grade WU40EG Bright		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	tap class
5398709	VTSFT7505	5398708	VTSFT7505	M3 X 0,5	46	11	19	4,0	2	JIS	ISO 2
5398791	VTSFT7506	5398790	VTSFT7506	M4 X 0,7	52	13	21	5,0	3	JIS	ISO 2
5398793	VTSFT7507	5398792	VTSFT7507	M5 X 0,8	60	16	24	5,5	3	JIS	ISO 2
5398795	VTSFT7508	5398794	VTSFT7508	M6 X 1	62	19	29	6,0	3	JIS	ISO 2
5398797	VTSFT7509	5398796	VTSFT7509	M8 X 1,25	70	22	37	6,2	3	JIS	ISO 2
5398799	VTSFT7510	5398798	VTSFT7510	M10 X 1,5	75	24	41	7,0	3	JIS	ISO 2
	–	5398800	VTSFT7511	M12 X 1,25	82	29	48	8,5	3	JIS	ISO 2
	–	5398802	VTSFT7513	M12 X 1,5	82	29	48	8,5	3	JIS	ISO 2
	–	5398801	VTSFT7512	M12 X 1,75	82	29	48	8,5	3	JIS	ISO 2
	–	5398804	VTSFT7515	M14 X 1,5	88	30	48	10,5	3	JIS	ISO 2
	–	5398803	VTSFT7514	M14 X 2	88	30	48	10,5	3	JIS	ISO 2
	–	5398806	VTSFT7517	M16 X 1,5	95	32	52	12,5	3	JIS	ISO 2
	–	5398805	VTSFT7516	M16 X 2	95	32	52	12,5	3	JIS	ISO 2
	–	5398807	VTSFT7518	M18 X 2,5	100	37	55	14,0	4	JIS	ISO 2
	–	5398808	VTSFT7519	M20 X 2,5	105	37	60	15,0	4	JIS	ISO 2

Straight Flute

WIDIA-GTD™ offers a wide range of straight-flute options for tapping through and blind holes in:

- Cast iron.
- Aluminium.

High-Performance Victory™ Solid Carbide Taps

- Straight flute designed for outstanding tool life in cast iron, aluminium, and hardened materials.
- Manufactured with fine-grain micrograin carbide for exceptional wear life.
- Ideal for long production runs where fewer tool changes mean greater productivity.
- Runs up to 4x faster and lasts up to 4x longer than conventional high-speed steel taps.
- Excellent thread quality and tap performance.

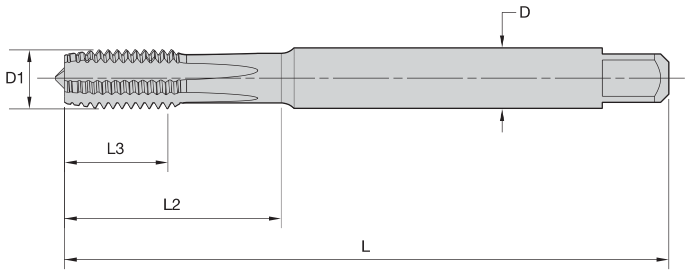
High-Performance Victory™ HSS-E-PM Taps

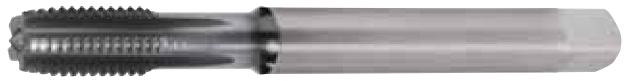
- Straight-flute taps store chips in hole or are flushed out with internal coolant.
- Manufactured from powdered metal high-speed steel coated for thread cutting in cast iron and aluminium.
- Offer performance advantages over conventional high-speed steel taps.
- Long tap life at up to 50% higher tapping speed than HSS taps.

WIDIA GTD

- WH16PG TiAlN/MoS_2 for steel 55–63 HRC.

HM · 2–3 · DIN 371 · DIN 374 · DIN 376 · 6HX · M · MF





Shank Tolerance

D mm	tolerance h6
1–3	+0, -0,025
3,5–6	+0, -0,030
7–10	+0, -0,036
11–18	+0, -0,043

WIDIA VICTORY

GX10 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel

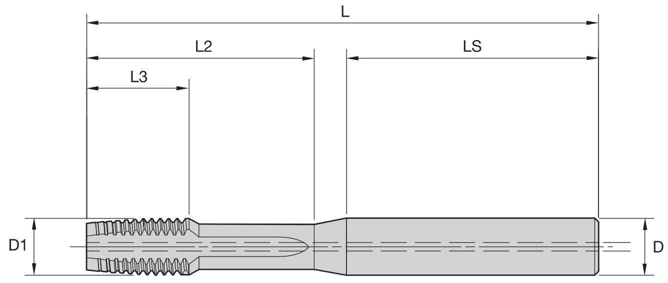
P M K N S H ●

● first choice
○ alternate choice

grade WH16PG TiAlN+MoS_2 order #	catalogue #	metric dimensions D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4158323	GX105001	M3 X 0,5	63	6	18	4,5	4	DIN 371	6HX
4158324	GX105002	M4 X 0,7	63	8	20	4,5	4	DIN 371	6HX
4158325	GX105003	M5 X 0,8	70	10	26	6,0	4	DIN 371	6HX
4158326	GX105004	M6 X 1	80	12	28	6,0	4	DIN 371	6HX
4158331	GX105009	M8 X 1	90	15	35	8,0	5	DIN 374	6HX
4158327	GX105005	M8 X 1,25	90	15	35	8,0	5	DIN 371	6HX
4158332	GX105010	M10 X 1	100	18	38	10,0	5	DIN 374	6HX
4158328	GX105006	M10 X 1,5	100	18	38	10,0	5	DIN 371	6HX
4158333	GX105011	M12 X 1,5	110	21	41	12,0	5	DIN 374	6HX
4158329	GX105007	M12 X 1,75	110	21	41	12,0	5	DIN 376	6HX
4158334	GX105012	M14 X 1,5	110	24	44	14,0	5	DIN 374	6HX
4158330	GX105008	M14 X 2	110	24	44	14,0	6	DIN 376	6HX
4158335	GX105013	M16 X 1,5	110	24	44	16,0	5	DIN 374	6HX

• WK12PG TiCN for cast iron.

HM 1,5–2 6HX M MF



Shank Tolerance	
D	**tolerance h6**
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

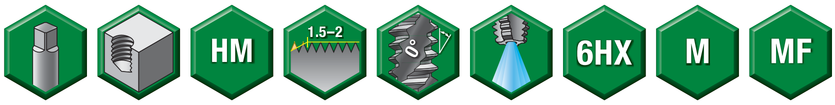
■ GX35 • Form E Bottoming Chamfer • Through Coolant M6 and Larger • Metric • For Cast Iron

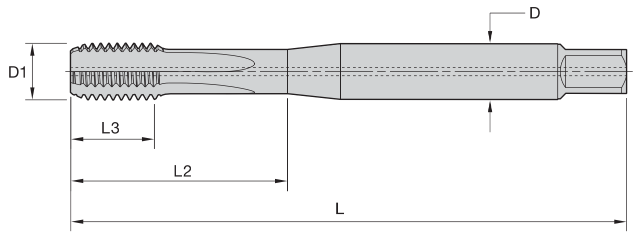
P	○
M	
K	●
N	
S	
H	

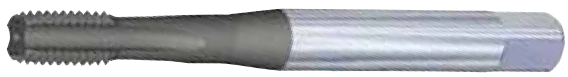
● first choice
○ alternate choice

grade WK12PG TiCN		metric dimensions							
order #	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**LS**	**D**	**number of flutes**	**class of fit**
5551152	**GX352733**	M6 X 1	70	12	24	42	6,0	4	6HX
5551153	**GX352734**	M8 X 1,25	80	15	32	43	8,0	4	6HX
5551154	**GX352735**	M10 X 1,5	90	18	40	44	10,0	4	6HX
5551156	**GX352738**	M12 X 1,5	100	21	48	46	12,0	4	6HX
5551155	**GX352737**	M12 X 1,75	100	21	48	46	12,0	4	6HX
5551159	**GX352740**	M14 X 1,5	110	24	56	52	12,0	4	6HX
5551157	**GX352739**	M14 X 2	110	24	56	52	12,0	4	6HX
5551160	**GX352741**	M16 X 2	110	24	64	44	14,0	4	6HX

- WK12PG TiCN for cast iron.





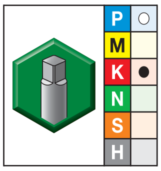


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

■ GX35 • Form E Bottoming Chamfer • Through Coolant • Metric • For Cast Iron

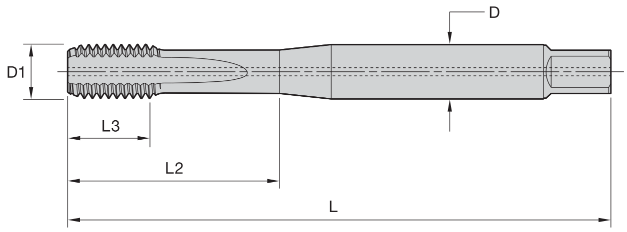


● first choice
○ alternate choice

grade WK12PG TiCN order #	catalogue #	metric dimensions D1 size	L	L3	L2	D	number of flutes	class of fit
5520825	GX355006	M6 X 1	80	10	30	6,0	4	6HX
5520826	GX355007	M7 X 1	80	10	30	7,0	4	6HX
5520827	GX355008	M8 X 1,25	90	13	35	8,0	4	6HX
5520828	GX355009	M9 X 1,25	90	13	35	9,0	4	6HX
5520830	GX355101	M10 X 1	90	10	35	7,0	4	6HX
5520831	GX355102	M10 X 1,25	100	15	39	7,0	4	6HX
5520829	GX355010	M10 X 1,5	100	15	39	10,0	4	6HX
5520834	GX355121	M12 X 1,25	100	15	39	9,0	4	6HX
5520835	GX355122	M12 X 1,50	100	15	39	9,0	4	6HX
5520833	GX355012	M12 X 1,75	110	18	44	9,0	4	6HX
5520837	GX355141	M14 X 1,25	100	15	47	11,0	4	6HX
5520838	GX355142	M14 X 1,5	100	15	47	11,0	4	6HX
5520836	GX355014	M14 X 2	110	20	52	11,0	4	6HX

• WN14PG TiN + CrC/C for aluminium.

HM 1.5–2 6HX M



Shank Tolerance

D	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

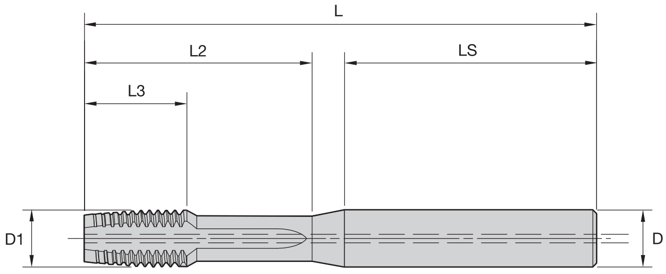
■ GX47 • Form E Bottoming Chamfer • Through Coolant • Metric • For Aluminium

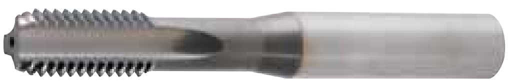
P	
M	
K	
N	●
S	
H	

● first choice
○ alternate choice

grade WN14PG TiN+CrC/C order #	catalogue #	metric dimensions D1 size	L	L3	L2	D	number of flutes	class of fit
5520839	GX475006	M6 X 1	80	10	30	6,0	3	6HX
5520840	GX475008	M8 X 1,25	90	10	35	8,0	3	6HX
5520841	GX475010	M10 X 1,5	100	15	39	10,0	3	6HX

- WN14PG TiN + CrC/C for aluminium.





Shank Tolerance	
D mm	**tolerance h6**
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

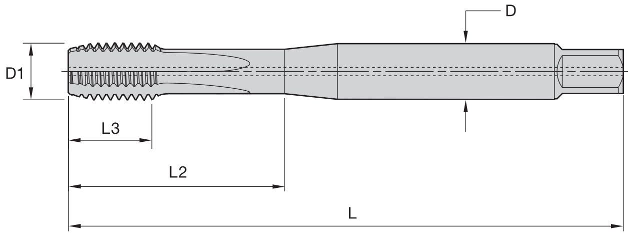
■ GX47 • Form E Bottoming Chamfer • Through Coolant • Metric • For Aluminium

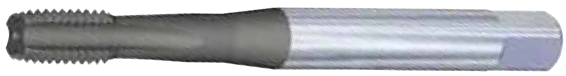
P	M	K	N	S	H
			●		

● first choice
○ alternate choice

grade WN14PG TiN+CrC/C		metric dimensions							
order #	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**LS**	**D**	**number of flutes**	**class of fit**
5551161	**GX472866**	M6 X 1	70	12	24	42	6,0	3	6HX
5551162	**GX472867**	M8 X 1,25	80	15	32	43	8,0	3	6HX
5551163	**GX472868**	M10 X 1,5	90	18	40	44	10,0	3	6HX
5551164	**GX472872**	M12 X 1,5	100	21	48	46	12,0	3	6HX
5551165	**GX472870**	M12 X 1,75	100	21	48	46	12,0	3	6HX
5551166	**GX472874**	M14 X 1,5	110	24	56	52	12,0	4	6HX
5551167	**GX472873**	M14 X 2	110	24	56	52	12,0	4	6HX
5551168	**GX472875**	M16 X 2	110	24	64	44	14,0	4	6HX

• WK12PG TiCN for cast iron.





Shank Tolerance	
D mm	**tolerance h6**
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

GX50 • Form C Semi-Bottoming Chamfer • Through Coolant M6 and Larger • Metric • For Cast Iron

P	○
M	
K	●
N	
S	
H	

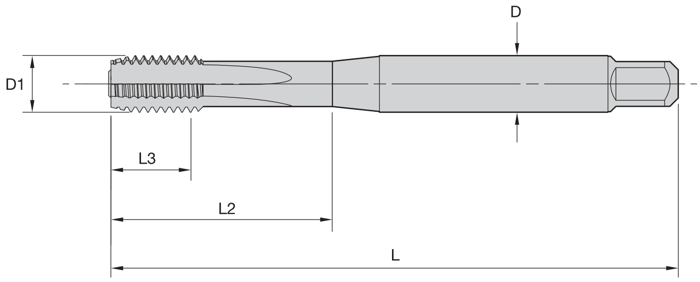
● first choice
○ alternate choice

grade WK12PG TiCN		metric dimensions						
order #	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**D**	**number of flutes**	**class of fit**
5520817	**GX505004**	M4 X 0,7	63	10	21	4,5	3	6HX
5520818	**GX505005**	M5 X 0,8	70	10	25	6,0	3	6HX
5520819	**GX505006**	M6 X 1	80	10	30	6,0	4	6HX
5520820	**GX505008**	M8 X 1,25	90	13	35	8,0	4	6HX
5520822	**GX505010**	M10 X 1,5	100	15	39	10,0	4	6HX
5520823	**GX505012**	M12 X 1,75	110	18	44	9,0	4	6HX
5520824	**GX505014**	M14 X 2	110	20	52	11,0	4	6HX

WIDIA GTD

- GP6520 TiCN for cast iron and cast aluminium.

HSS-E-PM | 2–3 | DIN 371 | DIN 374 | DIN 376 | M | MF



Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

GT40 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium

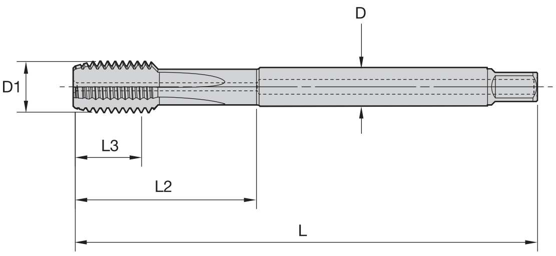
P	
M	
K	●
N	●
S	
H	

● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4033699	GT405001	M4 X 0,7	63	10	21	4,5	3	DIN 371	6HX
4033700	GT405002	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4033701	GT405003	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4033702	GT405004	M8 X 1,25	90	13	35	8,0	4	DIN 371	6HX
4033753	GT405005	M10 X 1,5	100	15	39	10,0	4	DIN 371	6HX
5408066	GT405057	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4033754	GT405006	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
5408067	GT405058	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4033755	GT405007	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
5408068	GT405059	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
4033756	GT405008	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
4033757	GT405009	M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
4033758	GT405010	M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX
4033759	GT405011	M22 X 2,5	140	25	70	18,0	4	DIN 376	6HX

- GP6520 TiCN for cast iron and cast aluminium.

HSS-E-PM | 2–3 | DIN 371 | DIN 374 | DIN 376 | 6HX | MF | M



Shank Tolerance	
D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

GT41 • Form C Semi-Bottoming Chamfer • Through Coolant • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium

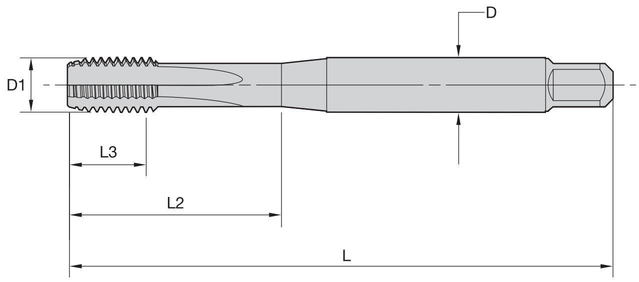
P	
M	
K	●
N	●
S	
H	

● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4033659	GT415001	M4 X 0,7	63	10	21	4,5	3	DIN 371	6HX
4033660	GT415002	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4033661	GT415003	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4033662	GT415004	M8 X 1,25	90	13	35	8,0	4	DIN 371	6HX
4033813	GT415005	M10 X 1,5	100	15	39	10,0	4	DIN 371	6HX
5408069	GT415021	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4033814	GT415006	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
5408400	GT415022	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4033815	GT415007	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
5408401	GT415023	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
4033816	GT415008	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
4033817	GT415009	M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
4033818	GT415010	M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX

- GP6520 TiCN for cast iron and cast aluminium.

HSS-E-PM 1,5–2 DIN 371 DIN 374 DIN 376 6HX M MF



Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

■ GT42 • Form E Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium

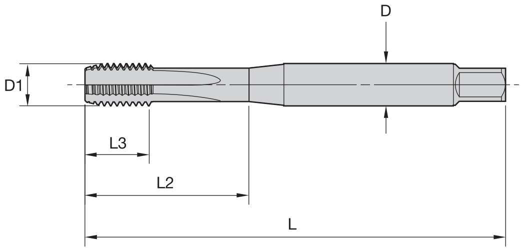
P	
M	
K	●
N	●
S	
H	

● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4154274	GT425001	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4154275	GT425002	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4154276	GT425003	M8 X 1,25	90	13	35	8,0	4	DIN 371	6HX
4154277	GT425004	M10 X 1,5	100	15	39	10,0	4	DIN 371	6HX
4154280	GT425007	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4154278	GT425005	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
4154281	GT425008	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4154279	GT425006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
4154282	GT425009	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
5408402	GT425010	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
5408403	GT425011	M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
5408404	GT425012	M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX

- GP6520 TiCN for cast iron and cast aluminium.

HSS-E-PM 1.5–2 DIN 371 DIN 374 DIN 376 6HX M MF



Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

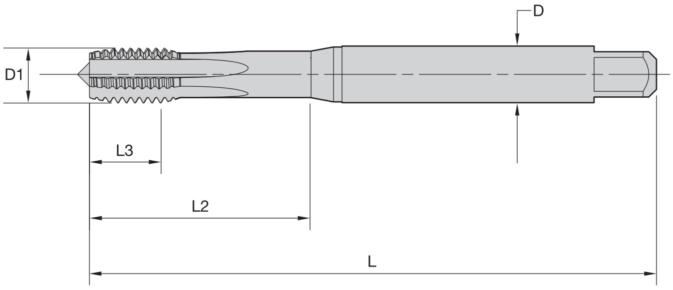
GT43 • Form E Bottoming Chamfer • Through Coolant • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium

P	
M	
K	●
N	●
S	
H	

● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4154283	GT435001	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4154284	GT435002	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4154285	GT435003	M8 X 1,25	90	13	35	8,0	4	DIN 371	6HX
4154286	GT435004	M10 X 1,5	100	15	39	10,0	4	DIN 371	6HX
4154289	GT435007	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4154287	GT435005	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
4154290	GT435008	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4154288	GT435006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
4154291	GT435009	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
5408405	GT435010	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
5408406	GT435011	M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
5408407	GT435012	M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX

- WS32MG TiCN for steel 44–55 HRC.

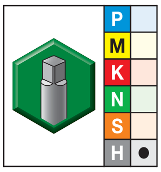


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

■ GT06 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel



● first choice
○ alternate choice

grade WS32MG TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4159915	GT065003	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4159918	GT065006	M8 X 1	90	10	35	8,0	5	DIN 374	6HX
4159913	GT065001	M8 X 1,25	90	14	35	8,0	5	DIN 371	6HX
4159919	GT065007	M10 X 1	90	10	35	10,0	5	DIN 374	6HX
4159914	GT065002	M10 X 1,5	100	16	39	10,0	5	DIN 371	6HX
4159920	GT065008	M12 X 1,5	100	15	—	9,0	5	DIN 374	6HX
4159916	GT065004	M12 X 1,75	110	18	—	9,0	5	DIN 376	6HX
4159921	GT065009	M14 X 1,5	100	15	—	11,0	6	DIN 374	6HX
4159922	GT065010	M16 X 1,5	100	15	—	12,0	6	DIN 374	6HX
4159917	GT065005	M16 X 2	110	22	—	12,0	6	DIN 376	6HX

Forming Taps

WIDIA-GTD™ offers a wide range of forming tap options for tapping through and blind holes in:

- Steel and steel alloys.
- Stainless steel.
- Aluminium.

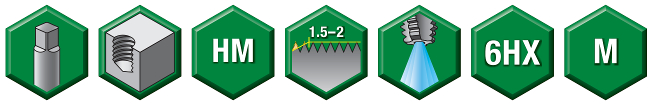
High-Performance Victory™ Solid Carbide Taps

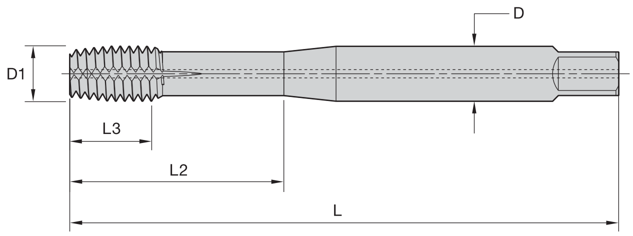
- Advanced forming geometries designed for superior tap performance in aluminium.
- Manufactured with fine-grain micrograin carbide for exceptional wear life.
- Ideal for long production runs where fewer tool changes mean greater productivity.
- Runs up to 4x faster and lasts up to 4x longer than conventional high-speed steel taps.
- Excellent thread quality and tap performance.

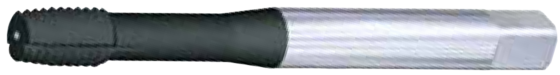
High-Performance Victory™ HSS-E-PM Taps

- Manufactured from powdered metal high-speed steel coated for thread forming in steel, stainless steel, and aluminium.
- High hardness provides superior wear resistance.
- Offer performance advantages over conventional high-speed steel taps.
- Long tap life at up to 50% higher tapping speed than HSS taps.

- WN14PG TiN + CrC/C for aluminium.







Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

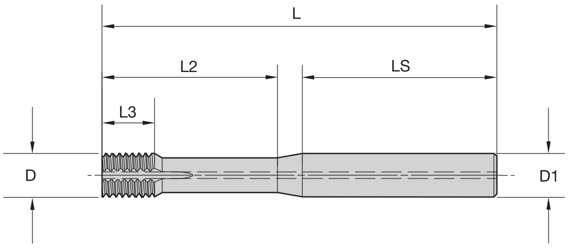
■ GX49 • Form E Bottoming Entry Taper • Through Coolant • Metric • For Aluminium

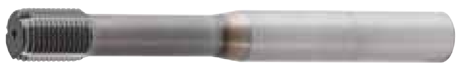
P	
M	
K	
N	●
S	
H	

● first choice
○ alternate choice

grade WN14PG TiN+CrC/C order #	catalogue #	metric dimensions D1 size	L	L3	L2	D	number of lube grooves	class of fit
5520842	**GX495006**	M6 X 1	80	10	30	6,0	2	6HX
5520843	**GX495008**	M8 X 1,25	90	13	35	8,0	2	6HX
5520844	**GX495010**	M10 X 1,5	100	15	39	10,0	3	6HX

• WN14PG TiN + CrC/C
for aluminium.



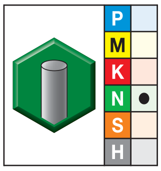


Shank Tolerance

D	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

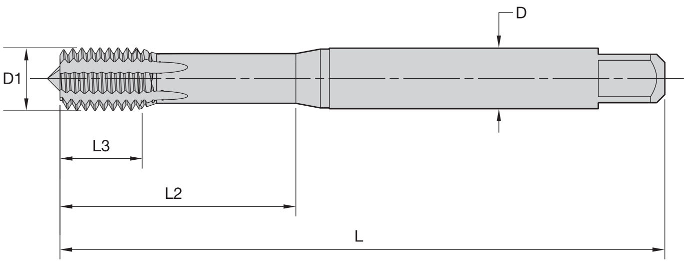
■ GX49 • Form E Bottoming Entry Taper • Through Coolant • Metric • For Aluminium



● first choice
○ alternate choice

grade WN14PG TiN+CrC/C		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	LS	D	number of lube grooves	class of fit
5551169	GX492908	M6 X 1	70	8	24	42	6,0	2	6HX
5551170	GX492909	M8 X 1,25	80	10	32	43	8,0	2	6HX
5551171	GX492911	M10 X 1,5	90	12	40	44	10,0	3	6HX
5551173	GX492915	M12 X 1,5	100	14	48	46	12,0	3	6HX
5551172	GX492914	M12 X 1,75	100	14	48	46	12,0	3	6HX

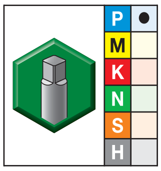
- WP31MG TiN for steel.
- WN38MG DLC for aluminium.

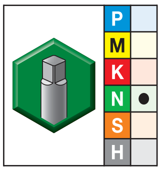


Shank Tolerance	
D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

GT22 • Form C Semi-Bottoming Entry Taper • Metric DIN 2174 • For Steel and Aluminium

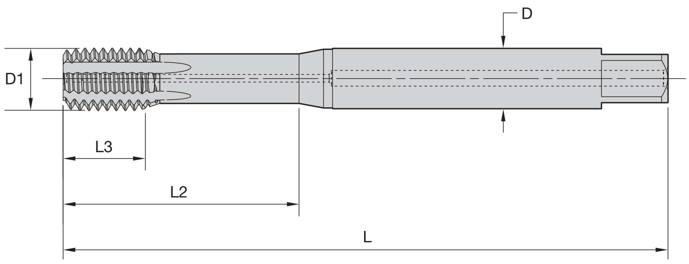




● first choice
○ alternate choice

grade WP31MG TiN		grade WN38MG DLC		metric dimensions						
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	dimension standard	class of fit
4158495	GT225016	4154671	GT225001	M3 X 0,5	56	6	18	3,5	DIN 2174	6HX
4158496	GT225017	4154672	GT225002	M4 X 0,7	63	7	21	4,5	DIN 2174	6HX
4158497	GT225018	4154673	GT225003	M5 X 0,8	70	8	25	6,0	DIN 2174	6HX
4158498	GT225019	4154674	GT225004	M6 X 1	80	10	30	6,0	DIN 2174	6HX
4158513	GT225024	4154679	GT225009	M8 X 1	90	10	35	8,0	DIN 2174	6HX
4158499	GT225020	4154675	GT225005	M8 X 1,25	90	14	35	8,0	DIN 2174	6HX
4158514	GT225025	4154680	GT225010	M10 X 1	90	10	35	10,0	DIN 2174	6HX
4158515	GT225026	4154681	GT225011	M10 X 1,25	100	16	39	10,0	DIN 2174	6HX
4158500	GT225021	4154676	GT225006	M10 X 1,5	100	16	39	10,0	DIN 2174	6HX
4158516	GT225027	4154682	GT225012	M12 X 1,25	100	15	—	9,0	DIN 2174	6HX
4158517	GT225028	4154683	GT225013	M12 X 1,5	100	15	—	9,0	DIN 2174	6HX
4158501	GT225022	4154677	GT225007	M12 X 1,75	110	18	—	9,0	DIN 2174	6HX
4158518	GT225029	4154684	GT225014	M14 X 1,5	100	15	—	11,0	DIN 2174	6HX
4158519	GT225030	4154685	GT225015	M16 X 1,5	100	15	—	12,0	DIN 2174	6HX
4158502	GT225023	4154678	GT225008	M16 X 2	110	22	—	12,0	DIN 2174	6HX

- WP31MG TiN for steel.
- WN38MG DLC for aluminium.



Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

GT23 • Form C Semi-Bottoming Entry Taper • Through Coolant • Metric DIN 2174 • For Steel and Aluminium

- ● first choice
- ○ alternate choice

grade WP31MG TiN order #	grade WP31MG TiN catalogue #	grade WN38MG DLC order #	grade WN38MG DLC catalogue #	D1 size	L	L3	L2	D	dimension standard	class of fit
4159965	GT235012	4159522	GT235001	M5 X 0,8	70	8	25	6,0	DIN 2174	6HX
4159966	GT235013	4159644	GT235002	M6 X 1	80	10	30	6,0	DIN 2174	6HX
4159971	GT235018	4159649	GT235007	M8 X 1	90	10	35	8,0	DIN 2174	6HX
4159967	GT235014	4159645	GT235003	M8 X 1,25	90	14	35	8,0	DIN 2174	6HX
4159972	GT235019	4159650	GT235008	M10 X 1	90	10	35	10,0	DIN 2174	6HX
4159968	GT235015	4159646	GT235004	M10 X 1,5	100	16	39	10,0	DIN 2174	6HX
4159993	GT235020	4159651	GT235009	M12 X 1,5	100	15	–	9,0	DIN 2174	6HX
4159969	GT235016	4159647	GT235005	M12 X 1,75	110	18	–	9,0	DIN 2174	6HX
4159994	GT235021	4159652	GT235010	M14 X 1,5	100	15	–	11,0	DIN 2174	6HX
4159995	GT235022	4159653	GT235011	M16 X 1,5	100	15	–	12,0	DIN 2174	6HX
4159970	GT235017	4159648	GT235006	M16 X 2	110	22	–	12,0	DIN 2174	6HX

Thread Mills

Our solid thread mills are designed to be the highest quality thread milling solution.

- Cut up to 63 HRC.
- Improved overall thread quality.

Unmatched Capabilities

- Capable of easily cutting most difficult materials.
- Carbide grades make threading easier and reduce machining times.
- High-quality internal and external threading on 3-axis CNC machines.
- Thread mills make interrupted cuts and short chips.
- Design offers a range of benefits to improve overall thread quality.
- Short, easily evacuated chips generate less heat and friction, so there is a lower risk of damage to threading.

Choose WIDIA-GTD™ Thread Mills

- Greater versatility than competitive products.
- Optimum surface quality for an excellent end product.
- Designed to eliminate chipping issues.
- No need to reverse the spindle.
- Fewer machining problems means more production safety.

Victory™ GTM Series HP Solid Carbide Thread Mills • Metric

★ Good
★★ Better
★★★ Best

GTM Series Solid Thread Milling • Metric	series	size range (inch and metric) size min–max	hole	operation	coolant	grade	shank
	GTM11	M3–M20				WU13PV	6535 HA
	GTM21	M5–M16				WU12PV	6535 HA
	GTM31	M4–M16				WU12PV	6535 HA
	GTM41	M6–M24				WU16PV	6535 HA
	GTM41LH	M6–M12				WU16PV	6535 HA

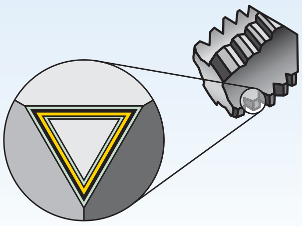
Victory GTM Series HP Solid Carbide Thread Mills • Inch

★ Good
★★ Better
★★★ Best

GTM Series Solid Thread Milling • Inch	series	size range (inch and metric) size min–max	hole	operation	coolant	grade	shank
	GTM21	#10–5/8"				WU12PV	6535 HA
	GTM31	1/4–5/8"				WU12PV	6535 HA
	GTM41	1/4–3/4"				WU16PV	6535 HA

	P				M	K		N			S				H			
	1, 2, 3, 4, 6, 7	5, 9, 10, 11	12, 13.1	13.2	14.1, 14.2, 14.3, 14.4	15, 16, 17, 18, 19	20	21	22, 23, 24, 25	26, 27, 28	31, 32	33, 34, 35	36	37	38.1, 38.2, 40.1, 40.2, 41.1	39.1, 41.2		
	Steel <35 HRC	Steel 36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron		Wrought Aluminium	Cast Aluminium	Copper, Copper Alloys	Iron Based	Cobalt Based	Nickel Based	Titanium Alloys	Hardened Steels 49–55 HRC	Hardened Steels 56–68 HRC	page(s)	recommended cutting parameters
	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★	★	★	★			Y69	Y77
	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★			Y71	Y77
						★★★	★★★	★★★	★★★	★★★							Y73	Y77
	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★					★★★	★★★	Y75	Y78
											★★★	★★★	★★★	★★★	★★★	★★★	Y76	Y78

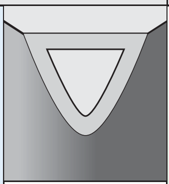
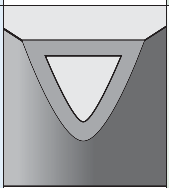
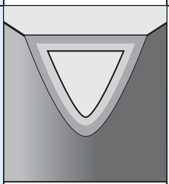
	P				M	K		N			S				H			
	1, 2, 3, 4, 6, 7	5, 9, 10, 11	12, 13.1	13.2	14.1, 14.2, 14.3, 14.4	15, 16, 17, 18, 19	20	21	22, 23, 24, 25	26, 27, 28	31, 32	33, 34, 35	36	37	38.1, 38.2, 40.1, 40.2, 41.1	39.1, 41.2		
	Steel <35 HRC	Steel 36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron		Wrought Aluminium	Cast Aluminium	Copper, Copper Alloys	Iron Based	Cobalt Based	Nickel Based	Titanium Alloys	Hardened Steels 49–55 HRC	Hardened Steels 56–68 HRC	page(s)	recommended cutting parameters
	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★			Y70	Y77
						★★★	★★★	★★★	★★★	★★★							Y72	Y77
	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★					★★★	★★★	Y74	Y78



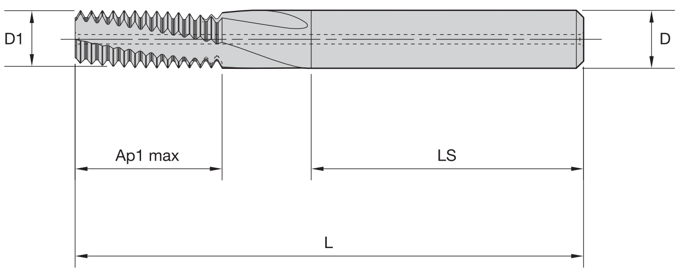
Coatings are designed for optimised tapping performance in specific materials.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟵⟶ toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WU12PV		Coated carbide. PVD fine-grain carbide substrate with high-hardness TiCN coating. Universal grade for thread milling most materials.	P		■	■	■					
			M		■	■	■					
			K		■	■	■					
			N			■	■	■				
			S		■	■	■					
WU13PV		Coated carbide. PVD carbide substrate with heat-resistant TiAlN coating. Universal grade for thread milling most materials.	P			■	■	■	■			
			M			■	■	■	■			
			K		■	■	■	■				
			N				■	■	■	■		
			S			■	■	■	■			
WU16PV		Coated carbide. PVD two-layer coating with heat-resistant TiAlN base layer and low-friction MoS_2 top layer over carbide substrate. Use for thread milling most materials, including high-hardness materials.	P				■	■	■	■		
			M				■	■	■	■		
			K			■	■	■	■			
			N			■	■	■	■			
			S				■	■	■	■		
			H					■	■	■	■	

HM 2x M MF



Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

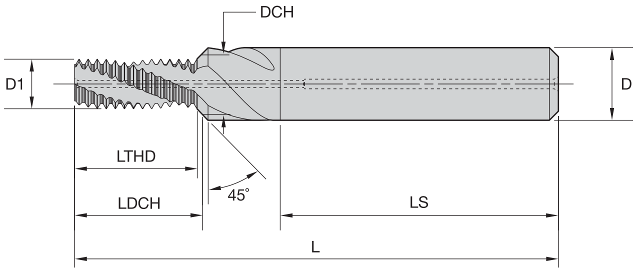
WIDIA VICTORY

■ GTM11 • Through Coolant • Metric and Metric Fine

P	●
M	●
K	●
N	●
S	●
H	

● first choice
○ alternate choice

grade WU13PV TiAlN		metric dimensions						
order #	catalogue #	D1 size	D1	Ap1 max	L	LS	D	cutting edges
4138391	GTM115001	M3X0.5	2,4	6	42	28	4,0	3
4138502	GTM115012	M4X0.5	3,4	8	55	36	6,0	3
4138392	GTM115002	M4X0.7	3,2	9	55	36	6,0	3
4138503	GTM115013	M5X0.5	4,3	10	55	36	6,0	3
4138493	GTM115003	M5X0.8	4,0	11	55	36	6,0	3
4138504	GTM115014	M6X0.75	5,0	12	55	36	6,0	3
4138494	GTM115004	M6X1	4,8	12	55	36	6,0	3
4138505	GTM115015	M8X0.75	5,9	17	63	36	6,0	3
4138506	GTM115016	M8X1	5,9	16	63	36	6,0	3
4138495	GTM115005	M8X1.25	5,9	17	63	36	6,0	3
4138507	GTM115017	M10X1	7,9	20	70	36	8,0	3
4138496	GTM115006	M10X1.5	7,9	20	70	36	8,0	3
4138508	GTM115018	M12X1	9,9	24	80	40	10,0	4
4138509	GTM115019	M12X1.5	9,9	25	80	40	10,0	4
4138497	GTM115007	M12X1.75	9,9	25	80	40	10,0	4
4138510	GTM115020	M14X1.5	9,9	29	80	40	10,0	4
4138498	GTM115008	M14X2	11,6	29	90	45	12,0	4
4138511	GTM115021	M16X1.5	11,9	32	90	45	12,0	4
4138499	GTM115009	M16X2	11,9	33	90	45	12,0	4
4138512	GTM115022	M18X1.5	13,9	37	90	45	14,0	4
4138500	GTM115010	M18X2.5	13,9	39	90	45	14,0	4
4138513	GTM115023	M20X1.5	13,9	41	90	45	14,0	4
4138501	GTM115011	M20X2.5	13,9	41	90	45	14,0	4



Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

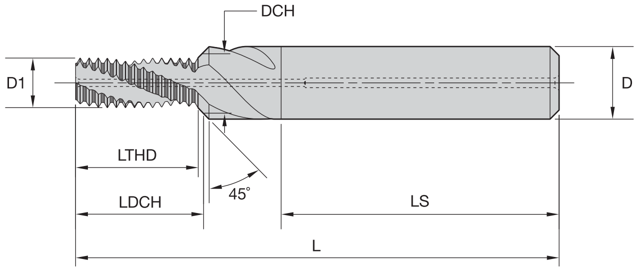
GTM21 • Through Coolant • Inch UNC and UNF

P	●
M	●
K	●
N	●
S	●
H	

● first choice
○ alternate choice

grade WU12PV TiCN

order #	catalogue #	D1 TPI	D1	DCH	LTHD	LDCH	L	LS	D	cutting edges
		metric dimensions								
4138537	GTM215024	#10-32	3,8	5,13	9,95	10,53	55	36	6,0	3
4138530	GTM215017	1/4-20	4,7	6,65	13,36	14,23	62	36	8,0	3
4138538	GTM215025	1/4-28	5,2	6,65	13,19	13,84	62	36	8,0	3
4138531	GTM215018	5/16-18	6,2	8,25	16,26	17,19	74	40	10,0	3
4138539	GTM215026	5/16-24	6,6	8,25	16,44	17,15	74	40	10,0	3
4138532	GTM215019	3/8-16	7,7	9,83	19,89	20,85	80	45	12,0	3
4138540	GTM215027	3/8-24	8,2	9,83	19,62	20,31	80	45	12,0	3
4138533	GTM215020	7/16-14	9,0	11,43	22,72	23,79	80	45	12,0	3
4138541	GTM215028	7/16-20	9,6	11,43	22,28	23,08	80	45	12,0	3
4138534	GTM215021	1/2-13	10,4	13,00	26,43	27,60	90	45	14,0	4
4138542	GTM215029	1/2-20	11,1	13,00	26,10	26,89	90	45	14,0	4
4138535	GTM215022	9/16-12	11,8	14,61	30,75	31,99	100	48	16,0	4
4138543	GTM215030	9/16-18	12,5	14,61	28,99	29,88	100	48	16,0	4
4138536	GTM215023	5/8-11	13,1	16,18	33,54	34,89	102	48	18,0	4
4138544	GTM215031	5/8-18	14,1	16,18	33,24	34,09	102	48	18,0	4



Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

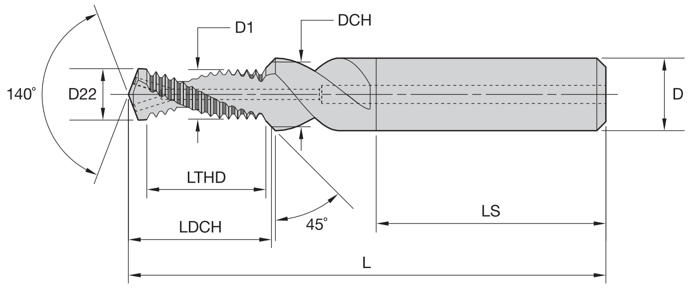
GTM21 • Through Coolant • Metric and Metric Fine

P	●
M	●
K	●
N	●
S	●
H	

● first choice
○ alternate choice

grade WU12PV TiCN		metric dimensions								cutting edges
order #	catalogue #	D1 size	D1	DCH	LTHD	LDCH	L	LS	D	
4138514	GTM215001	M5X0.8	4,0	5,30	10,82	11,40	55	36	6,0	3
4138521	GTM215008	M6X0.75	5,0	6,30	12,40	12,97	62	36	8,0	3
4138515	GTM215002	M6X1	4,8	6,30	12,52	13,19	62	36	8,0	3
4138522	GTM215009	M8X1	6,7	8,30	16,53	17,23	74	40	10,0	3
4138516	GTM215003	M8X1.25	6,5	8,30	16,91	17,71	74	40	10,0	3
4138523	GTM215010	M10X1	8,7	10,30	20,55	21,23	80	45	12,0	3
4138524	GTM215011	M10X1.25	8,4	10,30	20,67	21,50	80	45	12,0	3
4138517	GTM215004	M10X1.5	8,2	10,30	20,29	21,22	80	45	12,0	3
4138525	GTM215012	M12X1	10,6	12,30	24,56	25,27	90	45	14,0	4
4138526	GTM215013	M12X1.25	10,4	12,30	24,43	25,24	90	45	14,0	4
4138527	GTM215014	M12X1.5	10,1	12,30	24,80	25,76	90	45	14,0	4
4138518	GTM215005	M12X1.75	9,9	12,30	25,42	26,48	90	45	14,0	4
4138528	GTM215015	M14X1.5	12,1	14,30	29,31	30,25	100	48	16,0	4
4138519	GTM215006	M14X2	11,6	14,30	29,05	30,24	100	48	16,0	4
4138529	GTM215016	M16X1.5	14,0	16,30	32,31	33,30	102	48	18,0	4
4138520	GTM215007	M16X2	13,6	16,30	33,05	34,24	102	48	18,0	4

WIDIA GTD

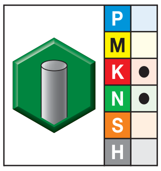


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

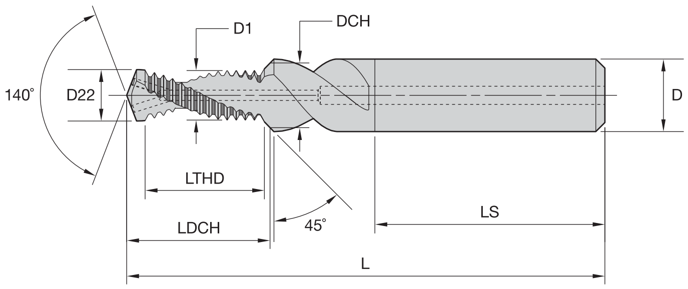
■ GTM31 • Through Coolant • Inch UNC and UNF



● first choice
○ alternate choice

grade WU12PV TiCN		metric dimensions									
order #	catalogue #	D1 TPI	D1	D22	DCH	LTHD	LDCH	L	LS	D	cutting edges
4138561	GTM315021	1/4-20	4,9	5,2	6,65	12,80	15,87	62	36	8,0	2
4138568	GTM315028	1/4-28	5,3	5,5	6,65	12,79	15,35	62	36	8,0	2
4138562	GTM315023	5/16-18	6,3	6,6	8,25	15,63	19,19	74	40	10,0	2
4138569	GTM315030	5/16-24	6,6	6,9	8,25	15,98	19,07	74	40	10,0	2
4138563	GTM315017w	3/8-16	7,7	8,0	9,83	19,16	23,25	79	45	12,0	2
4138570	GTM315024	3/8-24	8,2	8,5	9,83	19,16	22,54	79	45	12,0	2
4138564	GTM315018	7/16-14	9,0	9,4	11,43	21,89	26,58	79	45	12,0	2
4138571	GTM315025	7/16-20	9,6	9,9	11,43	21,72	25,69	79	45	12,0	2
4138565	GTM315019	1/2-13	10,4	10,8	13,00	25,52	30,71	89	45	14,0	2
4138572	GTM315026	1/2-20	11,1	11,5	13,00	25,55	29,82	89	45	14,0	2
4138566	GTM315020	9/16-12	11,8	12,3	14,61	27,66	33,37	102	48	16,0	2
4138573	GTM315027	9/16-18	12,5	12,9	14,61	28,37	33,15	102	48	16,0	2
4138567	GTM315022	5/8-11	13,1	13,5	16,18	30,14	36,40	102	48	18,0	2
4138574	GTM315029	5/8-18	14,1	14,5	16,18	31,21	36,25	102	48	18,0	2

HM 2x M MF



Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

GTM31 • Through Coolant • Metric and Metric Fine

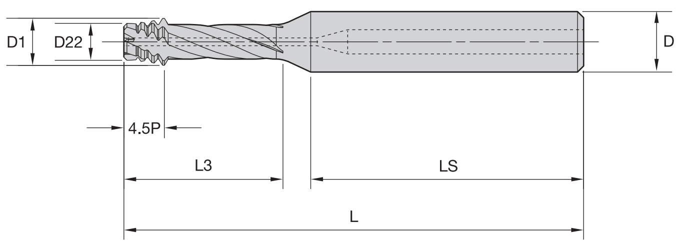
P	
M	
K	●
N	●
S	
H	

● first choice
○ alternate choice

grade WU12PV TiCN		metric dimensions									
order #	catalogue #	D1 size	D1	D22	DCH	LTHD	LDCH	L	LS	D	cutting edges
4138545	**GTM315001**	M4X0.7	3,2	3,3	4,30	7,74	9,59	49	36	6,0	2
4138546	**GTM315002**	M5X0.8	4,0	4,2	5,30	9,65	11,82	55	36	6,0	2
4138553	**GTM315009**	M6X0.75	5,1	5,3	6,30	12,07	14,37	62	36	8,0	2
4138547	**GTM315003**	M6X1	4,8	5,0	6,30	12,06	14,69	62	36	8,0	2
4138554	**GTM315010**	M8X1	6,8	7,0	8,30	16,09	19,10	74	40	10,0	2
4138548	**GTM315004**	M8X1.25	6,5	6,8	8,30	15,08	18,42	74	40	10,0	2
4138555	**GTM315011**	M10X1	8,7	9,0	10,30	20,11	23,52	79	45	12,0	2
4138556	**GTM315012**	M10X1.25	8,4	8,8	10,30	20,11	23,87	79	45	12,0	2
4138549	**GTM315005**	M10X1.5	8,2	8,5	10,30	19,59	23,65	79	45	12,0	2
4138557	**GTM315013**	M12X1.25	10,4	10,8	12,30	23,88	28,00	89	45	14,0	2
4138558	**GTM315014**	M12X1.5	10,2	10,5	12,30	24,12	28,57	89	45	14,0	2
4138550	**GTM315006**	M12X1.75	9,9	10,3	12,30	22,86	27,63	89	45	14,0	2
4138559	**GTM315015**	M14X1.5	12,1	12,5	14,30	27,14	31,98	102	48	16,0	2
4138551	**GTM315007**	M14X2	11,6	12,0	14,30	28,12	33,62	102	48	16,0	2
4138560	**GTM315016**	M16X1.5	14,1	14,5	16,30	31,65	36,87	102	48	18,0	2
4138552	**GTM315008**	M16X2	13,6	14,0	16,30	32,13	38,00	102	48	18,0	2

WIDIA GTD

HM 2x UNF UNC



Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

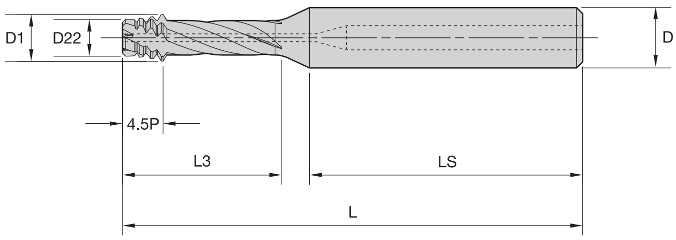
WIDIA VICTORY

GTM41 • Through Coolant • Right Hand • Inch UNC and UNF

P	M	K	N	S	H
●	●	●	●		●

● first choice
○ alternate choice

grade WU16PV TiAlN+MoS$_2$		metric dimensions							
order #	catalogue #	D1 TPI	D1	D22	L3	L	LS	D	cutting edges
4138610	GTM415025	1/4-20	4,64	3,34	17,00	60	36	8,0	3
4138617	GTM415033	1/4-28	4,66	3,62	17,00	60	36	8,0	3
4138611	GTM415026	5/16-18	5,64	4,12	21,90	76	40	10,0	4
4138618	GTM415034	5/16-24	5,64	4,48	21,90	76	40	10,0	4
4138612	GTM415027	3/8-16	7,16	5,42	26,30	76	40	10,0	4
4138619	GTM415035	3/8-24	7,14	6,00	26,30	76	40	10,0	4
4138613	GTM415028	7/16/14	8,47	6,49	31,00	86	45	12,0	4
4138620	GTM415036	7/16-20	8,45	7,06	33,00	86	45	12,0	4
4138606	GTM415029	1/2-13	10,08	7,95	33,40	86	45	12,0	4
4138615	GTM415037	1/2-20	8,45	7,06	33,00	86	45	12,0	4
4138614	GTM415030	9/16-12	11,28	8,98	41,00	98	48	16,0	4
4138621	GTM415038	9/16-18	11,27	9,72	41,00	98	48	16,0	4
4138607	GTM415031	5/8-11	12,89	10,40	42,00	98	48	16,0	4
4138616	GTM415039	5/8-18	12,38	10,83	42,00	98	48	16,0	4
4138608	GTM415032	3/4-10	15,50	12,77	51,30	111	50	20,0	5
4138609	GTM415040	3/4-16	15,38	13,65	51,30	111	50	20,0	5



Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

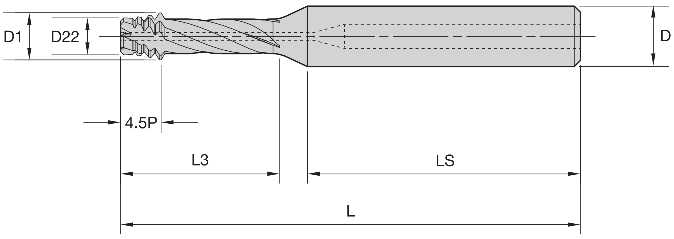
WIDIA VICTORY

■ GTM41 • Through Coolant • Right Hand • Metric and Metric Fine

P	●
M	●
K	●
N	●
S	
H	●

● first choice
○ alternate choice

grade WU16PV TiAlN+MoS$_2$		metric dimensions							
order #	catalogue #	D1 size	D1	D22	L3	L	LS	D	cutting edges
4138576	GTM415001	M6X1	4,51	3,41	16,5	60	36	8,0	3
4138578	GTM415002	M7X1	4,51	3,41	16,5	60	36	8,0	3
4138592	GTM415014	M8X1	6,23	5,13	21,9	71	40	10,0	4
4138580	GTM415003	M8X1.25	6,23	4,91	21,9	71	40	10,0	4
4138593	GTM415015	M9X1	6,23	5,13	21,9	71	40	10,0	4
4138582	GTM415004	M9X1.25	6,23	4,91	21,9	71	40	10,0	4
4138594	GTM415016	M10X1	6,23	5,13	21,9	71	40	10,0	4
4138595	GTM415013	M10X1.25	6,23	4,91	21,9	71	40	10,0	4
4138584	GTM415005	M10X1.5	7,75	6,11	26,3	76	40	10,0	4
4138586	GTM415006	M11X1.5	7,75	6,11	26,3	76	40	10,0	4
4138596	GTM415017	M12X1	9,15	8,06	30,0	86	45	12,0	4
4138598	GTM415007	M12X1.5	7,75	6,11	26,3	76	40	10,0	4
4138587	GTM415008	M12X1.75	9,16	7,21	32,4	86	45	12,0	4
4138599	GTM415018	M14X1	9,15	8,06	30,0	86	45	12,0	4
4138600	GTM415019	M14X1.5	10,83	9,15	37,4	98	48	16,0	4
4138588	GTM415009	M14X2	11,08	8,91	41,0	98	48	16,0	4
4138601	GTM415020	M16X1.5	10,83	9,15	37,4	98	48	16,0	4
4138589	GTM415010	M16X2	11,08	8,91	41,0	98	48	16,0	4
4138602	GTM415021	M18X1.5	14,83	13,15	47,0	98	48	16,0	4
4138590	GTM415011	M18X2.5	14,38	11,71	51,3	111	50	20,0	5
4138603	GTM415022	M20X1.5	14,83	13,15	47,0	98	48	16,0	4
4138591	GTM415012	M20X2.5	14,38	11,71	51,3	111	50	20,0	5
4138604	GTM415023	M22X1.5	18,23	16,55	56,0	111	50	20,0	5
4138605	GTM415024	M24X1.5	18,23	16,55	56,0	111	50	20,0	5

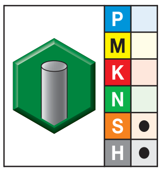


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

■ GTM41 • Through Coolant • Left Hand • Metric and Metric Fine



● first choice
○ alternate choice

grade WU16PV TiAlN+MoS$_2$ order #	catalogue #	D1 size	D1	D22	L3	L	LS	D	cutting edges
		metric dimensions							
4138575	**GTM415041**	M6X1	4,51	3,41	16,5	60	36	8,0	3
4138577	**GTM415042**	M7X1	4,51	3,41	16,5	60	36	8,0	3
4138579	**GTM415043**	M8X1.25	6,23	4,91	21,9	71	40	10,0	4
4138581	**GTM415044**	M9X1.25	6,23	4,91	21,9	71	40	10,0	4
4138583	**GTM415045**	M10X1.5	7,75	6,11	26,3	76	40	10,0	4
4138585	**GTM415046**	M11X1.5	7,75	6,11	26,3	76	40	10,0	4
4138597	**GTM415047**	M12X1.5	9,17	7,21	32,4	86	45	12,0	4

GTM11 and GTM21 • Metric

Thread Mill GTM11

Thread Mill • Chamfer GTM21

Material Group		GTM11 Cutting Speed — vc Range — m/min min	GTM11 Starting Value	GTM11 max	GTM11 Feed/Tooth by Diameter	<10mm	>10mm	GTM21 Cutting Speed — vc Range — m/min min	GTM21 Starting Value	GTM21 max	GTM21 Feed/Tooth by Diameter	<10mm	>10mm
P	1	90	**115**	150	mm	**0,05**	0,08	140	**185**	240	mm	**0,06**	0,10
	2	90	**115**	150	mm	**0,05**	0,08	140	**185**	240	mm	**0,06**	0,10
	3	40	**50**	70	mm	**0,02**	0,03	70	**90**	120	mm	**0,03**	0,04
	4	–	–	–	–	–	–	70	**90**	120	mm	**0,03**	0,04
	5	60	**80**	100	mm	**0,04**	0,06	70	**90**	120	mm	**0,05**	0,08
	6	–	–	–	–	–	–	–	–	–	–	–	–
M	1	60	**80**	100	mm	**0,04**	0,06	70	**90**	120	mm	**0,05**	0,08
	2	60	**80**	100	mm	**0,04**	0,06	70	**90**	120	mm	**0,05**	0,08
	3	–	–	–	–	–	–	–	–	–	–	–	–
K	1	120	**150**	200	mm	**0,06**	0,10	130	**170**	220	mm	**0,06**	0,11
	2	120	**150**	200	mm	**0,06**	0,10	130	**170**	220	mm	**0,06**	0,11
	3	90	**115**	150	mm	**0,05**	0,07	110	**140**	180	mm	**0,05**	0,07
N	1	200	**225**	250	mm	**0,05**	0,06	270	**300**	330	mm	**0,08**	0,16
	2	170	**190**	210	mm	**0,04**	0,05	160	**175**	190	mm	**0,08**	0,16
	3	250	**275**	300	mm	**0,07**	0,09	270	**300**	330	mm	**0,08**	0,16
	4	250	**275**	300	mm	**0,07**	0,09	270	**300**	330	mm	**0,08**	0,16
	5	270	**300**	330	mm	**0,12**	0,13	250	**275**	300	mm	**0,11**	0,20
	6	170	**190**	210	mm	**0,05**	0,06	90	**100**	110	mm	**0,11**	0,20
S	1	60	**80**	100	mm	**0,04**	0,06	70	**90**	120	mm	**0,05**	0,08
	2	50	**65**	80	mm	**0,03**	0,04	50	**60**	80	mm	**0,03**	0,05
	3	50	**65**	80	mm	**0,03**	0,04	50	**60**	80	mm	**0,03**	0,05
	4	50	**65**	80	mm	**0,03**	0,04	50	**60**	80	mm	**0,03**	0,05

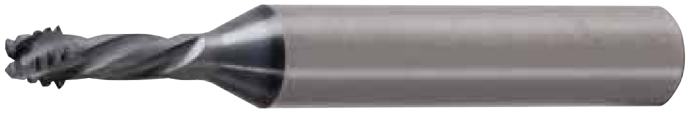
GTM31 • Metric

Drill • Chamfer • Thread Mill GTM31

Material Group		Cutting Speed — vc Range — m/min min	Starting Value	max	Drilling: Recommended Feed by Diameter	<6mm	6–10mm	10–16mm	Milling: Feed/Tooth by Diameter	<6mm	6–10mm	10–16mm
K	1	130	**175**	230	mm/r	**0,10**	**0,16**	0,30	mm	**0,05**	**0,07**	0,10
N	1	270	**300**	330	mm/r	**0,15**	**0,25**	0,34	mm	**0,06**	**0,08**	0,12
	2	140	**150**	170	mm/r	**0,15**	**0,25**	0,34	mm	**0,06**	**0,08**	0,12
	4	270	**300**	330	mm/r	**0,15**	**0,25**	0,34	mm	**0,06**	**0,08**	0,12
	5	110	**120**	130	mm/r	**0,12**	**0,20**	0,32	mm	**0,06**	**0,08**	0,12

NOTE: For thread depths over 2 x D up to 3 x D, reduce speed and feed by 25%.

Universal Thread Mills • GTM41 • Metric



Mill • Chamfer • Thread Mill GTM41

Material Group		TM Style	Grade	Cutting Speed — vc Range — m/min			Feed/Tooth by Diameter		
				min	Starting Value	max		< 10mm	>10mm
P	1	GTM41 R	WU16PV	170	**225**	290	mm	**0,05**	0,08
	2	GTM41 R	WU16PV	170	**225**	290	mm	**0,05**	0,08
	3	GTM41 R	WU16PV	120	**150**	200	mm	**0,03**	0,05
	4	GTM41 R	WU16PV	100	**125**	160	mm	**0,03**	0,05
	5	GTM41 R	WU16PV	120	**150**	200	mm	**0,03**	0,04
	6	GTM41 R	WU16PV	60	**80**	100	mm	**0,03**	0,04
M	1	GTM41 R	WU16PV	120	**150**	200	mm	**0,03**	0,04
	2	GTM41 R	WU16PV	120	**150**	200	mm	**0,03**	0,04
	3	GTM41 R	WU16PV	120	**150**	200	mm	**0,03**	0,04
K	1	GTM41 R	WU16PV	190	**250**	330	mm	**0,06**	0,10
	2	GTM41 R	WU16PV	190	**250**	330	mm	**0,06**	0,10
	3	GTM41 R	WU16PV	140	**185**	240	mm	**0,04**	0,07
N	1	–	–	–	**–**	–	–	**–**	–
	2	GTM41 R	WU16PV	180	**230**	300	mm	**0,06**	0,07
	3	–	–	–	**–**	–	–	**–**	–
	4	GTM41 R	WU16PV	210	**275**	360	mm	**0,06**	0,07
	5	–	–	–	**–**	–	–	**–**	–
	6	GTM41 R	WU16PV	210	**275**	360	mm	**0,06**	0,07
S	1	GTM41 L	WU16PV	120	**150**	200	mm	**0,025**	0,045
	2	GTM41 L	WU16PV	50	**60**	80	mm	**0,015**	0,025
	3	GTM41 L	WU16PV	50	**60**	80	mm	**0,015**	0,025
	4	GTM41 L	WU16PV	70	**90**	120	mm	**0,025**	0,035
H	1	GTM41	WU16PV	80	**100**	130	mm	**0,030**	0,050
	2	GTM41	WU16PV	80	**100**	130	mm	**0,030**	0,050
	3	GTM41	WU16PV	50	**65**	80	mm	**0,020**	0,030
	4	GTM41	WU16PV	50	**65**	80	mm	**0,020**	0,030

NOTE: For thread depths over 2 x D up to 3 x D, reduce speed and feed by 25%.

Thread Milling Methods

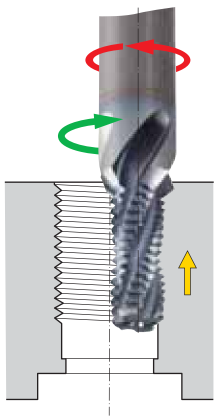
Climb Milling

Properties:

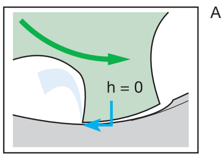
- Tool rotation direction clockwise
- Tool moves anti-clockwise
- Pitch upwards

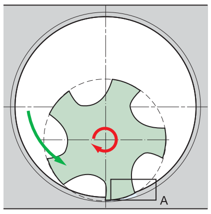
↓

- Right-hand thread



Climb milling is always when the cutting edge goes out of the material with a chip thickness h = 0





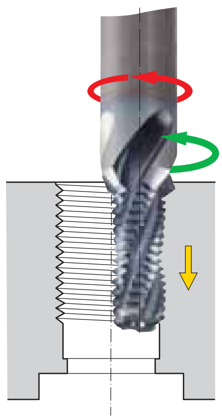
Conventional Milling

Properties:

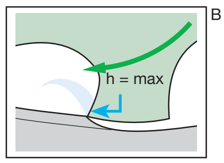
- Tool rotation direction clockwise
- Tool moves clockwise
- Pitch downwards

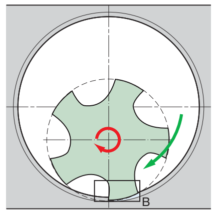
↓

- Right-hand thread



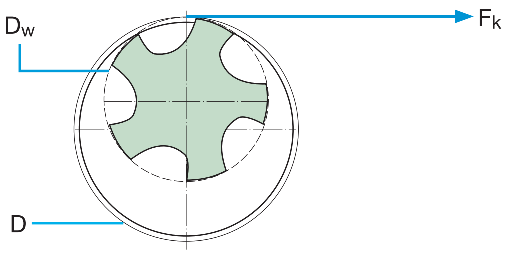
Conventional milling is always when the cutting edge goes out of the material with a chip thickness h = max





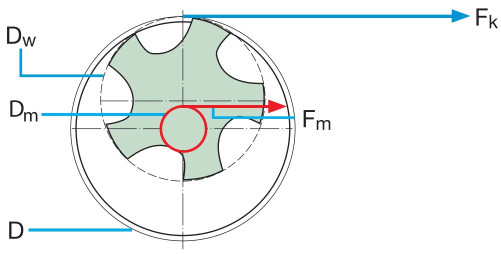
Counter Feed F_k

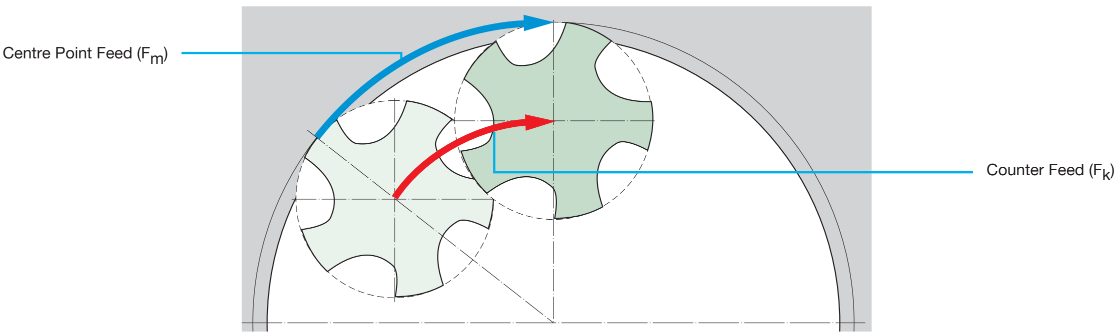
$$F_k = n \cdot f_z \cdot Z \text{ [mm/min]}$$



Centre Point Feed F_m

$$F_m = \frac{F_k \cdot (D - Dw)}{D} \text{ [mm/min]}$$



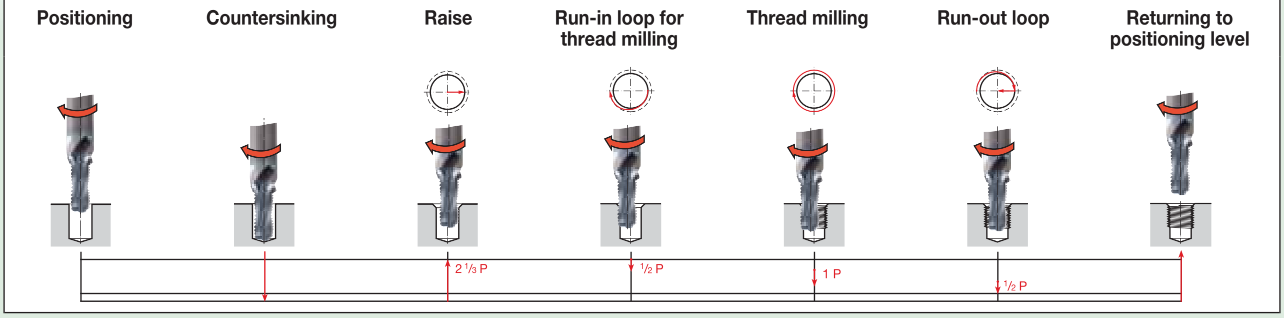


D_W = Tool diameter [mm]
n = RPM [min-^{1}]
f_z = Feed per tooth [mm]
Z = Number of teeth on tool (radial)
D = Nominal diameter of thread = Diameter of external contour [mm]
D_m = Diameter of the centre point (D-D_W) [mm]

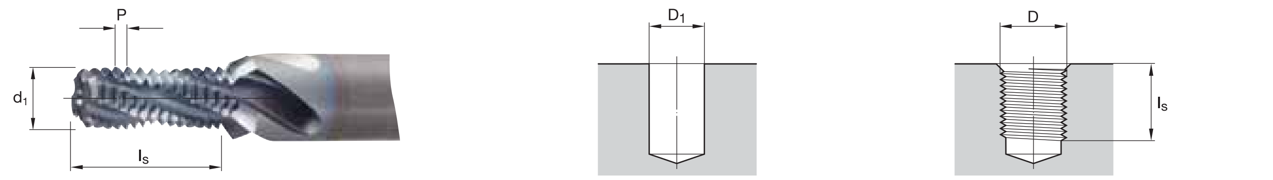
Thread Mill GTM21

Preparation	Drilling of thread hole
Process Principle	Countersinking, thread milling (conventional milling)

Cycle



Required Specification Values



Example

Size — M10-6H
Thread diameter D 10mm
Pitch 1,5mm
Core hole diameter D_1 .... 8,5mm
Material — Cast aluminium
Grade — WU12PV

Tool — GTM21
Catalogue number GTM215004
Number of teeth Z 3
Tool diameter d_1 .... 8,2mm*
Tool radius compensation k[1] 0,1mm**
Tool radius to be programmed[2] 4mm***
Countersink depth l_s 21,2mm
Cutting speed v_c .... 250 m/min
Feed (countersinking) f_s .... 0,3 mm/U
Feed (milling) f_z .... 0,09 mm/tooth

$N = \frac{V_c \bullet 1000}{d_1 \bullet \pi}$ S = 9709

$v_s = f_s \bullet n$ F = 2913 (countersinking)

$v_f = f_z \bullet Z \bullet n$ F = 2622 (contour)

$v_f = \frac{v_f \text{ contour} \bullet (D-d_1)}{D}$ F = 472 (centre point)

*(measured on the cutting part) **(0.01 x D) ***(1/2 d_1 - k)

Program to DIN 66025 (conventional milling, on the contour, incremental)

Positioning the tool	N 10	G 54	G 90	G 00	X...	Y...	Z 2	S 9709	T01 [2]	M03
Advancing tool to full thread depth	N 20	G 91	Z-21.200							
Countersinking	N 30	G 01	Z-2	F 2913	(countersink)					
Raise	N 40	G 00	Z 3.450							
Moving sideways to the starting point	N 50	G 42	G01	X 4.250	F 1311	(milling, 1/2 contour)		[F 236] [3]	(milling,1/2 centre point)	
Run-in loop in arc	N 60	G 02	X-9.25	Y 0.000	Z-0.750	I-4.625	J 0			
Thread milling	N 70	G 02	X 0	Y 0	Z-1.500	I 5	J 0.000	F2622	[F 472] [3]	(centre point)
Run-out loop in arc	N 80	G 02	X 9.25	Y 0.000	Z-0.750	I 4.625	J 0			
Exit	N 90	G 40	G 01	X-4.25						
Retracting tool to positioning level	N 100	G 90	G 00	Z 2						

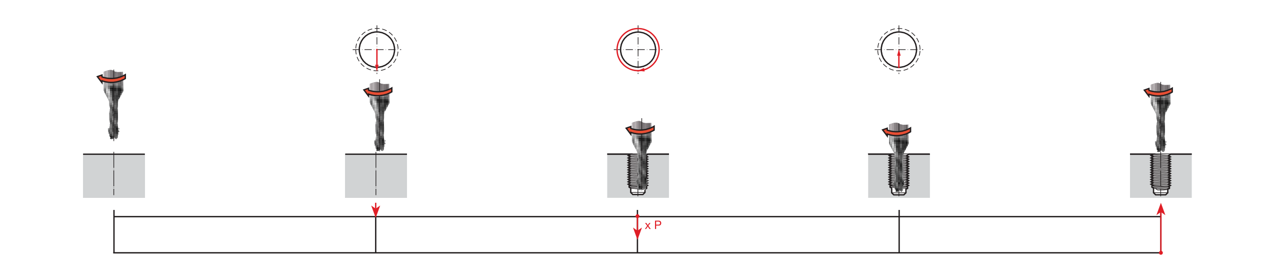
Cutting time t_h	1.4 seconds

NOTES:
[1] The cutter radius measured over the tooth crests of the threaded part must be reduced by the amount of the cutter radius compensation. This is necessary to achieve a depth of cut to the middle of the 6H/ISO2 nut tolerance. Please note, however, that this also depends on the radial deflection of the tool (tensile strength of the material, projecting length of the tool).
[2] The cutter radius to be programmed is normally included in the tool memory.
[3] The feed values in brackets must be used for controllers, which do not calculate the centre point feed themselves.

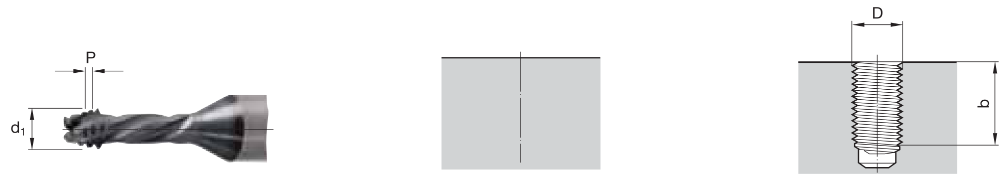
Drill Thread Mill GTM41 • Right Hand

Preparation	None
Process Principle	Milling thread and core hole, countersinking (conventional milling)

Cycle



Required Specification Values



Example

Size — M10-6H
Thread diameter D..10mm
Pitch..1,5mm
Core hole diameter D_1.................................8,5mm
Material — Hard steel, 50 HRC
Grade — WU16PV

Tool — GTM41 Right Hand
Catalogue number GTM415005
Number of teeth Z...4
Tool diameter d_1...7,75mm*
Tool radius compensation k[1] 0,08mm**
Tool radius to be programmed[2] 3,795mm***
Thread depth b 20mm
Cutting speed v_c..100 m/min
Feed (milling) f_z...0,04 mm/tooth
Number of turns[5] 17

$N = \dfrac{V_c \bullet 1000}{d_1 \bullet \pi}$ S = 4109

$v_f = f_z \bullet Z \bullet n$ F = 657 (contour)

$N = \dfrac{v_f \text{ contour} \bullet (D-d_1)}{D}$ F = 148 (centre point)

*(measured on the cutting part) **(0.01 x D; adjust to application) ***(1/2 d_1 - k)

Program to DIN 66025 (conventional milling, on the contour, incremental)

Positioning the tool	N 10	G 54	G 90	G 00	X…	Y…	Z 1.500	S 4109	T01 [2]	M03 [6]	
Incremental programming	N 20	G 91									
Moving sideways to the starting point	N 30	G 42	G 01	X 0	Y-5	F 657	(contour)	[F 148] [4]	(centre point)		
Thread milling	N 40	G 02		X 0	Y 0	Z-1.500	I 0	J 5.000			
Repeat thread milling	… [5]										
Exit	N 50	G 40	G 01	X 0	Y 5						
Retracting tool to positioning level	N 70	G 90	G 00	Z 2							

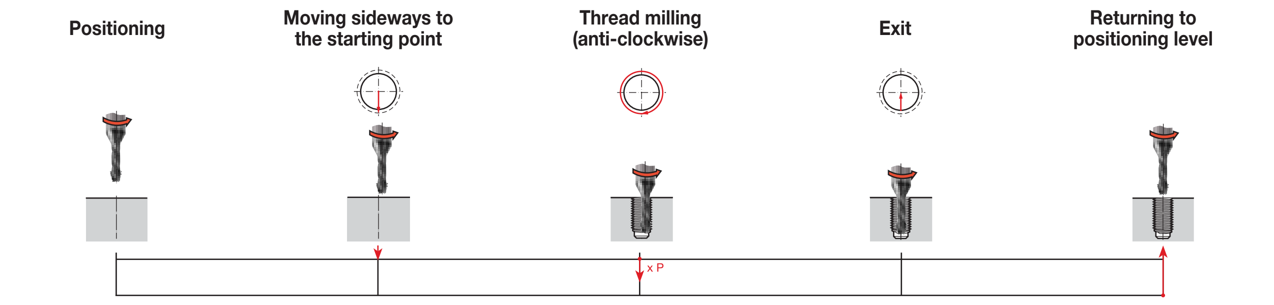
Cutting time t_h	51.6 seconds

NOTES:
[1] The cutter radius measured over the tooth crests of the threaded part must be reduced by the amount of the cutter radius compensation. This is necessary to achieve a depth of cut to the middle of the 6H/ISO2 nut tolerance. Please note, however, that this also depends on the radial deflection of the tool (tensile strength of the material, projecting length of the tool).
[2] The cutter radius to be programmed is normally included in the tool memory.
[3] The thread depth b must be divisible by the thread pitch P.
[4] The feed values in brackets must be used for controllers, which do not calculate the centre point feed themselves.
[5] Set N40 must be repeated with the number of threads. Repetitions N = thread depth b/pitch P (rounded up to the nearest integer).

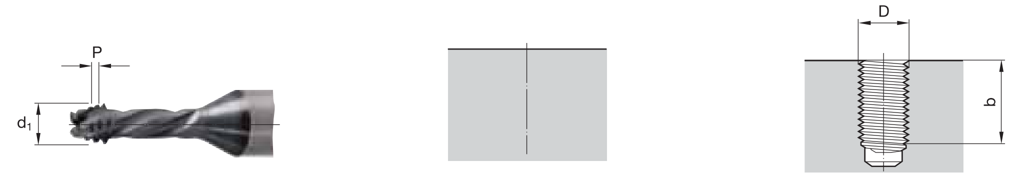
Drill Thread Mill GTM41 • Left Hand

Preparation	None
Process Principle	Milling thread and core hole, countersinking (climb milling)

Cycle



Required Specification Values



Example

Size — M10-6H
Thread diameter D 10mm
Pitch 1,5mm
Core hole diameter D_1 .... 8,5mm
Material — TiAl6V4 titanium
Grade — WU16PV

Tool — GTM41 Left Hand
Catalogue number GTM415005
Number of teeth Z 4
Tool diameter d_1 .... 7,75mm*
Tool radius compensation k[1] 0,08mm**
Tool radius to be programmed[2] 3,795mm***
Thread depth b 20mm
Cutting speed v_c .... 100 m/min
Feed (milling) f_z .... 0,03 mm/tooth
Number of turns[5] 17

$N = \frac{V_c \bullet 1000}{d_1 \bullet \pi}$ S = 4109

$v_f = f_z \bullet Z \bullet n$ F = 493 (contour)

$N = \frac{v_{f\,contour} \bullet (D-d_1)}{D}$ F = 111 (centre point)

*(measured on the cutting part) **(0.01 x D) ***(1/2 d_1 - k)

Program to DIN 66025 (climb milling, on the contour, incremental)

Positioning the tool	N 10	G 54	G 90	G 00	X…	Y…	Z 1.500	S 4109	T01 [2]	M04
Incremental programming	N 20	G 91								
Moving sideways to the starting point	N 30	G 42	G 01	X 0	Y-5	F 493	(contour)	[F 111] [4]	(centre point)	
Thread milling	N 40	G 02		X 0	Y 0	Z-1.500	I 0	J 5.000		
Repeat thread milling	… [5]									
Exit	N 50	G 40	G 01	X 0	Y 5					
Retracting tool to positioning level	N 70	G 90	G 00	Z 2						

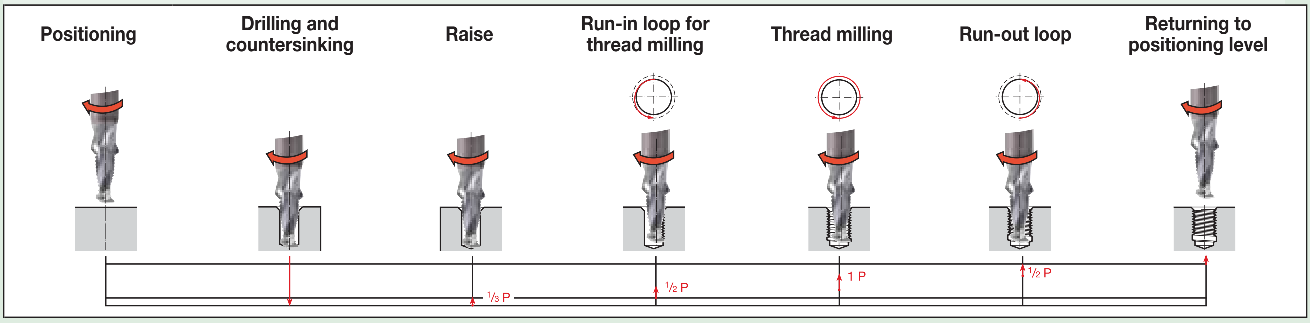
Cutting time t_h	68.8 seconds

NOTES:
[1] The cutter radius measured over the tooth crests of the threaded part must be reduced by the amount of the cutter radius compensation. This is necessary to achieve a depth of cut to the middle of the 6H/ISO2 nut tolerance. Please note, however, that this also depends on the radial deflection of the tool (tensile strength of the material, projecting length of the tool).
[2] The cutter radius to be programmed is normally included in the tool memory.
[3] The thread depth b must be divisible by the thread pitch P.
[4] The feed values in brackets must be used for controllers, which do not calculate the centre point feed themselves.
[5] Set N40 must be repeated with the number of threads. Repetitions N = thread depth b/pitch P (rounded up to the nearest integer).

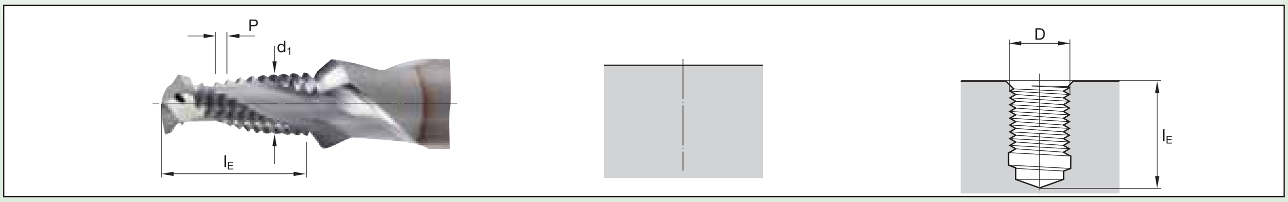
Drill Thread Mill GTM31

Preparation	Drilling of thread hole
Process Principle	Drilling, countersinking, thread milling (climb milling)

Cycle



Required Specification Values



Example

Size — M10-6H
Thread diameter D 10mm
Pitch 1,5mm
Core hole diameter D_1 .... 8,5mm

Material — Grey cast iron
Grade — WU12PV

Tool — GTM31
Catalogue number GTM315005
Number of teeth Z 2
Tool diameter d_1 .... 8,2mm*
Tool radius compensation k[1] 0,1mm**
Tool radius to be programmed[2] 4mm***
Countersink depth l_s 19,11mm
Cutting speed v_c .... 250 m/min
Feed (countersinking) f_s .... 0,25 mm/U
Feed (milling) f_z .... 0,1 mm/tooth

$N = \dfrac{V_c \bullet 1000}{d_1 \bullet \pi}$ — S = 9709

$v_s = f_b \bullet n$ — F = 2427 (drilling, countersinking)

$v_f = f_z \bullet Z \bullet n$ — F = 1942 (contour)

$v_f = \dfrac{v_f \text{ contour} \bullet (D-d_1)}{D}$ — F = 350 (centre point)

*(measured on the cutting part) **(0.01 x D) ***(1/2 d_1 - k)

Program to DIN 66025 (climb milling, on the contour, incremental)

Positioning the tool	N 10	G 54	G 90	G 00	X...	Y...	Z 2	S 9709	T01[2]	M03
Drilling and countersinking	N 20	G 91	G 01	Z-21.110	F 2427	(drill, countersink)				
Raise	N 30	G 01	Z 0.500							
Moving sideways to the starting point	N 40	G 41	Y-4.250	F 971	(milling, 1/2 contour)			[F 175][3] (1/2 centre point)		
Run-in loop in arc	N 50	G 03	X 0	Y 9.250	Z 0.750	I 0	J 4.625			
Thread milling	N 60	G 03	X 0	Y 0	Z 1.500	I 0	J -5.000			
Run-out loop in arc	N 70	G 03	X 0	Y-9.250	Z 0.750	I 0	J- 4.625	F1942	[F 350][3]	(centre point)
Exit	N 80	G 00	G 40	X 0	Y 4.250					
Retracting tool to positioning level	N 90	G 90	Z 2							

Cutting time t_h	2.3 seconds

NOTES:
[1] The cutter radius measured over the tooth crests of the threaded part must be reduced by the amount of the cutter radius compensation. This is necessary to achieve a depth of cut to the middle of the 6H/ISO2 nut tolerance. Please note, however, that this also depends on the radial deflection of the tool (tensile strength of the material, projecting length of the tool).
[2] The cutter radius to be programmed is normally included in the tool memory.
[3] The feed values in brackets must be used for controllers, which do not calculate the centre point feed themselves.

Carbide Taps • Metric

Material Group		Through Holes					Blind Holes				
				Range — m/min					Range — m/min		
		Tap Style	Grade	min	Starting Value	max	Tap Style	Grade	min	Starting Value	max
P	P0	GX32, GX38	GP4535	60	**100**	130	GX33, GX39	GP4535	50	**70**	90
	P1	GX32, GX38	GP4535	60	**90**	120	GX33, GX39	GP4535	40	**60**	80
	P2	GX32, GX38	GP4535	50	**85**	110	GX33, GX39	GP4535	40	**60**	80
	P3	GX32, GX38	GP4535	50	**80**	100	GX33, GX39	GP4535	40	**60**	80
K	K1	GX34, GX50	WK12PG	70	**105**	140	GX35, GX50	WK12PG	50	**70**	90
	K2	GX34, GX50	WK12PG	60	**100**	130	GX35, GX50	WK12PG	50	**70**	90
	K3	GX34, GX50	WK12PG	60	**90**	120	GX35, GX50	WK12PG	40	**60**	80
N	N2	GX46, GX48	WN14PG	80	**120**	160	GX47, GX49	WN14PG	60	**80**	100
	N3	GX46, GX48	WN14PG	60	**100**	130	GX47, GX49	WN14PG	50	**70**	90
	N4	GX46, GX48	WN14PG	60	**90**	120	GX47, GX49	WN14PG	40	**60**	80
H	H3	GX10	WH16PG	1,2	**1,5**	2,0	GX10	WH16PG	0,8	**1,1**	1,4
	H4	GX10	WH16PG	0,6	**0,8**	1,0	GX10	WH16PG	0,4	**0,5**	0,7

HSS-E-PM Taps • Metric

Material Group		Through Holes					Blind Holes				
				Range — m/min					Range — m/min		
		Tap Style	Grade	min	Starting Value	max	Tap Style	Grade	min	Starting Value	max
P	P1	GT20	GP6520	20	**30**	45	GT30, GT32, GT50	GP6520	14	**21**	32
		GT24	WU32MG	20	**30**	45	GT24, GT26	WU32MG	14	**21**	32
	P2	GT20	GP6520	17	**25**	38	GT30, GT32, GT50	GP6520	12	**18**	26
		GT24	WU32MG	17	**25**	38	GT24, GT26	WU32MG	12	**18**	26
	P3	GT20	GP6520	12	**15**	20	GT30, GT32, GT50	GP6520	8	**11**	14
	P4	GT00	WP31MG	5	**6**	8	GT02, GT04	WP31MG	3	**4**	5
	P5	GT20	GP6520	12	**15**	20	GT30, GT32, GT50	GP6520	8	**11**	14
	P6	GT00	WP31MG	6	**8**	10	GT02, GT04	WP31MG	4	**6**	7
M	M1	GT20	GM6515	12	**15**	20	GT30, GT32, GT50	GM6515	8	**11**	14
		GT24	WU32MG	5	**8**	12	GT24, GT26	WU32MG	4	**6**	8
	M2	GT20	GM6515	9	**12**	16	GT30, GT32, GT50	GM6515	6	**8**	11
	M3	GT00	WP31MG	4	**5**	7	GT02, GT04	WP31MG	3	**4**	5
K	K1	GT40	GP6520	27	**35**	46	GT40, GT42	GP6520	19	**25**	32
	K2	GT40	GP6520	23	**30**	39	GT40, GT42	GP6520	16	**21**	27
N	N1	GT72	WN44EG	33	**50**	65	GT82, GT86	WN44EG	23	**35**	46
		GT22	WN48EG	37	**55**	72	GT22	WN48EG	26	**39**	50
	N2	GT40	GP6520	30	**45**	59	GT40, GT42	GP6520	21	**32**	41
		GT72	WN44EG	30	**45**	59	GT82, GT86	WN44EG	21	**32**	41
		GT22	WN38MG	33	**50**	65	GT22	WN38MG	23	**35**	46
	N4	GT40	GP6520	7	**10**	15	GT40, GT42	GP6520	5	**7**	11
S	S1	GT20	GP6520	8	**12**	18	GT30, GT32	GP6520	6	**8**	13
	S2, S3	GT90	WU32MG	3,3	**5,0**	7,5	GT92, GT94	WU32MG	2,3	**3,5**	5,3
		GT90	WS39MG	1,7	**2,5**	3,8	GT92, GT94	WS39MG	1,2	**1,8**	2,6
	S4	GT60	WS34MG	2,7	**4,0**	6,0	GT62	WS34MG	1,9	**2,8**	4,2
		GT60	WS30MG	1,3	**2,0**	3,0	GT62	WS30MG	0,9	**1,4**	2,1
H	H1	GT06	WN35MG	1,3	**2,0**	3,0	GT06	WN35MG	0,9	**1,4**	2,1
	H2	GT06	WN35MG	1,0	**1,5**	2,3	GT06	WN35MG	0,7	**1,1**	1,6

NOTE: Increase speed by up to 25% when using coolant taps (GT21, GT23, GT31, GT33 GT41, GT43, and GT51). Use grade GP6505™ in steels. Use 50% of the recommended speed listed for grade GP6520™.

VariTap • HSS-E • Metric

Material Group		Through Holes					Blind Holes				
				Range – m/min					Range – m/min		
		Tap Style	Grade	min	Starting Value	max	Tap Style	Grade	min	Starting Value	max
P	P1	VT-SPO	WP42EG, WU41EG	21	**27**	34	VT-SFT	WP42EG, WU41EG	13	**18**	26
		VT-SPO	WP49EG, WU40EG	10	**14**	17	VT-SFT	WP49EG, WU40EG	6	**9**	13
	P2	VT-SPO	WP42EG, WU41EG	16	**21**	27	VT-SFT	WP42EG, WU41EG	11	**15**	22
		VT-SPO	WP49EG, WU40EG	8	**11**	13	VT-SFT	WP49EG, WU40EG	4	**6**	9
	P3	VT-SPO	WP42EG, WU41EG	9	**12**	15	VT-SFT	WP42EG, WU41EG	6	**9**	13
		VT-SPO	WP49EG, WU40EG	5	**6**	8	VT-SFT	WP49EG, WU40EG	2	**3**	4
		VT-STR NPT	WU41EG	5	**6**	8	VT-STR NPT	WU41EG	5	**6**	8
		VT-STR NPT	WU40EG	2	**3**	4	VT-STR NPT	WU40EG	2	**3**	4
M	M1	VT-SPO	WP42EG, WU41EG	9	**12**	15	VT-SFT	WP42EG, WU41EG	6	**9**	13
		VT-SPO	WP49EG, WU40EG	5	**6**	8	VT-SFT	WP49EG, WU40EG	2	**3**	4
		VT-SFT NPT	WU41EG	5	**6**	8	VT-SFT NPT	WU41EG	5	**6**	8
		VT-SFT NPT	WP49EG, WU40EG	2	**3**	4	VT-SFT NPT	WP49EG, WU40EG	2	**3**	4
	M3	VT-SPO	WP42EG, WU41EG	7	**9**	11	VT-SFT	WP42EG, WU41EG	4	**6**	9
		VT-SPO	WP49EG, WU40EG	3	**5**	6	VT-SFT	WP49EG, WU40EG	2	**3**	4
K	K1	VT-STR NPT	WU41EG	10	**14**	17	VT-STR NPT	WU41EG	10	**14**	17
		VT-STR NPT	WU40EG	6	**8**	10	VT-STR NPT	WU40EG	6	**8**	10
	K2	VT-SPO	WP42EG, WU41EG	21	**27**	34	VT-SFT	WP42EG, WU41EG	13	**18**	26
		VT-SPO	WP49EG, WU40EG	10	**14**	17	VT-SFT	WP49EG, WU40EG	6	**9**	13
N	N1	VT-SPO	WP42EG, WU41EG	34	**46**	57	VT-SFT	WP42EG, WU41EG	23	**34**	48
		VT-SPO	WU40EG	17	**23**	29	VT-SFT	WU40EG	11	**15**	22
	N2	VT-SPO	WP42EG, WU41EG	30	**40**	50	VT-SFT	WP42EG, WU41EG	19	**27**	39
		VT-SPO	WU40EG	15	**20**	25	VT-SFT	WU40EG	11	**15**	22
	N4	VT-SPO	WP42EG, WU41EG	7	**9**	11	VT-SFT	WP42EG, WU41EG	4	**6**	9
		VT-SPO	WU40EG	3	**5**	6	VT-SFT	WU40EG	2	**3**	4

** Grades: WP42EG = TiCN*
WU41EG = TiN
WP49EG = oxide
WU40EG = bright

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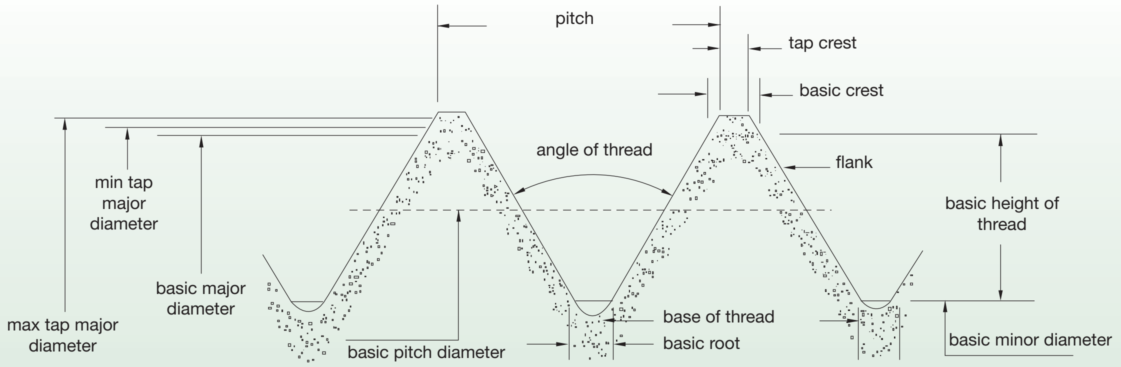
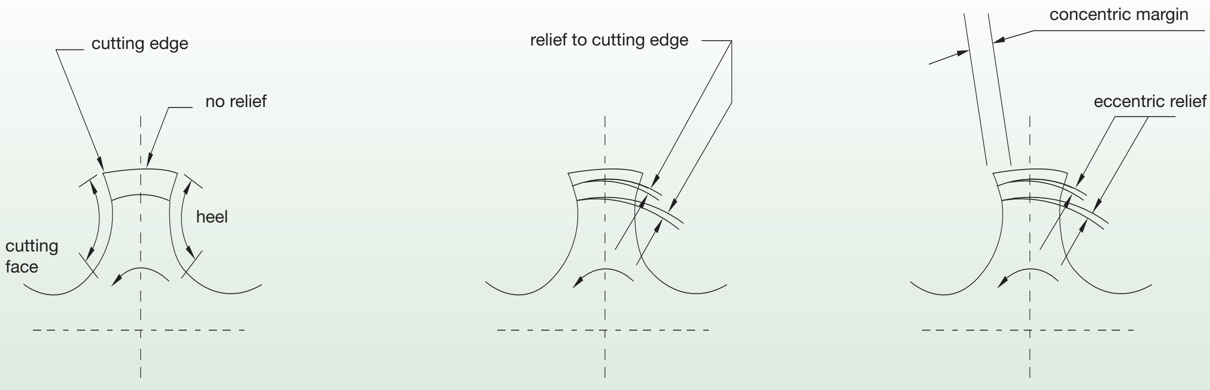
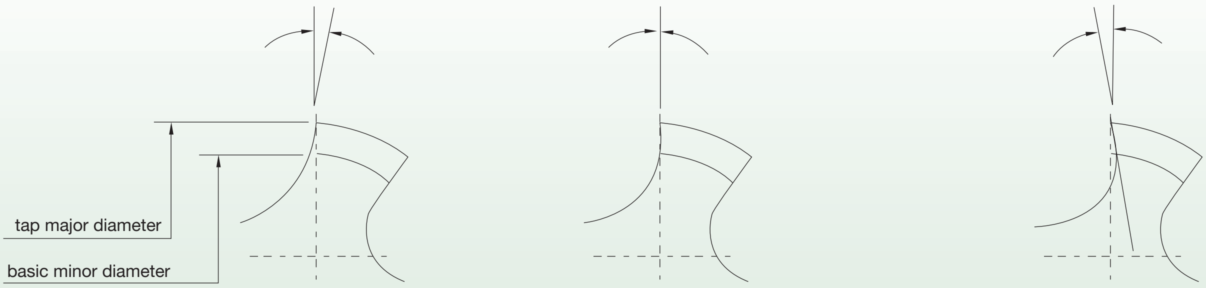
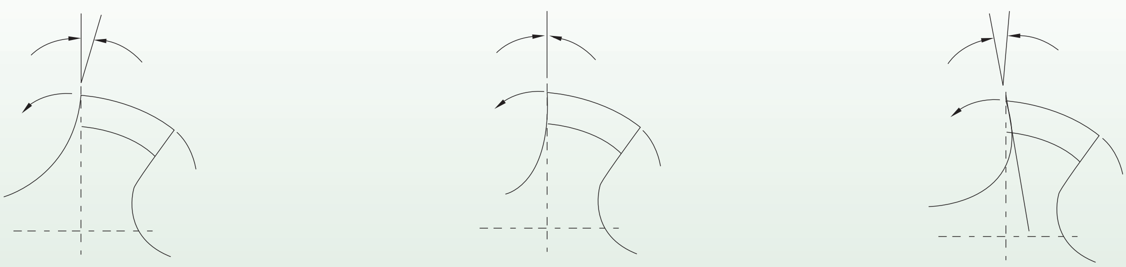




Concentric **Eccentric Relief** **Con-Eccentric Relief**



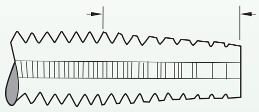
Negative Hook **0º Hook** **Positive Hook**



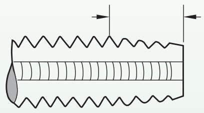
Negative Rake **Radial Rake** **Positive Rake**

Tap Chamfers • ANSI Taps

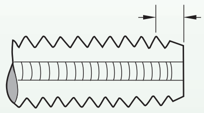
Taper Chamfer
7–10 Pitches



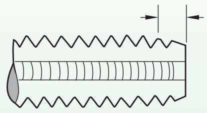
Plug Chamfer
3–5 Pitches



Modified Bottoming Chamfer
2–2.5 Pitches



Full Bottoming Chamfer
1–2 Pitches



Tap Chamfers

Taper (7–10 pitches)

The taper chamfer has the longest standard chamfer ensuring easier starting. It requires less tapping torque because of more working teeth.

Plug (3–5 pitches)

The most common chamfer for use by hand or machine in through or blind holes. This chamfer is more efficient than a bottoming or modified bottoming chamfer.

Semi-Bottom (2–2.5 pitches)

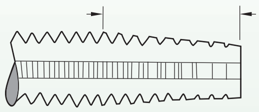
This short chamfer enables threading close to the bottom of blind holes. Due to the slightly longer chamfer and more working teeth, this chamfer is more efficient than a bottoming chamfer.

Bottoming (1–2 pitches)

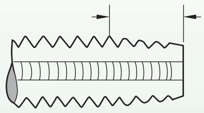
For threading close to the bottom of blind holes, the bottoming chamfer is the least efficient chamfer available.

Tap Chamfers • DIN Taps

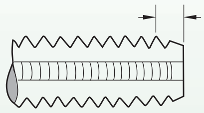
Taper Chamfer
7–10 Pitches



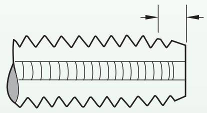
Plug Chamfer
3–5 Pitches



Modified Bottoming Chamfer
2–2.5 Pitches



Full Bottoming Chamfer
1–2 Pitches



Hand Tap Chamfers

Form A (6–8 pitches)

The Form A chamfer has the longest standard chamfer ensuring easier starting. It requires less tapping torque because of more working teeth.

Form B/D (3.5–5 pitches)

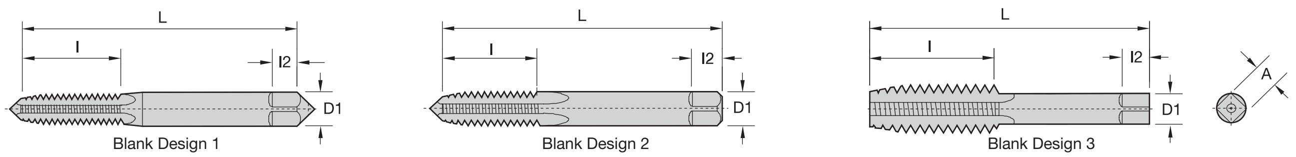
The most common chamfers for use by hand or machine in through or blind holes. Form B applies to spiral-point taps and Form D applies to straight-flute and spiral-flute taps. This chamfer is more efficient than Form E or Form C chamfer.

Form C (2–2.5 pitches)

This short chamfer enables threading close to the bottom of blind holes. Due to the slightly longer chamfer and more working teeth, this chamfer is more efficient than a Form E chamfer.

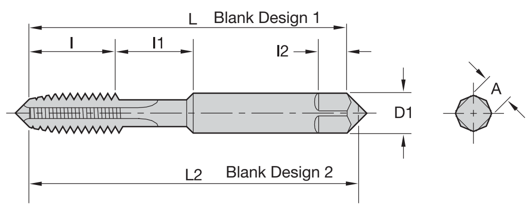
Form E (1.5–2 pitches)

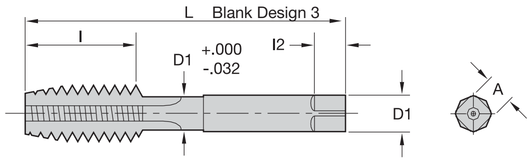
For threading close to the bottom of blind holes, the Form E chamfer is the least efficient chamfer available.



Blank Design 1 Blank Design 2 Blank Design 3

nominal diameter range (in)	machine screw size number (in)		nominal fractional diameter (in)		nominal metric diameter mm (in)		blank design number	overall length L	thread length l	square length l2	shank diameter D1	square size A
.052–.065	0	(.0600)	–		M1.6	(.0630)	1	1.63	.31	.19	.1410	.110
.065–.078	1	(.0730)	–		M1.8	(.0709)	1	1.69	.38	.19	.1410	.110
.078–.091	2	(.0860)	–		M2 (0787),	M2.2 (.0866)	1	1.75	.44	.19	.1410	.110
.091–.104	3	(.0990)	–		M2.5	(.0984)	1	1.81	.50	.19	.1410	.110
.104–.117	4	(.1120)	–		–	–	1	1.88	.56	.19	.1410	.110
.117–.130	5	(.1250)	–		M3	(.1181)	1	1.94	.63	.19	.1410	.110
.130–.145	6	(.1380)	–		M3.5	(.1378)	1	2.00	.69	.19	.1410	.110
.145–.171	8	(.1640)	–		M4	(.1575)	1	2.13	.75	.25	.1680	.131
.171–.197	10	(.1900)	–		M4.5 (.1772),	M5 (.1969)	1	2.38	.88	.25	.1940	.152
.197–.223	12	(.2160)	–		–	–	1	2.38	.94	.28	.2200	.165
.223–.260	–		1/4	(.2500)	M6	(.2362)	2	2.50	1.00	.31	.2550	.191
.260–.323	–		5/16	(.3125)	M7 (.2756),	M8 (.3150)	2	2.72	1.13	.38	.3180	.238
.323–.395	–		3/8	(.3750)	M10	(.3937)	2	2.94	1.25	.44	.3810	.286
.395–.448	–		7/16	(.4375)	–	–	3	3.16	1.44	.41	.3230	.242
.448–.510	–		1/2	(.5000)	M12	(.4724)	3	3.38	1.66	.44	.3670	.275
.510–.573	–		9/16	(.5625)	M14	(.5512)	3	3.59	1.66	.50	.4290	.322
.573–.635	–		5/8	(.6250)	M16	(.6299)	3	3.81	1.81	.56	.4800	.360
.635–.709	–		11/16	(.6875)	M18	(.7087)	3	4.03	1.81	.63	.5420	.406
.709–.760	–		3/4	(.7500)	–	–	3	4.25	2.00	.69	.5900	.442
.760–.823	–		13/16	(.8125)	M20	(.7874)	3	4.47	2.00	.69	.6520	.489
.823–.885	–		7/8	(.8750)	M22	(.8661)	3	4.69	2.22	.75	.6970	.523
.885–.948	–		15/16	(.9375)	M24	(.9449)	3	4.91	2.22	.75	.7600	.570
.948–1.010	–		1	(1.0000)	M25	(.9843)	3	5.13	2.50	.81	.8000	.600
1.010–1.073	–		1-1/16	(1.0625)	M27	(1.0630)	3	5.13	2.50	.88	.8960	.672
1.073–1.135	–		1-1/8	(1.1250)	–	–	3	5.44	2.56	.88	.8960	.672
1.135–1.198	–		1-3/16	(1.1875)	M30	(1.1811)	3	5.44	2.56	1.00	1.0210	.766
1.198–1.260	–		1-1/4	(1.2500)	–	–	3	5.75	2.56	1.00	1.0210	.766
1.260–1.323	–		1-5/16	(1.3125)	M33	(1.2992)	3	5.75	2.56	1.06	1.1080	.831
1.323–1.385	–		1-3/8	(1.3750)	–	–	3	6.06	3.00	1.06	1.1080	.831
1.358–1.448	–		1-7/16	(1.4375)	M36	(1.4173)	3	6.06	3.00	1.13	1.2330	.925
1.448–1.510	–		1-1/2	(1.5000)	–	–	3	6.38	3.00	1.13	1.2330	.925
1.510–1.635	–		1-5/8	(1.6250)	M39	(1.5354)	3	6.69	3.19	1.13	1.3050	.979
1.635–1.760	–		1-3/4	(1.7500)	M42	(1.6535)	3	7.00	3.19	1.25	1.4300	1.072
1.760–1.885	–		1-7/8	(1.8750)	–	–	3	7.31	3.56	1.25	1.5190	1.139
1.885–2.010	–		2	(2.0000)	M48	(1.8898)	3	7.63	3.56	1.38	1.6440	1.233
2.010–2.135	–		2-1/8	(2.1250)	–	–	3	8.00	3.56	1.38	1.7690	1.327
2.135–2.260	–		2-1/4	(2.2500)	M56	(2.2047)	3	8.25	3.56	1.44	1.8940	1.420
2.260–2.385	–		2-3/8	(2.3750)	–	–	3	8.50	4.00	1.44	2.0190	1.514
2.385–2.510	–		2-1/2	(2.5000)	–	–	3	8.75	4.00	1.50	2.1000	1.575
2.510–2.635	–		2-5/8	(2.6250)	M64	(2.5197)	3	8.75	4.00	1.50	2.2250	1.669
2.635–2.760	–		2-3/4	(2.7500)	–	–	3	9.25	4.00	1.56	2.3500	1.762
2.760–2.885	–		2-7/8	(2.8750)	M72	(2.8346)	3	9.25	4.00	1.56	2.4750	1.856
2.885–3.010	–		3	(3.0000)	–	–	3	9.75	4.56	1.63	2.5430	1.907
3.010–3.135	–		3-1/8	(3.1250)	–	–	3	9.75	4.56	1.63	2.6680	2.001
3.135–3.260	–		3-1/4	(3.2500)	M80	(3.1496)	3	10.00	4.56	1.75	2.7930	2.095
3.260–3.385	–		3-3/8	(3.3750)	–	–	3	10.00	4.56	1.75	2.8830	2.162
3.385–3.510	–		3-1/2	(3.5000)	–	–	3	10.25	4.94	2.00	3.0080	2.256
3.510–3.635	–		3-5/8	(3.6250)	M90	(3.5433)	3	10.25	4.94	2.00	3.1330	2.350
3.635–3.760	–		3-3/4	(3.7500)	–	–	3	10.50	5.31	2.13	3.2170	2.413
3.760–3.885	–		3-7/8	(3.8750)	–	–	3	10.50	5.31	2.13	3.3420	2.506
3.885–4.010	–		4	(4.0000)	M100	(3.9370)	3	10.75	5.31	2.25	3.4670	2.600





General Dimensions

Tap Dimensions — Inches

nominal diameter range (in)		machine screw size number (in)		nominal fractional diameter (in)		nominal metric diameter mm (in)		blank design number	overall length L	thread length l	neck length l1	square length l2	shank diameter D1	square size A
.104	.117	4	(.1120)	–		–	–	1	1.88	.31	.25	.19	.1410	.110
.117	.130	5	(.1250)			M3	(.1181)	1	1.94	.31	.31	.19	.1410	.110
.130	.145	6	(.1380)	–		M3.5	(.1378)	1	2.00	.38	.31	.19	.1410	.110
.145	.171	8	(.1640)			M4	(.1575)	1	2.13	.38	.38	.25	.1680	.131
.171	.197	10	(.1900)	–		M4.5	(.1772)	1	2.38	.50	.38	.25	.1940	.152
						M5	(.1969)	–	–	–	–	–	–	–
.197	.223	12	(.2160)	–	–	–	–	1	2.38	.50	.44	.28	.2200	.165
.223	.260			1/4	(.2500)	M6	(.2362)	2	2.50	.63	.38	.31	.2550	.191
.260	.323	–		5/16	(.3125)	M7, M8	(.2756), (.3150)	2	2.72	.69	.44	.38	.3180	.238
.323	.395			3/8	(.3750)	M10	(.3937)	2	2.94	.75	.50	.44	.3810	.286
.395	.448	–		7/16	(.4375)	–	–	3	3.16	.88	–	.41	.3230	.242
.448	.510			1/2	(.5000)	M12	(.4724)	3	3.38	.94	–	.44	.3670	.275
.510	.573	–		9/16	(.5625)	M14	(.5541)	3	3.59	1.00	–	.50	.4290	.322
.573	.635			5/8	(.6250)	M16	(.6299)	3	3.81	1.09	–	.56	.4800	.360
.635	.709	–		11/16	(.6875)	M18	(.7087)	3	4.03	1.09	–	.63	.5420	.406
.709	.760			3/4	(.7500)	–	–	3	4.25	1.22	–	.69	.5900	.442
.760	.823	–		13/16	(.8125)	M20	(.7874)	3	4.47	1.22	–	.69	.6520	.489
.823	.885			7/8	(.8750)	M22	(.8661)	3	4.69	1.34	–	.75	.3670	.523
.885	.948	–		15/16	(.9375)	M24	(.9449)	3	4.91	1.34	–	.75	.7600	.570
.948	1.010			1	(1.0000)	M25	(.9843)	3	5.13	1.50	–	.81	.8000	.600

NOTE: Thread length l is based on a length of 12 pitches of the UNC thread series. Thread length "l" is a minimum value and has no tolerance. When thread length "l" is added to neck length "l1", the total shall be no less than the minimum USCTI Table 302 thread length "l". Unless otherwise specified, all tolerances are in accordance with USCTI Table 302. For eccentricity tolerances, see USCTI Table 317. Table 302 is provided for reference only. WIDIA-GTD™ tap dimensions may differ.

Tolerances

element	nominal diameter range (in)	direction	tolerance (in)
length overall — L	.0520–1.0100	plus or minus	.031
	1.0100–4.0100	plus or minus	.063
length of thread — l	.0520–.2230	plus or minus	.047
	.2230–.5100	plus or minus	.063
	.5100–1.5100	plus or minus	.094
	1.5100–4.0100	plus or minus	.125
length of square — l2	.0520–1.0100	plus or minus	.031
	1.0100–4.0100	plus or minus	.063
diameter of shank — d1	.0520–.2230	minus	.0015
	.2230–.6350	minus	.0015
	.6350–1.0100	minus	.0020
	1.0100–1.5100	minus	.0020
	1.5100–2.0100	minus	.0030
	2.0100–4.0100	minus	.0030
size of square — a	.0520–.5100	minus	.004
	.5100–1.0100	minus	.006
	1.0100–2.0100	minus	.008
	2.0100–4.0100	minus	.010

Special Taps

Unless otherwise specified:

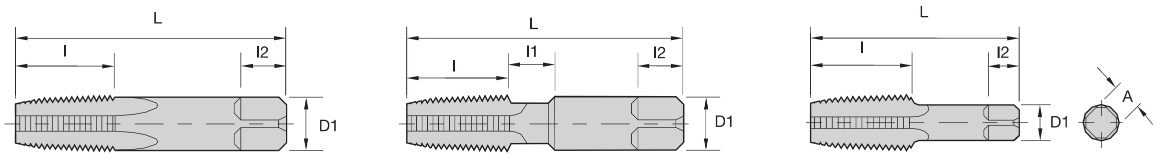
Special taps over 1.010–1.510" diameter inclusive, having 14 or more threads per inch or 1,75mm pitch and finer, and sizes over 1.510" diameter with 10 or more threads per inch or 2,5mm pitch and finer, are made to general dimensions shown in USCTI Table 303.

Special tap thread limits are determined using the formulas shown in USCTI Table 331 for Unified Inch Screw Threads and USCTI Table 341 for metric m-profile screw threads.

NOTE:
Tap sizes .395" and smaller have an external centre on the thread end (may be removed on bottoming taps). Sizes .125" and smaller have an external centre on the shank end. Sizes .224–.395" have truncated partial cone centres on the shank end (length of cone approximately 1/4 of diameter of shank). Sizes over .395" have internal centres on both the thread and shank ends.

For standard thread limits and tolerances for Unified Inch Screw Threads, see USCTI Table 327, and for metric threads, see USCTI Table 337.

For eccentricity tolerances of tap elements, see USCTI Table 317.



General Dimensions

nominal size (in)	overall length L	thread length l	square length l2	shank diameter D1	square size A	optional neck length l1
	dimensions (in)					
1/16	2.13	.69	.38	.3125	.234	.375
1/8	2.13	.75	.38	.3125	.234	–
1/8	2.13	.75	.38	.4375	.328	.375
1/4	2.44	1.06	.44	.5625	.421	.375
3/8	2.56	1.06	.50	.7000	.531	.375
1/2	3.13	1.38	.63	.6875	.515	–
3/4	3.25	1.38	.69	.9063	.679	–
1	3.75	1.75	.81	1.1250	.843	–
1-1/4	4.00	1.75	.94	1.3125	.984	–
1-1/2	4.25	1.75	1.00	1.5000	1.125	–
2	4.25	1.75	1.13	1.8750	1.406	–
2-1/2	5.50	2.56	1.25	2.2500	1.687	–
3	6.00	2.63	1.38	2.6250	1.968	–
3-1/2	6.50	2.69	1.50	2.8125	2.108	–
4	6.75	2.75	1.56	3.0000	2.250	–

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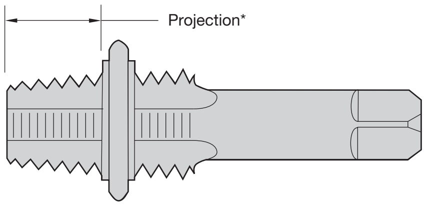
Tolerances

element	range	direction	tolerance
length overall — L	1/16–3/4 inc.	plus/minus	.031
	1–4 inc.	plus/minus	.063
length of thread — l	1/16–3/4 inc.	plus/minus	.063
	1-1-1/4 inc.	plus/minus	.094
	1-1/2–4	plus/minus	.125
length of square — l2	1/16–3/4 inc.	plus/minus	.031
	1–4 inc.	plus/minus	.063
diameter of shank — d1	1/16–1/8	minus	.0015
	1/4–1 inc.	minus	.0020
	1-1/4–4 inc.	minus	.0030
size of square — a	1/16–1/8	minus	.004
	1/4–3/4 inc.	minus	.006
	1–4 inc.	minus	.008

American National Standard Taper Pipe Thread Form (NPT)
Aeronautical National Taper Pipe Thread Form (ANPT)
Dryseal American National Standard Taper Pipe Thread Form (NPTF)



nominal size (in)	threads per inch	projection* (in)	projection tolerance + / –	taper per foot limits min	max	length L1	tap drill size** NPT, ANPT, NFTF
1/16	27	.312	.063	.719	.781	.160	C
1/8	27	.312	.063	.719	.781	.1615	Q
1/4	18	.459	.063	.719	.781	.2278	7/16
3/8	18	.454	.063	.719	.781	.240	9/16
1/2	14	.579	.063	.719	.781	.320	45/64
3/4	14	.565	.063	.719	.781	.339	29/32
1	11-1/2	.678	.094	.719	.781	.400	1-9/64
1-1/4	11-1/2	.686	.094	.719	.781	.420	1-31/64
1-1/2	11-1/2	.699	.094	.719	.781	.420	1-23/32
2	11-1/2	.667	.094	.719	.781	.436	2-3/16
2-1/2	8	.925	.094	.734	.781	.682	2-39/64
3	8	.925	.094	.734	.781	.766	3-15/64
3-1/2	8	.938	.125	.734	.781	.821	—
4	8	.950	.125	.734	.781	.844	—

**Distance from small end of tap projects through L1 taper thread ring gage.*
***Recommended size given permits direct tapping without reaming the hole, but only gives a full thread for approximately the L1 length.*

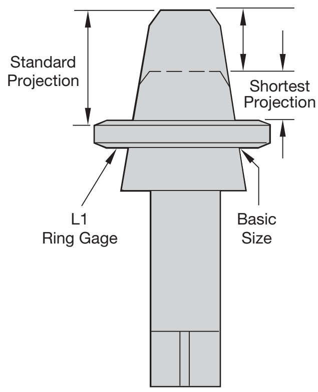
Pipe Taps

General-purpose pipe taps are appropriate for threading a wide variety of materials, both ferrous and non-ferrous.

Ground thread pipe taps are standard in American Standard Pipe Form (NPT) and American Standard Dryseal Pipe Form (NPFT). NPT threads require the use of a sealer, like Teflon® tape or pipe compound. Dryseal taps are used to tap fittings, which will give a pressure-tight joint without the use of a sealer.

The nominal size of a pipe tap is that of the pipe fitting to be tapped, not the actual size of the tap. The thread tapers 3/4" per foot.

All pipe taps are furnished with 2-1/2–3-1/2 thread chamfer.

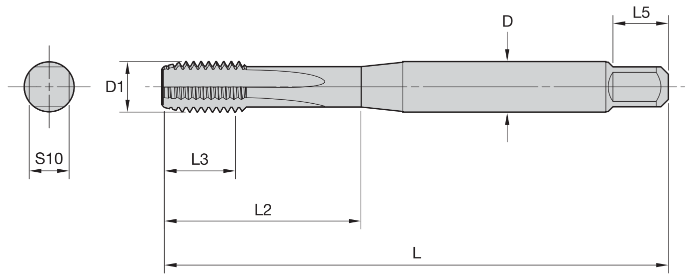


Short projection pipe taps are made with a projection shorter than standard for taper pipe tapping where the depth of tapping is limited.

Special short projection taper pipe taps can be furnished with American National Standard Taper Pipe thread (ANPT) or Dryseal American National Standard Taper Pipe thread (NPTF, PTF-SAE Short, or PTF-SPL Extra Short).

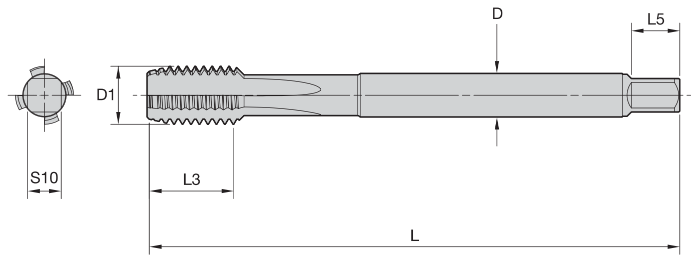
For information on short projection pipe taps and hole preparation for NPT, NPTF, and ANPT internal pipe threads, consult WIDIA-GTD™ Technical Bulletins.

WIDIA GTD



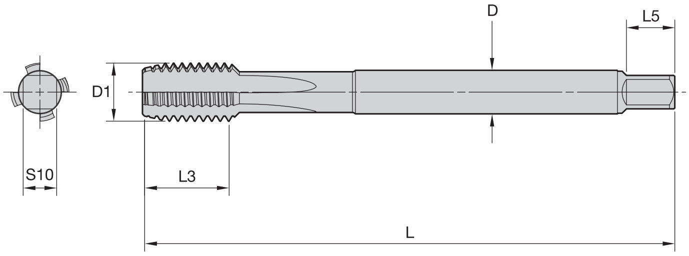
DIN 371

machine screw size number	nominal fraction diameter (in)	metric dimensions D	L	L3	L2	L5	S10
4	–	3,5	56	8	18	6	2,7
5	–	4,0	56	9	20	6	3,0
6	–	4,0	56	9	20	6	3,0
8	–	4,5	63	11	21	6	3,4
10	–	6,0	70	12	25	8	4,9
–	1/4	7,0	80	15	30	8	5,5
–	5/16	8,0	90	15	35	9	6,2
–	3/8	10,0	100	19	39	11	8,0



DIN 376

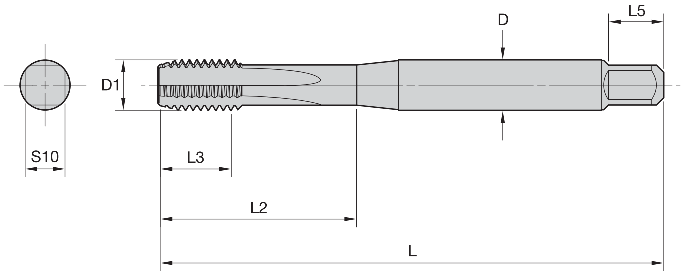
nominal fraction diameter (in)	metric dimensions D	L	L3	L5	S10
7/16	8	100	18	9	6,2
1/2	9	110	23	10	7,0
9/16	11	110	25	12	9,0
5/8	12	110	24	12	9,0
3/4	16	140	30	15	12,0
7/8	18	140	34	17	14,5
1	18	160	38	17	14,5



DIN 374

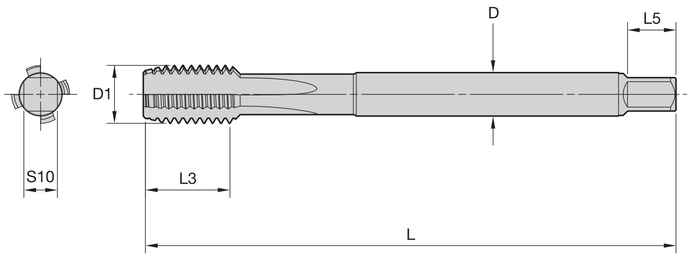
D1	pitch minimum	pitch maximum	metric dimensions D	L	L3*	L5	S10
M8	0.2	0.75	6	80	18	8	4.9
M8	–	1	6	90	22	8	4.9
M9	0.2	0.75	7	80	18	8	5.5
M9	–	1	7	90	22	8	5.5
M10	0.2	1	7	90	20	8	5.5
M10	–	1.25	7	100	24	8	5.5
M11	0.35	1	8	90	20	9	6.2
M12	0.35	1.5	9	100	22	10	7
M14	0.35	1.5	11	100	22	12	9
M16	0.35	1.5	12	100	22	12	9
M16	–	2	12	110	32	12	9
M18	0.35	1.5	14	110	25	14	11
M18	–	2	14	125	34	14	11
M20	0.35	1.5	16	125	25	15	12
M20	–	2	16	140	34	15	12
M22	0.35	1.5	18	125	25	17	14.5
M22	–	2	18	140	34	17	14.5
M24	0.35	2	18	140	28	17	14.5
M27	0.35	2	20	140	28	19	16
M30	0.35	2	22	150	28	21	18
M30	–	3	22	180	45	21	18

** Maximum*



JIS Type 2 Metric Coarse

				metric dimensions			
D1	pitch	D	L	L3	L2	L5	S10
M3	0.5	4	46	11	19	6	3.2
M3.5	0.6	4	48	13	20	6	3.2
M4	0.7	5	52	13	21	7	4
M4.5	0.75	5	55	13	21	7	4
M5	0.8	5.5	60	16	24	7	4.5
M6	1	6	62	19	29	7	4.5



JIS Type 3 Metric Coarse

				metric dimensions		
D1	pitch	D	L	L3	L5	S10
M8	1.25	6.2	70	22	8	5
M9	1.25	7	72	22	8	5.5
M10	1.5	7	75	24	8	5.5
M11	1.5	8	80	25	9	6
M12	1.75	8.5	82	29	9	6.5
M14	2	10.5	88	30	11	8
M16	2	12.5	95	32	13	10
M18	2.5	14	100	37	14	11
M20	2.5	15	105	37	15	12
M22	2.5	17	115	38	16	13
M24	3	19	120	45	18	15

Through Holes
Push Chips

- GUN™ (spiral point) or LHSF (Left-Hand Spiral Flute).
- Ideal for materials with long chips.

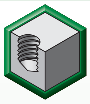
GUN™ LHSF

Blind Holes
Pull Chips

- RHSF (Right-Hand Spiral Flute).
- Ideal for materials with long chips.

RHSF

Blind or Through Holes
Store Chips



- STFL (Straight Flute).
- Ideal for materials with short chips.

STFL

Blind or Through Holes
No Chips

- Forming.
- Ideal for ductile materials <32 HRC.

Forming Tap

In addition to the nominal size and pitch of a tap, there is another important dimensional factor to be considered when selecting a ground thread tap for a given job. This factor is the pitch diameter tap limit, “H” and “L”. “H” represents (high) above basic pitch diameter; “L” (low) is below basic pitch diameter. Tap limits have been established to provide a choice in the selection of the tap size best suited to produce the class of thread desired.

Figure 1 Illustrates the numbering system and the .0005" diameter increment separation between successive limits. Because the starting point is basic pitch diameter, dividing the limit number by two establishes, in thousandths of an inch, the amount the maximum tap pitch diameter is above basic in the “H” series and the amount the minimum tap pitch diameter is under basic in the “L” series.

Figure 2 Illustrates the positioning of the tap limits in relation to the various classes of threads for a 1/4–20 size.

Figure 1

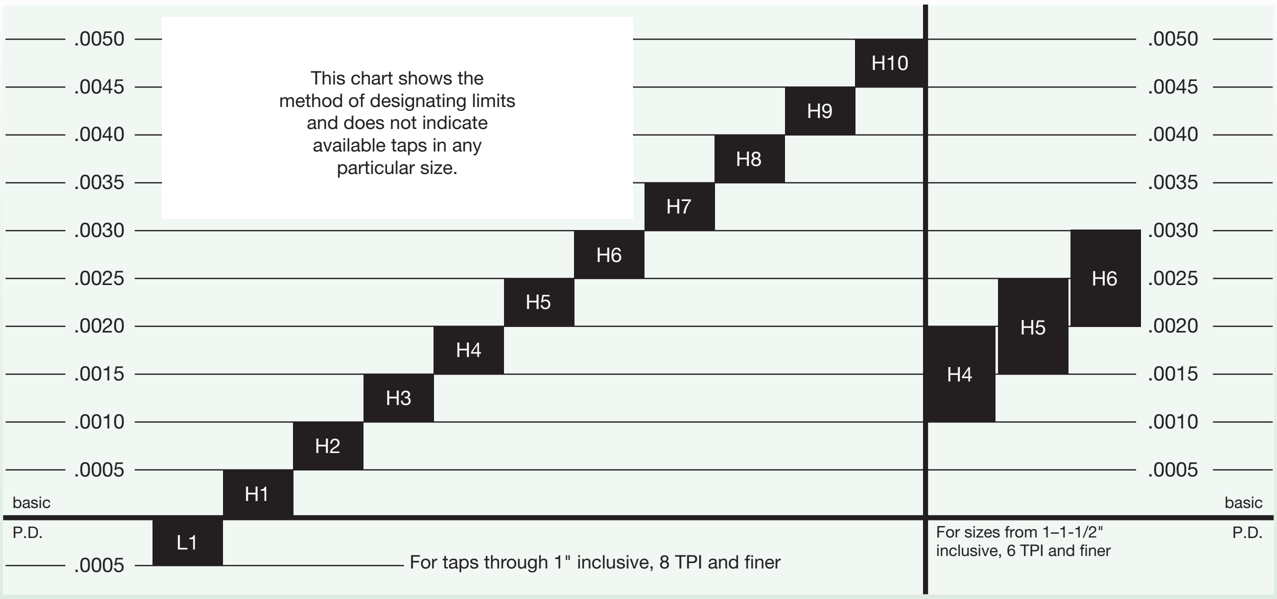
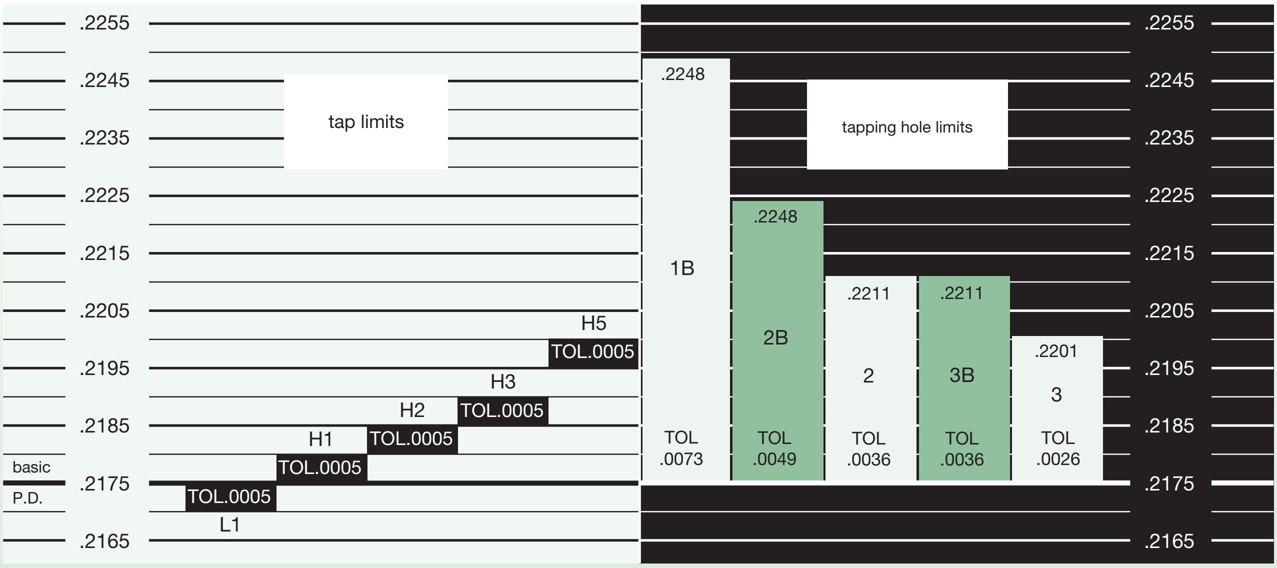
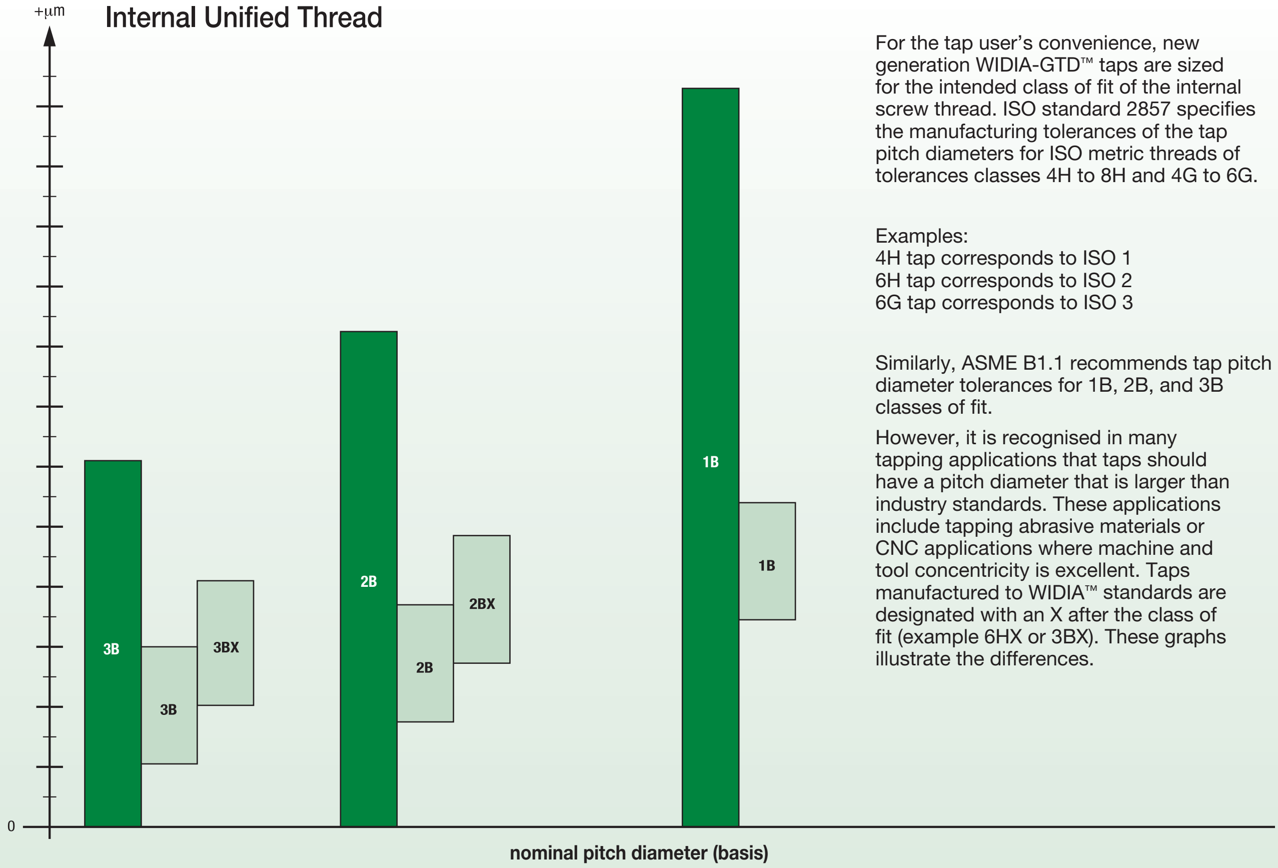


Figure 2 Class of Thread – 1/4–20 UNC and NC



Internal Unified Thread



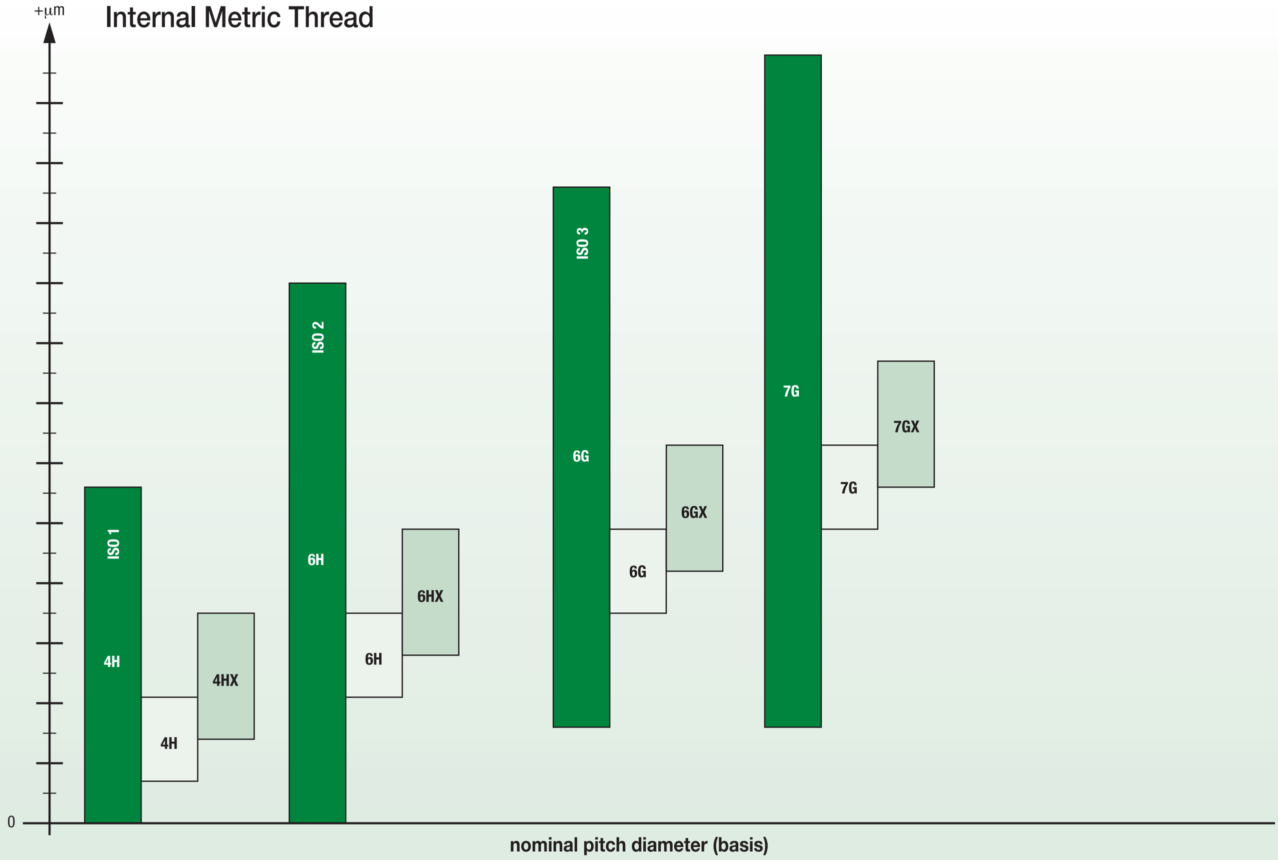
For the tap user's convenience, new generation WIDIA-GTD™ taps are sized for the intended class of fit of the internal screw thread. ISO standard 2857 specifies the manufacturing tolerances of the tap pitch diameters for ISO metric threads of tolerances classes 4H to 8H and 4G to 6G.

Examples:
4H tap corresponds to ISO 1
6H tap corresponds to ISO 2
6G tap corresponds to ISO 3

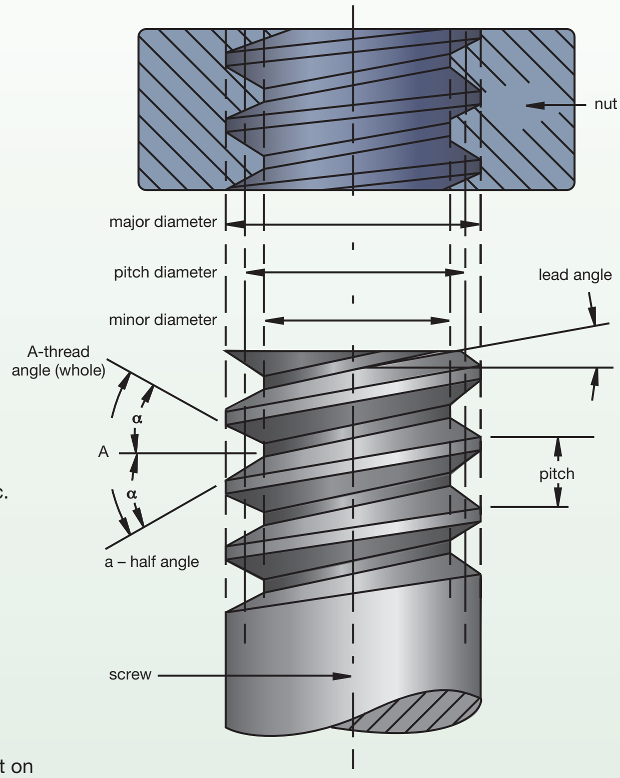
Similarly, ASME B1.1 recommends tap pitch diameter tolerances for 1B, 2B, and 3B classes of fit.

However, it is recognised in many tapping applications that taps should have a pitch diameter that is larger than industry standards. These applications include tapping abrasive materials or CNC applications where machine and tool concentricity is excellent. Taps manufactured to WIDIA™ standards are designated with an X after the class of fit (example 6HX or 3BX). These graphs illustrate the differences.

Internal Metric Thread



It is generally recognised that, in mass production, it is impossible to reproduce in exact detail the theoretically perfect product as laid out on the drawing board. The allowed slight variation between the theoretically perfect product drawing and each unit of the actual product is called the tolerance.



Allowance

An intentional difference in correlated dimensions of mating parts. It is the minimum clearance or maximum interference between such parts.

Angle of Thread

The angle included between the flanks of the thread measured in an axial plane.

Half Angle of Thread

The angle included between a flank of the thread and the normal (90°) to the axis, measured in an axial plane.

Lead of Thread

The distance a screw thread advances axially in one turn. On a single-thread screw, the lead and pitch are identical. On a double thread, the lead is 2x pitch; on a triple thread, the lead is 3x pitch, etc.

Major Diameter

The largest diameter of a straight-screw thread.

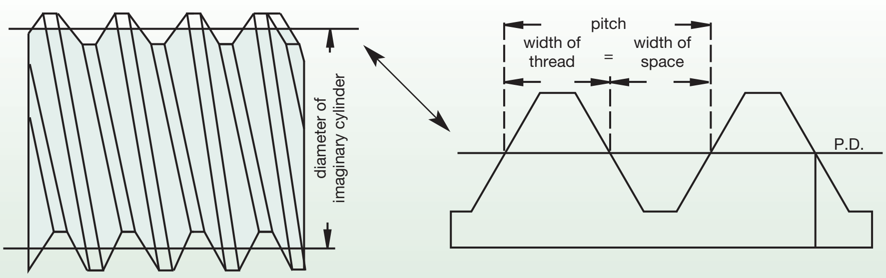
Minor Diameter

The smallest diameter of a straight-screw thread.

Pitch

The distance from a point on a screw thread to a corresponding point on the next thread measured parallel to the axis.

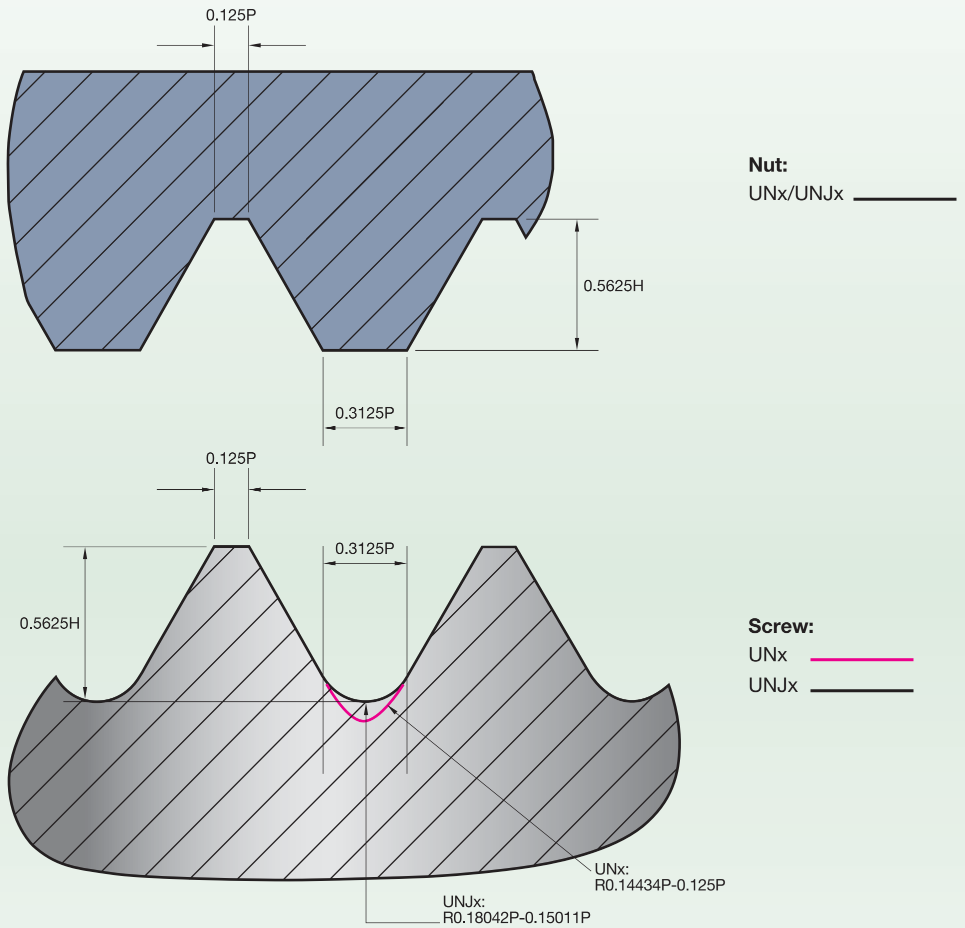
$$\text{The pitch in inches} = \frac{1}{\text{number of threads per inch}}$$



Pitch Diameter

On a straight-screw thread, the diameter of an imaginary cylinder that would pass through the threads at such points as to make equal the width of the threads and the width of the spaces cut by the surface of the cylinder.

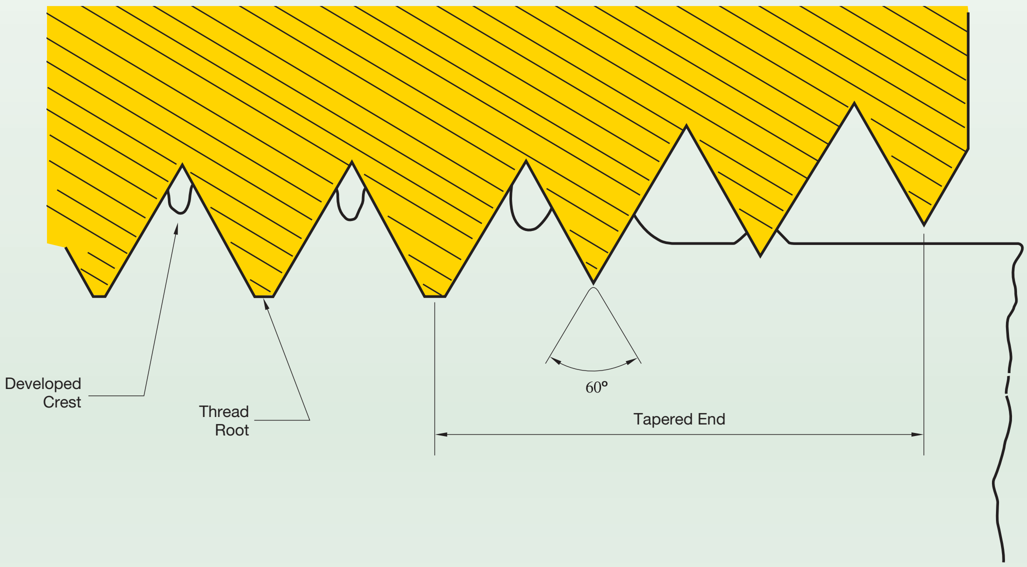
A thread system is available for aerospace and other applications where high fatigue strength is required. The UNJ thread form is defined by ASME B1.15 and is similar to Military Specification MIL-S-8879. Screw thread assemblies consist of external and internal threads. In order to minimise the stress on the external UNJ thread, a controlled root radius is required that is equal to 0.15011P to 0.18042P, where P is the thread pitch. Internal UNJ threads are not required to have a radius at either the major or minor diameters.



Because external UNJ threads must be produced with a defined root radius, standard UN tooling may not be used. However, internal UNF threads may be produced with ground thread UN taps sized to produce the proper class of fit. The tap does not need to be marked with a letter J. Attention must be paid to the tap drill since the minor diameter has to be specified so as to provide clearance with the root radius on the external thread.

For UNJ thread specifications, the reader is referred to ASME B1.15. Please note this standard includes Class 3 and Class 2 UNJ screw threads. However, only Class 3 UNJ threads meet the requirements of Military Specification MIL-S-8879. For Unified Inch (UN) thread specifications, refer to ASME B1.1.

Unlike cutting taps, which remove material, forming taps generate an internal screw thread by displacing material and forming it into the V-shaped thread. A common misconception is that a thread rolling action occurs. Instead, the threads are formed over the tapered entry section of the tap as the tap rotates into the hole. A succession of deeper penetrating lobes over the entry plastically displaces material radially between the tap's thread flanks until the entry length is reached. At this point, the thread is fully formed at the correct thread height.



Forming taps have numerous advantages over cutting taps. The most obvious advantage is that forming taps do not create chips. There are no chip removal problems. Bird nesting is a situation that occurs when chips wrap around the shank of spiral-fluted taps when tapping blind holes in long chipping materials. Forming taps help this to be avoided. Since forming taps avoid this problem, they are stronger and more resistant to breakage. Another misconception is that forming taps produce stronger threads. Although the forming process strain hardens the thread flanks, it has very little effect on the major diameter, the location where internal threads strip.

Forming taps can only be used in ductile materials. Due to increased friction relative to cutting, forming taps require higher torque than cutting taps. In some situations, oil-based lubrications are required, and this might not be convenient on CNC machining centres that use water soluble coolant. In this situation, the lubricant concentration should be increased.

Since forming taps displace material, larger diameter pre-tap holes are required. This is especially important when converting from cutting taps to forming taps. If a cutting tap hole size is used, the displaced material will over-fill the tap's threads and breakage will result. Please consult hole size charts for forming taps.

coating	properties and application	precautions
Titanium Nitride (TiN)	Proprietary TiN coating (hardness 2300 Vickers) offers significantly improved wear life and thread finish, often at higher tapping speeds, in a broad range of materials, especially steels, irons, and plastics. Golden colour.	Use with caution in non-ferrous materials such as aluminium because of tendency to gall.
Titanium Carbonitride (TiCN)	Proprietary TiCN coating (hardness 3000 Vickers) is harder, tougher, and more wear resistant than TiN under conditions of moderate cutting temperatures. Like TiN, TiCN may be used at higher cutting speeds in a broad range of materials, especially steels and irons. Blue-grey colour.	Use with caution in non-ferrous materials such as aluminium because of tendency to gall. TiAlN is a better choice when used at extreme temperatures.
Titanium Nitride + Chromium Carbide Carbon (TiN + CrC/C)	Proprietary coating (hardness 2300 Vickers) that combines the wear resistance of smooth TiN coating with a lubricous top layer of chromium carbide carbon. Effective in stainless steel and non-ferrous materials including aluminium and titanium. Ideal choice for 300 series stainless steels, wrought, and die cast aluminiums. Black/grey colour.	Effective in both ferrous and non-ferrous materials.
Titanium Aluminium Nitride (TiAlN)	Nanolayer TiAlN coating (hardness 3300 Vickers) offers improved wear life and thread finish, especially in conditions where high temperatures can be generated. Use for PH stainless steels and nickel-based alloys like INCONEL®. Violet/grey colour.	Use with caution in non-ferrous materials because of tendency to gall.
Chromium Nitride (CrN)	CrN is medium hard (hardness 1800 Vickers) and has a lower wear resistance than TiN, TiCN, and TiAlN. However, unlike these coatings, CrN does not gall when used in some non-ferrous work materials. Use for brass, bronze, zinc alloys, and magnesium alloys. Silver colour.	Ineffective in ferrous materials.
Nitride (MAXI #1)	Hardened case extends wear life in abrasive materials. Use for aluminium and other non-ferrous materials.	Avoid on taper pipe, fast spiral, and small diameter (<#6) or fine pitch taps due to tendency for thread chipping.
Oxide (SH-50)	Helps prevent galling in ferrous (iron-based) materials. For free machining steel. Use for steels, stainless steels, and irons.	Has a tendency to cause galling in non-ferrous materials such as aluminium.
Nitride and Oxide (SH-47)	Combines the benefits of nitride and oxide surface treatments. For steels, stainless steels, and nickel alloys.	See precautions for nitride and oxide surface treatments.

Factors when trying to determine the best tapping speeds:

- Material to be tapped
- Length of chamfer on tap
- Percentage of full thread to be cut
- Length of hole (depth of thread)
- Pitch of thread
- Cutting fluids
- Machine equipment
- Horizontal or vertical tapping

The best and most efficient operating speeds for taps cannot be calculated with the same certainty, as for many other metalcutting tools.

With other tools, the feed per revolution can be set at any desired point and can be varied as conditions demand. Taps, on the other hand, must always be advanced at a rate equal to one pitch for every revolution. The style of tap may vary the conditions.

For example, with a bottoming tap, the first thread on each land cuts the full height of thread, while, with a taper or starting tap, a number of threads do their share of the cutting before the full height of thread is reached.

The depth of thread also varies, depending on the pitch. The coarser the thread, the greater the advance of the tap per revolution and the greater the amount of material removed.

The method of feeding the tap, and the type of equipment for driving, also influences the permissible speeds. If taps are mechanically fed at the proper rate of advance, they can be operated at higher speeds than if they are required to feed themselves and pull some part of the machine along with them.

Speeds may be modified to take into account any or all of these factors:

- Speeds must be lowered as length of thread increases because, in deep thread holes, the accumulated chips increase friction and interfere with lubrication.
- Bottoming taps must be run slower than plug taps.
- Tapping full height of thread calls for slower speed than if the commercial 75% height only is required.
- Coarse-thread taps in the larger diameters should be run more slowly than fine-thread taps of the same diameters.
- The quantity and quality of cutting fluid may affect the permissible speeds as much as 100%.
- Taper threaded taps, such as pipe taps, should be operated from 1/2–3/4 the speed of a straight thread tap of comparable major diameter.

RPM Formulas

SFM = Surface Feet per Minute
RPM = Revolutions per Minute
IPM = Inches per Minute
TPI = Threads per Inch

S m/m = Surface Metres per Minute
π = 3.1416
mm/min = millimetres per minute
P = Pitch (1/number of threads per inch)

Inch Sizes

$$\text{SFM} = \frac{\text{RPM x tool diameter}}{3.82} \quad \text{or} \quad 0.26 \text{ x RPM x tool diameter}$$

$$\text{RPM} = \frac{3.82 \text{ x SFM}}{\text{tool diameter}}$$

$$\text{IPM} = \frac{\text{RPM}}{\text{TPI*}} \quad \text{or} \quad \text{*P x RPM}$$

Metric Sizes

$$\text{S m/m} = \frac{\pi \text{ x tool diameter x RPM}}{1000}$$

$$\text{RPM} = \frac{\text{mm/m x 1000}}{\pi \text{ x tool diameter}}$$

$$\text{mm/min} = \text{mm P x RPM}$$

Technical Information

UNC/UNF and NPT/NPTF

tap size	taper pipe taps	5'	10'	15'	20'	25'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
		surface feet per minute (SFM)																	
		revolutions per minute (RPM)																	
0	–	318	637	955	1273	1592	1910	2546	3183	3820	4456	5093	5729	6366	7003	7639	8276	8913	9549
1	–	273	546	819	1046	1308	1570	2093	2617	3140	3663	4186	4710	5233	5756	6279	6805	7326	1849
2	–	212	424	637	888	1110	1333	1777	2221	2665	3109	3554	3999	4442	4886	5330	5774	6218	6662
3	–	191	382	573	772	964	1157	1543	1929	2315	2701	3086	3472	3858	4244	4629	5015	5401	5787
4	–	174	347	521	682	853	1023	1364	1705	2046	2387	2728	3069	3411	3751	4092	4434	4775	5115
5	–	147	294	441	611	764	917	1222	1528	1833	2139	2445	2750	3056	3361	3667	3973	4278	4584
6	–	136	273	409	553	691	829	1106	1382	1859	1935	2212	2488	2766	3042	3318	3595	3871	4148
8	–	119	239	358	466	583	699	932	1165	1398	1631	1864	2097	2330	2563	2796	3029	3262	3495
10	–	101	201	302	402	502	603	804	1005	1205	1406	1607	1808	2009	2210	2411	2612	2813	3014
12	–	87	174	260	354	442	531	707	884	1061	1238	1415	1592	1769	1945	2122	2300	2476	2653
1/4	–	76	153	229	306	382	458	611	764	917	1070	1222	1375	1528	1681	1833	1986	2139	2292
5/16	–	62	123	185	245	306	367	489	611	733	856	978	1100	1222	1345	1467	1589	1711	1833
3/8	–	50	101	151	204	255	305	407	509	611	713	815	917	1019	1120	1222	1324	1426	1528
7/16	1/8	43	87	130	175	219	262	349	437	524	611	698	786	873	960	1048	1135	1222	1310
1/2	–	38	76	115	153	191	229	305	382	458	535	611	688	764	840	917	993	1070	1146
9/16	1/4	34	68	102	137	172	206	274	342	410	478	547	616	683	752	820	888	952	1020
5/8	–	32	64	96	122	153	183	244	306	367	428	489	550	611	672	733	794	856	917
11/16	3/8	28	55	83	111	138	167	222	278	333	389	444	500	556	611	667	722	778	833
3/4	–	25	51	76	102	128	153	203	255	305	357	407	458	509	560	611	662	713	764
7/8	1/2	22	43	65	87	109	131	175	218	262	306	350	392	437	480	524	568	611	655
1	–	19	38	57	76	96	115	153	191	230	268	305	344	382	420	458	497	535	573
1-1/8	3/4	17	34	51	68	84	102	136	170	204	238	272	306	340	373	407	441	475	509
1-1/4	–	15	31	46	61	76	92	122	153	183	214	244	275	305	336	367	397	428	458
1-3/8	1	14	28	42	56	69	83	111	139	167	194	222	250	278	306	333	361	389	417
1-1/2	–	13	25	38	51	63	76	102	127	153	178	204	229	255	280	305	331	356	382
1-5/8	–	12	23	35	47	59	71	94	118	141	165	188	212	235	259	282	306	329	353
1-3/4	–	11	22	33	44	55	65	87	109	131	153	175	196	218	240	262	284	306	327
1-7/8	–	10	20	30	41	51	61	81	102	122	143	163	183	204	224	244	265	285	306
2	–	9	19	29	38	48	57	76	96	115	134	153	172	191	210	229	248	267	287

Metric

metric taps	5'	10'	15'	20'	25'	30'	40'	50'	60'	70'	80'	90'	10'	110'	120'	130'	140'	150'
	surface feet per minute (SFM)																	
	revolutions per minute (RPM)																	
M1	490	979	1469	1959	2449	2938	3918	4897	5877	6856	7836	8815	9795	10774	11754	12733	13713	14692
M2	242	484	725	967	1209	1451	1934	2418	2901	3385	3868	4352	4835	5319	5803	6286	6770	7253
M3	162	324	486	347	809	971	1295	1619	1942	2266	2590	2914	3237	3561	3885	4208	4532	4856
M3.5	138	277	415	554	692	830	1107	1384	1661	1938	2214	1491	2768	3045	3322	3599	3875	4152
M4	122	243	365	487	608	730	973	1217	1460	1703	1946	2190	2433	2676	2920	3163	3406	3650
M5	97	194	291	388	485	582	776	970	1163	1357	1551	1745	1939	2133	2327	2521	2715	2905
M6	81	162	243	324	405	486	647	809	971	1133	1295	1457	1619	1781	1942	2104	2266	2428
M7	69	138	208	277	346	415	554	692	830	969	1107	1246	1384	1522	1661	1799	1938	2076
M8	61	121	182	243	303	364	485	606	728	849	970	1091	1213	1334	1455	1577	1698	1819
M10	48	97	145	194	242	291	388	485	582	679	776	873	970	1067	1163	1260	1357	1454
M12	40	81	121	162	202	243	324	405	486	567	647	728	809	890	971	1052	1133	1214
M14	35	69	104	139	173	208	277	347	416	485	555	624	693	763	832	901	971	1040
M16	30	61	91	121	152	182	243	303	364	424	485	546	606	667	728	788	849	910
M18	27	54	81	108	135	162	216	269	323	377	431	485	539	593	647	700	754	808
M20	24	49	73	97	121	146	194	243	291	340	388	437	485	534	582	631	680	728
M22	22	44	66	88	110	132	176	221	265	309	353	397	441	485	529	573	618	662
M24	20	40	61	81	101	121	162	202	243	283	323	364	404	445	485	526	566	606
M27	18	36	54	72	90	108	144	180	216	252	287	323	359	395	431	467	503	539
M30	16	32	49	65	81	97	129	162	194	226	259	291	323	356	388	420	453	485

Partial List of Solutions to Tapping Problems

application	symptom	common cause	remedy
general	gage out of limits	tap size and gage mismatch	select tap size for gage
	oversize thread	alignment, spindle feed	correct
	oversize at top	runout or alignment	correct
	go gage binds part way	worn tool, tap cuts off lead	replace tap, synchronous holder
	thread shaving	feed error, high axial force	programme, synchronous holder
	chipping	high cutting force, worn tap	tap geometry, replace tap
	breakage	chip jamming flutes	tap geometry, tapping depth
	–	worn tool, high torque	replace tap with new tool
	short life, low speed	excessive wear	SC or HSS-E-PM HP taps
steel	birdnest blind hole	long, ductile chips	GT30 GP6505 (oxide), peck feed
	chipping	high material hardness	GT00, GT02 WP31MG (TiN)
	breakage in blind holes	hole depth >2D, chip jamming	GT04 WH36MG (TiN/MoS_2)
stainless steel	oversize thread, low life	galling	GT20, GT30 GM6515 (TiN-CrC/C)
	short life	work hardened core hole	replace drill
cast iron	excessive wear	abrasion	GT40 GP6520 (TiCN)
aluminium, cast	excessive wear	high silicon	GT40 GP6520 (TiCN)
aluminium, wrought	oversize thread	galling	GT70, GT80 WN48EG (DLC)
nickel, cobalt alloys	short life	high cutting temperature	GT10, GT12 WS32MG (TiCN)
titanium	short life	high cutting temperature	GT14, GT16 WN35MG (TiN-DLC)

Thread Mills

	vibration marks	major crest wear	edge chipping	cone-shaped thread	entry marks
cutting speed	check	reduce	–	–	–
feed per tooth	check	increase	reduce	–	–
workpiece clamping	improve	improve	improve	–	improve
machine tool stability	improve	improve	improve	–	improve
cantilever arm	shorten	shorten	–	–	shorten
helix angle	increase	reduce	–	–	–
radial runout	check	check	–	–	–
coating	–	improve	improve	–	–
milling operation	–	climb mill	climb mill	climb mill	–
line feed/entry ramp	check	check	–	–	improve
coolant pressure	–	check (>20 bar, 290 psi)	check (>20 bar, 290 psi)	–	–

WIDIA GTD

drill size	decimal (in)	drill size	decimal (in)	drill size	decimal (in)	drill size	decimal (in)	drill size	decimal (in)	drill size	decimal (in)
0,30mm	.0118	54	.0550	3,10mm	.1220	5,50mm	.2165	8,50mm	.3346	9/16	.5625
0,32mm	.0126	1,40mm	.0551	1/18	.1250	7/32	.2188	8,60mm	.3386	14,50mm	.5709
80	.0135	1,45mm	.0571	3,20mm	.1260	5,60mm	.2205	R	.3390	37/64	.5781
0,35mm	.0138	1,50mm	.0591	30	.1285	2	.2210	8,70mm	.3425	14,75mm	.5807
79	.0145	53	.0595	3,30mm	.1299	5,70mm	.2244	11/32	.3438	15,00mm	.5906
0,38mm	.0150	1,55mm	.0610	3,40mm	.1339	1	.2280	8,80mm	.3465	19/32	.5938
1/64	.0156	1/16	.0625	29	.1360	5,80mm	.2283	S	.3480	15,25mm	.6004
0,40mm	.0157	1,60mm	.0630	3,50mm	.1378	5,90mm	.2323	8,90mm	.3504	39/64	.6094
78	.0160	52	.0635	28	.1405	A	.2340	9,00mm	.3543	15,50mm	.6102
0,42mm	.0165	1,65mm	.0650	9/64	.1406	15/64	.2344	T	.3580	15,75mm	.6201
0,45mm	.0177	1,70mm	.0669	3,60mm	.1417	6,00mm	.2362	9,10mm	.3583	5/8	.6250
77	.0180	51	.0670	27	.1440	B	.2380	23/64	.3594	16,00mm	.6299
0,48mm	.0189	1,75mm	.0689	3,70mm	.1457	6,10mm	.2402	9,20mm	.3622	16,25mm	.6398
0,50mm	.0197	50	.0700	26	.1470	C	.2420	9,30mm	.3661	41/64	.6406
76	.0200	1,80mm	.0709	25	.1495	6,20mm	.2441	U	.3680	16,50mm	.6496
75	.0210	1,85mm	.0728	3,80mm	.1496	D	.2460	9,40mm	.3701	21/32	.6562
0,55mm	.0217	49	.0730	24	.1520	6,30mm	.2480	9,50mm	.3740	16,75mm	.6594
74	.0225	1,90mm	.0748	3,90mm	.1535	1/4, E	.2500	3/8	.3750	17,00mm	.6693
0,60mm	.0236	48	.0760	23	.1540	6,40mm	.2520	V	.3770	43/64	.6719
73	.0240	1,95mm	.0768	5/32	.1562	6,50mm	.2559	9,60mm	.3780	17,25mm	.6791
0,62mm	.0244	5/64	.0781	22	.1570	F	.2570	9,70mm	.3819	11/16	.6875
72	.0250	47	.0785	4,00mm	.1575	6,60mm	.2598	9,80mm	.3858	17,50mm	.6890
0,65mm	.0256	2,00mm	.0787	21	.1590	G	.2610	W	.3860	45/64	.7031
71	.0260	2,05mm	.0807	20	.1610	6,70mm	.2638	9,90mm	.3898	18,00mm	.7087
0,70mm	.0276	46	.0810	4,10mm	.1614	17/64	.2656	25/64	.3906	23/32	.7188
70	.0280	45	.0820	4,20mm	.1654	H	.2660	10,00mm	.3937	18,50mm	.7283
69	.0292	2,10mm	.0827	19	.1660	6,80mm	.2677	X	.3970	47/64	.7344
0,75mm	.0295	2,15mm	.0846	4,30mm	.1693	6,90mm	.2717	10,20mm	.4016	19,00mm	.7480
68	.0310	44	.0860	18	.1695	I	.2720	Y	.4040	3/4	.7500
1/32	.0312	2,20mm	.0866	11/64	.1719	7,00mm	.2756	13/32	.4062	49/64	.7656
0,80mm	.0315	2,25mm	.0886	17	.1730	J	.2770	Z	.4130	19,50mm	.7677
67	.0320	43	.0890	4,40mm	.1732	7,10mm	.2795	10,50mm	.4134	25/32	.7812
66	.0330	2,30mm	.0906	16	.1770	K	.2810	27/64	.4219	20,00mm	.7874
0,85mm	.0335	2,35mm	.0925	4,50mm	.1772	9/32	.2812	10,80mm	.4252	51/64	.7969
65	.0350	42	.0935	15	.1800	7,20mm	.2835	11,00mm	.4331	20,50mm	.8071
0,90mm	.0354	3/32	.0938	4,60mm	.1811	7,30mm	.2874	7/16	.4375	13/16	.8125
64	.0360	2,40mm	.0945	14	.1820	L	.2900	11,20mm	.4409	21,00mm	.8268
63	.0370	41	.0960	4,70mm, 13	.1850	7,40mm	.2913	11,50mm	.4528	53/64	.8281
0,95mm	.0374	2,45mm	.0965	3/16	.1875	M	.2950	29/64	.4531	27/32	.8438
62	.0380	40	.0980	4,80mm, 12	.1890	7,50mm	.2953	11,80mm	.4646	21,50mm	.8465
61	.0390	2,50mm	.0984	11	.1910	19/64	.2969	15/32	.4688	55/64	.8594
1,00mm	.0394	39	.0995	4,90mm	.1929	7,60mm	.2992	12,00mm	.4724	22,00mm	.8661
60	.0400	38	.1015	10	.1935	N	.3020	12,20mm	.4803	7/8	.8750
59	.0410	2,60mm	.1024	9	.1960	7,70mm	.3031	31/64	.4844	22,50mm	.8858
1,05mm	.0413	37	.1040	5,00mm	.1969	7,80mm	.3071	12,50mm	.4921	57/64	.8906
58	.0420	2,70mm	.1063	8	.1990	7,90mm	.3110	1/2	.5000	23,00mm	.9055
57	.0430	36	.1065	5,10mm	.2008	5/16	.3125	12,80mm	.5039	29/32	.9062
1,10mm	.0433	7/64	.1094	7	.2010	8,00mm	.3150	13,00mm	.5118	59/64	.9219
1,15mm	.0453	35	.1100	13/64	.2031	O	.3160	33/64	.5156	23,50mm	.9252
56	.0465	2,80mm	.1102	6	.2040	8,10mm	.3189	13,20mm	.5197	15/16	.9375
3/64	.0469	34	.1110	5,20mm	.2047	8,20mm	.3228	17/32	.5312	24,00mm	.9449
1,20mm	.0472	33	.1130	5	.2055	P	.3230	13,50mm	.5315	61/64	.9531
1,25mm	.0492	2,90mm	.1142	5,30mm	.2087	8,30mm	.3268	13,80mm	.5433	24,50mm	.9646
1,30mm	.0512	32	.1160	4	.2090	21/64	.3281	35/64	.5469	31/32	.9688
55	.0520	3,00mm	.1181	5,40mm	.2126	8,40mm	.3307	14,00mm	.5512	25,00mm	.9843
1,35mm	.0531	31	.1200	3	.2130	Q	.3320	14,25mm	.5610	63/64	.9844
										1"	1.0000

Metric   Fractional   Wire gage   Letter size

WIDIA

Knowing the hardness of the work material to be tapped is essential in selecting the best tap for the job.

10 mm/min ball 3000 kg	120° cone 150 kg	1/16" ball 100 kg	model C	1000 lb per sq. in.	10 mm/min ball 3000 kg	120° cone 150 kg	1/16" ball 100 kg	model C	1000 lb per sq. in.
Brinell	**Rockwell C**	**Rockwell B**	**Shore Scleroscope**	**tensile strength**	**Brinell**	**Rockwell C**	**Rockwell B**	**Shore Scleroscope**	**tensile strength**
800	72	–	100	–	276	30	105	42	136
780	71	–	99	–	269	29	104	41	132
760	70	–	98	–	261	28	103	40	129
745	68	–	97	367	258	27	102	39	127
725	67	–	96	357	255	26	102	39	125
712	66	–	95	350	249	25	101	38	123
682	65	–	93	337	245	24	100	37	119
668	64	–	91	326	240	23	99	36	117
652	63	–	89	318	237	23	99	35	115
626	62	–	87	306	229	22	98	34	113
614	61	–	85	299	224	21	97	33	110
601	60	–	83	292	217	20	96	33	107
590	59	–	81	290	211	19	95	32	104
576	57	–	79	281	206	18	94	32	102
552	56	–	76	270	203	17	94	31	100
545	55	–	75	268	200	16	93	31	98
529	54	–	74	259	196	15	92	30	96
514	53	120	72	254	191	14	92	30	94
502	52	119	70	247	187	13	91	29	92
495	51	119	69	244	185	12	91	29	91
477	49	118	67	233	183	11	90	28	90
461	48	117	66	227	180	10	89	28	89
451	47	117	65	223	175	9	88	27	86
444	46	116	64	219	170	7	87	27	84
427	46	115	62	209	167	6	87	27	82
415	44	115	60	204	165	5	86	26	81
401	43	114	58	196	163	4	85	26	80
388	42	114	57	191	160	3	84	25	78
375	41	113	55	184	156	2	83	25	76
370	40	112	54	182	154	1	82	25	75
362	39	111	53	179	152	–	82	24	74
351	38	111	51	173	150	–	81	24	74
346	37	110	50	170	147	–	80	24	72
341	37	110	49	168	145	–	79	23	71
331	36	109	47	163	143	–	79	23	70
323	35	109	46	158	141	–	78	23	69
311	34	108	46	153	140	–	77	22	69
301	33	107	45	148	135	–	75	22	67
293	32	106	44	144	130	–	72	22	65
285	31	105	43	140	–	–	–	–	–

material number	DIN EN - D	AFNOR - F	BS - UK	JIS
0.6010	GG10	–	Grade 100	FC 100
0.6015	GG15	FGL 150	Grade 150	FC 150
0.6020	GG20	FGL 200	Grade 220	FC 200
0.6025	GG25	FGL 250	Grade 250, 260	FC 250
0.6030	GG30	FGL 300	Grade 300	FC 300
0.6035	GG35	FGL 350	Grade 350	FC 350
0.6655	–	L-NUC 15 6 2	F1	–
0.6656	–	L-NUC 15 6 3	F1	–
0.6660	–	L-NC 20 2	F2	–
0.6661	–	L-NC 20 3	F2	–
0.6676	–	L-NC 30 3	F3	–
0.7040	GGG40	FGS 400-15	Grade 420/12	FCD 400
0.7043	GGG40.3	FGS 370-17	Grade 370/12	FCD 370
0.7050	GGG50	FGS 500-7	Grade 500/7	FCD 500
0.7060	GGG60	FGS 600-3	Grade 600/3	FCD 600
0.7070	GGG70	FGS 700-2	Grade 700/2	FCD 700
0.7080	GGG80	FGS 800-2	Grade 800/2	FCD 800
0.7652	–	S-NM 13 7	S 6	–
0.7660	–	S-NC 20 2	S 2	–
0.7661	–	S-NC 20 3	S 2	–
0.7670	–	S-N 22	S 2 C	–
0.7673	–	S-NM 23 4	S 2 M	–
0.7676	–	S-NC 30 3	S 3	–
0.7677	–	S-NC 30 1	S 3	–
0.8035	GTW35	MB 35-7	W 35-04	FCMW 330
0.8038	–	MB 380-12	–	–
0.8040	GTW40	MB 400-5	W 40-05	FCMW 370
0.8045	GTW45	MB 450-7	W 45-07	FCMWP 440
0.8135	GTS35	MN 350-10	B 35-12	FCMB 340
0.8145	GTS45	MP 50-5	P 45-06	–
0.8155	GTS55	MP 60-3	P 55-04	–
0.8165	GTS65	–	P 65-02	FCMP 540
0.8170	GTS70	MP 70-2	P 70-02	FCMP 690
0.9620	X 260 NiCr 4-2	–	Grade 2 A	–
0.9625	X 330 NiCr 4-2	–	Grade 2 B	–
0.9630	300 CrNiSi 9-5-2	–	Grade 2 C, D, E	–
0.9635	300 CrMo 15-3	–	Grade 3 A, B	–
0.9640	300 CrMoNi 15-2-1	–	Grade 3 A, B	–
0.9645	260 CrMoNi 20-2-1	–	Grade 3 C	–
0.9650	G-X 260 Cr 27	–	Grade 3 D	–
0.9655	300 CrMo 27-1	–	Grade 3 E	–
1.0301	C 10	XC 10	045 M 10040 A 10	S 10 C
1.0401	C 15	XC 12, XC 18	080 M 15	S 15 C
1.0402	C 22	C 22, XC 18, XC 25	1 C 22, 070 M 20	S 20 C, S 2 C
1.0406	C 25	1 C 25	070 M 26	S 25 C
1.0501	C 35	XC 38, 1 C 35	080 M 36, 1 C 35	S 35 C
1.0503	C 45	1 C 45, XC 48 H 1	1 C 45, 080 M 46	S 45 C
1.0511	C 40	1 C 40, XC 42 H 1	080 M 40, 1 C 40	S 40 C
1.0528	C 30	–	1 C 30, XC 32	S 30 C
1.0535	C 55	1 C 55, XC 55 H 1	1 C 55, 070 M 55	S 55 C
1.0540	C 50	1 C 50	1 C 50, 080 M50	S 50 C
1.0570	S355J2G3	E 36-3, E 36-4	Fe 510 D1 FF, 50/35	SM 490 _, SM 520 B
1.0601	C 60	1 C 60, AF 70 C 55	1 C 60, 080 A 67	S 58 C
1.0715	9 SMn 28	S 250	080 M 15, 230 M 07	SUM 22
1.0718	9 SMnPb 28	S 250 Pb	–	SUM 22 L, SUM 23 L
1.0721	10 S 20	13 MF 4, 10 F 1	210 M 15	–
1.0722	10 SPb 20	CC 10 Pb, 10 PbF 2	–	SUM 12
1.0726	35 S 20	35 MF 6	212 M 36	SUM 41
1.0727	45 S 20	45 MF 61, 45 MF 4	212 M 36	SUM 42
1.0728	60 S 20	–	–	–
1.0736	9 SMn 36	S 300	240 M 07	SUM 25
1.0737	9 SMnPb 36	S 300 Pb	–	SUM 24 L
1.1121	Ck 10 (C 10 E)	XC 10	045 M 10, 040 A 10	S 9 CK, S 10 C
1.1141	Ck 15 (C 15 E)	XC 12, XC 15	080 M 15, 040 A 15	S 15, S 15 Ck
1.1151	C 22 E	2 C 22, XC 18/25	055 M 15	S 20 C, S 20 CK, S 22 C
1.1157	40 Mn 4	35 M 5, 40 M 5	150 M 36	–
1.1158	C 25 E	2 C 25, XC 25	070 M 26	S 25 C, S 28 C

UNI - I	UNE - E	AISI - US	condition	material group
G 10	FG 10	Class 20 B	U	15
G 15	FG 15	Class 25 B	U	15
G 20	FG 20	Class 30 B	U	16
G 25	FG 25	Class 40 B	U	16
G 30	FG 30	Class 45 B	U	16
G 35	FG 35	Class 50 B	U	16
–	–	–	GG/AU	17
–	–	–	GG/AU	17
–	–	–	GG/AU	17
–	–	–	GG/AU	18
–	–	–	GG/AU	31
GS 400-12	–	Grade 60-40-18	U	17
–	–	–	U	17
GS 500-7	–	Grade 65-45-12	U	17
GS 600-3	–	Grade 80-55-06	U	18
GS 700-2	–	Grade 100-70-03	U	18
GS 800-2	–	Grade 120-90-02	U	18
–	–	–	GGG/AU	17
–	–	–	GGG/AU	17
–	–	–	GGG/AU	18
–	–	–	GGG/AU	17
–	–	–	GGG/AU	17
–	–	–	GGG/AU	31
–	–	–	GGG/AU	31
–	–	–	G	20
W 38-12	–	–	G	19
W 40-05	–	–	G	19
W 45-07	–	–	G	19
B 35-10	Type A	Grade 22010, 32510	G	19
P 45-06	Type E	–	G	19
P 55-04	Type C	–	G	20
P 65-02	–	–	G	20
P 70-02	–	–	G	20
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
C 10	F. 1511	1010	–	1
C 15, C 16	F. 111	1015	–	1
1 C 22, C 20, C 21	1 C 22, F. 112	1020, 1023	–	1
C 25, 1 C 25	–	1025	var[1]	2–3
C 35, 1 C 35	1 C 35, F. 113	1035	var[1]	2–3
C 45, 1 C 45	1 C 45, F. 114	1045	var[1]	2–3
1 C 40	1 C 40, F. 114.	1040	var[1]	2–3
1 C 30	1 C 30	1030	var[1]	2–3
C 55, 1 C 55	1 C 55	1055	var[1]	4–5
1 C 50	1 C 50	1050	var[1]	2–3
Fe 510 C FN	AE 355 D, Fe 510 D1 FF	–	–	2
C 60, 1 C 60	1 C 60	1060	var[1]	4–5
CF 9 SMn 28, CF 9 M 07	F. 2111	1213	1	–
CF 9 SMnPb 28	F. 2112	12 L 14, 12 L 13	–	1
CF 10 S 20	F. 2121	1102, 1108, 1109	–	1
CF 10 SPb 20	F. 2122	1108, 11 L 08	–	1
CF 35 SMn 10	F. 2131, F. 210.	1141, 1140	var[1]	2–3
CF 44 SMn 28	F. 2133	1146	var[1]	2–3
–	–	1151	var[1]	4–5
CF 9 SMn 36	F. 2113	1215	–	1
CF 9 SMnPb 36	F. 2114	12 L 14	–	1
C10, 2 C 10	F. 1510, C 10	1010	–	1
C 15, C 16	F. 1110, F. 1511	1015	–	1
C 20, C 25	F. 1120	1020, 1023	–	1
–	–	1035, 1041	var[1]	2–3
C 25	F. 1120	1025	var[1]	2–3

material number	DIN EN - D	AFNOR - F	BS - UK	JIS
1.1170	28 Mn 6	28 Mn 6, 35 M 5	28 Mn 6, 150 M 19	SMn 433
1.1178	C 30 E	–	2 C 30, XC 32	S 30 C
1.1181	C 35 E	2 C 35, XC 38 H 1	080 M 36	S 35 C
1.1183	Cf 35	XC 42 TS	080 A 35	S 35 C
1.1186	C 40 E	2 C 40, XC42 H 1	2 C 40, 080 M 40	S 40 C
1.1191	C 45 E	XC 48 H 1, 2 C 45	2 C 45, 080 M 46	S 45 C
1.1193	Cf 45	XC 42 TS	060 A 47	S 45 C
1.1203	C 55 E	2 C 55, XC 55 H 1	2 C 55, 070 M 55	S 55 C
1.1206	C 50 E	2 C 50	2 C 50, 080 M 50	S 50 C
1.1213	Cf 53	42 M 4 TS	060 A 57	S 50 C
1.1221	C 60 E	2 C 60	2 C 60, 060 A 62	S 58 C
1.2241	51 CrV 4	50 CV 4	735 A 51	SUP 10
1.2369	81 MoCrV 42-16	–	–	–
1.3505	100 Cr 6	100 C 6	535 A 99	SUJ 2
1.3520	100 CrMn 6	–	535 A 99	SUJ 3
1.3533	17 NiCrMo 14	16 NCD 13	–	–
1.3536	100 CrMo 7-3	–	–	–
1.3537	100 CrMo 7	100 CD 7	–	SUJ 4
1.3541	X 45 Cr 13	–	–	–
1.3543	X 102 CrMo 17	Z 100 CD 17	–	SUS440 C
1.3551	80 MoCrV 42-16	80 DCV 40	–	–
1.3553	X 82 WMoCrV 6-5-4	Z 85 WDCV 6	BM 2	SKH 51
1.3558	X 75 WCrV 18-4-1	–	BT 1	SKH 2
1.4000	X 6 Cr 13	Z 6 C 13	403 S 17	SUS 410 S
1.4002	X 6 CrAl 13	Z6 CA 13	405 S 17	SUS 405
1.4005	X 12 CrS 13	Z12 CF 13	416 S 21	SUS 416
1.4006	X 12 Cr 13 (X 10 Cr 13)	10 C 13, Z 12 C 13	410 S 21	SUS 410
1.4007	X 35 Cr 14	–	–	SUS 420
1.4016	X 6 Cr 17	Z 8 C 17	430 S 17	SUS 430
1.4021	X 20 Cr 13	Z 20 C 13	420 S 37	SUS 420
1.4024	X 15 Cr 13	–	403 S 17	–
1.4028	X 30 Cr 13	30 C 13, Z 33 C 13	420 S 45	SUS 420
1.4034	X 46 Cr 13	Z 40 C 14	420 S 45	SUS 420
1.4057	X 20 CrNi 17-2	Z 15 CN 16-02	431 S 29	SUS 431
1.4104	X 12 CrMoS 17	Z 10 CF 17	441 S 29	SUS 430 F
1.411	X 90 CrMoV 1	–	–	SUS 440 B
1.4113	X 6 CrMo 17-1	Z 8 CD 17-01	434 S 17	SUS 434
1.4125	X 105 CrMo 17	Z100 CD 17	–	SUS 440 C
1.4301	X 5 CrNi 18-10 (X 4 CrNi 18-10)	Z 6 CN 18-09	304 S 16	SUS 304
1.4303	X 5 CrNi 18-12 (X 4 CrNi 18-12)	Z 8 CN 18-12	305 S 19	–
1.4305	X 10 CrNiS 18-9	Z 10 CNF 18-09	303 S 21	SUS 303
1.4306	X 2 CrNi 19-11	Z 2 CN 18-10	304 S 11	SUS 304 L
1.4307	X 2 CrNi 18-9	Z 3 CN 18-10	304 S 11	SUS 304 L
1.4310	X 12 CrNi 17-7	Z 11 CN 18-08	301 S 21	SUS 301
1.4311	X 2 CrNiN 18-10	Z 3 CN 18-10 Az	304 S 61	SUS 304 LN
1.4362	X 2 CrNiN 23-4	Z 3 CN 23-04 Az	–	–
1.4372	X 12 CrMnNiN 17-7-5	Z 12 CMN 17-07 Az	–	–
1.4401	X 5 CrNiMo 17-12-2 (X 4 CrNiMo 17-12-2)	Z 6 CND 17-11	316 S 31	SUS 316
1.4404	X 2 CrNiMo 17-13-2 (X 2 CrNiMo 17-12-2)	Z 2 CND 17-12	316 S 11	SUS 316 L
1.4406	X 2 CrNiMoN 17-11-2 (X 2 CrNiMoN 17-11-2)	Z 2 CND 17-11 Az	316 S 62	SUS 316 LN
1.4410	X 2 CrNiMoN 25-7-4	Z 3 CND 25-06 Az	–	–
1.4418	X 4 CrNiMo 16-5	Z 6 CND 16 05 1	–	–
1.4429	X 2 CrNiMoN 17-13-3	Z 2 CND 17-13 Az	–	SUS 316 LN
1.4432	X 2 CrNiMo 17-12-3	Z 3 CND 17-12-03	316 S 13	SUS 316 L
1.4434	X 2 CrNiMoN 17-12-3	Z 3 CND 19-14 Az	–	SUS 317 LN
1.4435	X 2 CrNiMo 18-14-3	Z 2 CND 17-13	316 S 13	SUS 316 L
1.4436	X 5 CrNiMo 17-13-3 (X 4 CrNiMo 17-13-3)	Z 6 CND 17-12	316 S 33	SUS 316
1.4438	X 2 CrNiMo 18-16-4 (X 2 CrNiMo 18-15-4)	Z 2 CND 19-15	317 S 12	SUS 317 L
1.4439	X 2 CrNiMoN 17-13-5	3 CND 18-14-05 Az	–	–
1.4441	X 2 CrNiMo 18-15-3	Z 3 CND 18-14-13	316 S 13	–
1.4460	X 4 CrNiMoN 27-5-2 (X 3 CrNiMoN 27-5-2)	25 CND 27-05 A2	–	SUS 329
1.4462	X 2 CrNiMoN 22-5-3	Z2 CND 22-05 Az	–	–
1.4466	X 1 CrNiMoN 25-22-2 (X 2 CrNiMoN 25-22-2)	–	–	–
1.4504	[X 8 CrNiAl 17-7]	Z 8 CNA 17-07	316 S 111	17-7 PH
1.4510	X 6 CrTi 17 (X 3 CrTi 17)	Z 8 CT 17	–	–
1.4512	X 6 CrTi 12 (X 2 CrTi 12)	Z 3 CT 12	409 S 19	SUH 409
1.4532	X 7 CrNiMoAl 15-7 (X 8 CrNiMoAl 15-7-2)	Z 8 CNDA 15-7	–	–
1.4540	X 4 CrNiCuNb 16-4	Z 6 CNU 17-04	–	SUS 630
1.4541	X 6 CrNiTi 18-10	Z 6 CNT 18-10	321 S 12	SUS 321

UNI - I	UNE - E	AISI - US	condition	material group
28 Mn 6	28 Mn 6, 36 Mn	1330	var[1]	2–3
2 C 30, 080 M 30	2 C 30	–	var[1]	2–3
2 C 35, C 35	2 C 35, C 35 k	–	var[1]	2–3
C 36	C 38 k	1035	var[1]	2–3
2 C 40, C40	2 C 40, C 42 k	1040	var[1]	2–3
2 C 45, C 45	2 C 45, C 45 k	–	var[1]	2–3
C 43	C 42 k	1045	var[1]	2–3
2 C 55, C 55	2 C 55, C 55 k	–	var[1]	4–5
2 C 50, C 50	2 C 50, C 55 k	1050	var[1]	2–3
C 48	C 48 k	1050	var[1]	2–3
2 C 60, C 60	2 C 60	–	var[1]	4–5
50 CrV 4	F.1430	6150	var[1]	6–9
–	–	613	var[1]	10–11
100 Cr 6	–	52100	var[1]	6–9
100 CrMo 7	–	A 485/2	var[1]	6–9
–	–	E-3310	var[1]	6–9
–	–	5120	var[1]	6–9
100 CrMo 7	–	A 485/3	var[1]	6–9
X 45 Cr 13	–	–	var[1]	10–11
X 105 CrMo 17	–	440 C	var[1]	10–11
X 80 MoCrV 44	–	–	var[1]	10–11
X 82 WMoV 6 5	–	M2 regular C	var[1]	10–11
X 75 WCrV 18	–	T 1	var[1]	10–11
X5 Cr 13	–	410 S	FE	12
X 6 CrA 13	–	405	FE	12
X 12 CrS 13	–	416	FE	12
X 12 Cr 13	–	410	MA	12
–	–	420	MA	12
X 8 Cr 17	–	430	FE	12
X 20 Cr 13	–	420	MA	12
–	–	403	MA	12
–	–	420	MA	13.1
–	–	420	MA	13.1
X 15 CrNi 16	–	431	MA	13.1
X 10 CrS 17	–	430 F	MA	13.1
–	–	440 B	MA	13.1
X 8 CrMo 17	–	434	MA	13.1
–	–	440 C	MA	13.1
X 5 CrNi 18 10	–	304	AU	14.1
X 8 CrNi 18 12	–	305	AU	14.1
X 10 CrNiS 18 09	–	303	AU	14.1
X 2 CrNi 18 11	–	304 L	AU	14.1
–	–	304 L	AU	14.1
X 12 CrNi 17 07	–	301	AU	14.1
–	–	304 LN	AU	14.1
–	–	–	DU	14.2
–	–	201	DU	14.2
X 5 CrNiMo 17 12	–	316	AU	14.1
X 2 CrNiMo 17 12	–	316 L	AU	14.1
X 2 CrNiMoN	–	316 LN	AU	14.1
–	–	–	DU	14.2
–	–	–	MA	13.1
X 2 CrNiMoN 17 13	–	316 LN	AU	14.1
–	–	316 L	AU	14.1
–	–	317 LN	AU	14.1
X 2 CrNiMo 17 13	–	316 L	AU	14.1
X 5 CrNiMo 17 13	–	316	AU	14.1
X 2 CrNiMo 18 16	–	317 L	AU	14.1
–	–	–	AU	14.1
–	–	316 LVM	AU	14.1
–	–	329	DU	14.2
–	–	2205	DU	14.2
–	–	310 mod	S-AU	14.3
X 2 CrNiMo 17.12	–	17-7 PH	AU-PH	14.4
–	–	439, 430 Ti	FE	12
–	–	409	FE	12
–	–	632	AU	14.1
–	–	630	AU	14.1
X 6 CrNiTi 18 11	–	321	AU	14.1

material number	DIN EN - D	AFNOR - F	BS - UK	JIS
1.4542	X 5 CrNiCuNb 17-4	Z 6 CNU 17-04, Z 7 CNNb 17-07	–	SUS 630
1.4548	X 5 CrNiCuNb 17-4-4	Z 7 CNNb 17-07	–	SUS 630
1.4550	X 6 CrNiNb 18-10	Z 6 CNNB 18-10	347 S 17	SUS 347
1.4552	GX 5 CrNiNb 19-10 (G-X 5 CrNiNb 18-9)	Z 6 CNNb 18.10 M	347 C 17	SCS 21
1.4567	X 3 CrNiCu 18-9 (X 3 CrNiCu 18-9-4)	Z 3 CNU 18-09 FF	–	–
1.4568	X 7 CrNiAl 17-7	Z 8 CNA 17-7	316 S 111	17-7 PH
1.4571	X 6 CrNiMoTi 17-12-2	Z 6 CNDT 17-12	320 S 31	SUS 316 Ti
1.4573	X 10 CrNiMoTi 18-12	Z 6 CNDT 17-13	320 S 33	–
1.4580	X 6 CrNiMoNb 17-12-2	Z 6 CNDNb 17-12	–	–
1.4581	GX 5 CrNiMoNb 19-11 (G-X 5 CrNiMoNb 18-10)	Z 4 CNDNb 18.12 M	318 C 17	SCS 22
1.4583	X 10 CrNiMoNb 18-12	Z 6 CNDNb 17-13	–	–
1.4713	X 10 CrAl 7	Z 8 CA 7	–	–
1.4718	X 45 CrSi 9-3	Z 45 CS 9	401 S 45	SUH 1
1.4720	X 7 CrTi 12	Z 6 CT 12	–	SUS 409
1.4724	X 10 CrAl 13	Z 10 C 13	403 S 17	SUS 405
1.4731	X 40 CrSiMo 10-2	Z 40 CSD 10	–	SUH 3
1.4742	X 10 CrAl 18	Z 12 CAS 18, Z 10 CAS 18	430 S 17	SUS 430
1.4748	X 85 CrMoV 18-2	Z 85 CDV 18.02	–	–
1.4762	X 10 CrAl 24	Z10 CAS 24	–	SCH446
1.4821	X 20 CrNiSi 25-4	Z 20 CNS 25.04	–	–
1.4828	X 15 CrNiSi 20-12 Z	15 CN 23-13, Z 15 CNS 20-12	309 S 24	SUS 309 S
1.4833	X 7 CrNi 23-14	Z 15 CN 23.13, Z 15 CN 24.13	309 S 16	SUH 309
1.4841	X 15 CrNiSi 25-20	Z 15 CNS 25-20, Z 12 CNS 25-20	310 S 24	SUS310
1.4845	X 12 CrNi 25-21	Z 12 CN 26.21, Z 12 CN 25.20	310 S 31	SUH 310
1.4864	X 12 NiCrSi 36-16	Z 20 NCS 33.16, Z 12 NCS 35.16	–	SUH 330
1.4871	X 53 CrMnNiN 21-9	Z 53 CMN 21.09 Az	349 S 54	SUH 35
1.4873	X 45 CrNiW 18-9	Z 35 CNWS 14.14	331 S 40	SUH 31
1.4875	X 55 CrMnNiN 20-8	Z 55 CMN 20.08 Az	–	–
1.4876	X 10 NiCrAlTi 32-20	Z 8 NC 33.21, Z 8 NC 32.21	–	–
1.487	X 12 CrNiTi 18-9	Z 6 CNT 18.12, Z 6 CNT 18.10	321 S 12, 321 S 51	SUS 321
1.4948	X 6 CrNi 18-11	Z 6 CN 18-09	304 S 51	SUS304
1.5023	38 Si 7	46 S 7	–	–
1.5092	60 SiCr 7	61 SC 7	251 A 61	SUP 7
1.5919	15 CrNi 6	16 NC 6	815 M 17	SNC 15
1.5920	18 CrNi 8	20 NC 6	822 M17	SNCM 616
1.6511	36 CrNiMo 4	36 CrNiMo 4	36 CrNiMo 4, 817 A 37	SNCM 439
1.6580	30 CrNiMo 8	30 CrNiMo 8, 30 CND 8	30 CrNiMo 8	SNCM 630
1.6582	34 CrNiMo 6	34 CrNiMo 6	34 CrNiMo 6, 817 M 40	SNCM 447
1.6587	17 CrNiMo 6	18 NCD 6	820 M 17	SNCM 815
1.7003	38 Cr 2	38 Cr 2	38 Cr 2, 120 M 36	SMn 438
1.7003	46 Cr 2	46 Cr 2, 42 C 2	46 Cr 2, 605 M 36	SMn 443
1.7030	28 Cr 4	30 CD 4	530 A 30	–
1.7033	34 Cr 4	34 Cr 4, 32 C 4	34 Cr 4, 530 A 32	SCr 430
1.7034	37 Cr 4	37 Cr 4, 38 C 4	37 Cr 4, 530 A 36	SCr 435
1.7035	41 Cr 4	41 Cr 4, 42 C 4	41 Cr 4, 530 M 40	41 Cr 4SCr 440
1.7037	34 CrS 4	34 CrS 4, 32 C 4	34 CrS 4, 530 A 32	–
1.7038	37 CrS 4	37 CrS 4, 38 C 4	37 CrS 4, 530 A 36	–
1.7039	41 CrS 4	41 CrS 4, 42 C 4	41 CrS 4, 530 M 40	–
1.7102	54 SiCr 6	51 S 7	251 A 58	SKD12
1.7131	16 MnCr 5	16 MC 5	527 M 17	–
1.7147	20 MnCr 5	20 MC 5	–	SMnC 420
1.7176	55 Cr 3	55 C 3	525 A 60	SUP 9
1.7213	25 CrMoS 4	25 CrMoS 4, 25 CD 4	25 CrMoS 4, 708 A 25	–
1.7218	25 CrMo 4	25 CrMo 4, 25 CD 4	25 CrMo 4, 708 A 25	SCM 430
1.7220	34 CrMo 4	34 CrMo 4, 34 CD 4	34 CrMo 4, 708 A 37	SCM 435
1.7225	42 CrMo 4	42 CrMo 4, 42 CD 4	42 CrMo 4, 708 M 40	SCM440
1.7226	34 CrMoS 4	34 CrMoS 4, 34 CD 4	34 CrMoS 4708 A 37	–
1.7227	42 CrMoS 4	42 CrMoS 4, 42 CD 4	42 CrMoS 4, 708 M 40	–
1.7228	50 CrMo 4	50 CrMo 4	50 CrMo 4, 708 A 47	–
1.7321	20 MoCr 4	–	805 M 20	SNCM 220
1.7325	25 MoCr 4	18 CD 4	–	–
1.7361	32 CrMo 12	30 CD 12	722 M 24	–
1.7701	51 CrMoV 4	51 CDV 4	–	SUP 13
1.8159	51 CrV 4	51 CrV 4, 50 CV 4	51 CrV 4	SUP 10
1.8507	34 CrAlMo 5	–	–	–
1.8509	41 CrAlMo 7	40 CAD 6 12	905 M 39	–
1.8515	31 CrMo 12	30 CD 12	722 M 24	–
1.8523	39 CrMoV 13-9	–	897 M 39	–
1.8550	34 CrAlNi 7	–	–	–

UNI - I	UNE - E	AISI - US	condition	material group
—	—	630	AU-PH	14.4
—	—	630	AU-PH	14.4
X 8 CrNiNb 18 11	—	347	AU	14.1
—	—	—	AU	14.1
—	—	302 HQ	AU	14.1
X 2 CrNiMo 17.12	—	17-07 PH	AU-PH	14.4
X 6 CrNiMoTi 17 12	—	316 Ti	AU	14.1
X 6 CrNiMoTi 17 12	—	(316 Ti)	AU	14.1
X 6 CrNiMoNb 17 12	—	316 Cb	AU	14.1
GX 6 CrNiMoNb 20 11	—	—	AU	14.1
X 6 CrNiMoNb 17 13	—	316 Cb, (318)	AU	14.1
—	—	—	FE	10–11
X 45 CS 8	—	HNV 3	—	31–32
—	—	409	—	31–32
X 10 CrAl 12	X 10 CrAl 13	405	FE	12
—	—	—	—	12
X 8 Cr 17	X 10 CrAl 18	430	—	12
—	—	—	—	31–32
X 16 Cr 26	—	446	—	12
—	X 15 CrNiSi 25 04	—	DU	14.2
—	X 10 CrNiSi 20	309	AU	14.1
X 6 CrNi 23 14	—	309 S	AU	14.1
X 16 CrNiSi 25 20	X 15 CrNiSi 25 20	310	AU	14.1
—	—	310 S	AU	14.1
—	X 12 NiCrSi 36 16	330	—	31–32
—	—	EV 8	—	10
X 45 CrNiW 18 9	—	EV 9	—	31–32
—	—	EV 11	—	31–32
—	X 10 NiCrAlTi 32 20	—	S-AU	31–32
X 6 CrNiTi 18 11	—	321, 321 H	—	31–32
—	—	304H	AU	14.1
—	—	—	var1	6–9
60 SiCr 8	F.1442	9260	var1	6–9
—	F.1581	4320	var1	6–9
16 NiCrMo 12	F.1525	—	var1	6–9
36 CrNiMo 4, 39 NiCrMo 3 1	36 CrNiMo 4, 40 NiCrMo 4	—	var1	6–9
SNCM 630	30 CrNiMo 8, 32 NiCrMo 16	—	var1	6–9
34 CrNiMo 6	34 CrNiMo 6	4340	var1	6–9
18 NiCrMo 12	F.1560	—	var1	6–9
38 Cr 2	38 Cr 2, 38 Cr 3	—	var1	6–9
46 Cr 2	46 Cr 2	—	var1	6–9
—	—	—	var1	6–9
34 Cr 4	34 Cr 4	5132	var1	6–9
37 Cr 4	37 Cr 4, 38 Cr 4	5135	var1	6–9
41 Cr 4	41 Cr 4, 42 Cr 4	5140	var1	6–9
34 CrS 4	34 CrS 4	—	var1	6–9
37 CrS 4	37 Cr 4, 38 Cr 4-1	—	var1	6–9
41 CrS 4	41 CrS 4, 42 Cr 4-1	—	var1	6–9
48 Si 7	F.1450	9260	var1	6–9
16 MnCr 5	F.1516	—	var1	6–9
20 MnCr 5	F.1523	—	var1	6–9
55 Cr 3	—	5155	var1	6–9
25 CrMoS 4, 25 CrMo 4	25 CrMoS 4, 30 CrMo 4-1	—	var1	6–9
25 CrMo 4	25 CrMo 4, 30 CrMo 4	4130	var1	6–9
34 CrMo 4, 35 CrMo 4	34 CrMo 4, 35 CrMo 4	4137	var1	6–9
42 CrMo 4	42 CrMo 4	—	var1	6–9
34 CrMoS 4, 35 CrMo 4	34 CrMoS 4, 35 CrMo 4	—	var1	6–9
42 CrMoS 4, 42 CrMo 4	42 CrMoS 4, 40 CrMo 4-1	—	var1	6–9
50 CrMo 4	50 CrMo 4	4150	var1	6–9
16 NiCrMo 2	F.1523	8620	var1	6–9
20 NiCrMo 2	—	8625	var1	6–9
—	—	—	var1	6–9
51 CrMoV 4	—	—	var1	6–9
51 CrV 4, 50 CrV 4	51 CrV 4	6150	var1	6–9
—	35 CrAlMo 5	A 355/D	var1	6–9
41 CrAlMo 7	41 CrAlMo 7	A 355/A	var1	6–9
31 CrMo 12	31 CrMo 12	—	var1	6–9
36 CrMoV 12	—	—	var1	6–9
—	—	A 355/C	var1	6–9

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Index

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Index

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Index

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WIDIA

WIDIA

WIDIA

WIDIA

WIDIA

WIDIA

WIDIA

WIDIA

Index

WIDIA

Index

Index

WIDIA

WIDIA

WIDIA

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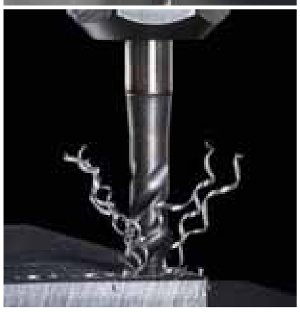

Turning Icons

Shank: KM-TS™ (ISO 26622)	ISO: 26622	Through Coolant: 100 bar	Through Coolant: 100 bar	Turning
Cut-off	I.D. Turning	I.D. Chamfering	I.D. Grooving	I.D. Face Grooving
I.D. Internal Threading	Profiling	Facing	Face Grooving	Back Boring
Threading	Grooving			

Indexable Milling Icons

Countersinking	Face Milling	Helical Milling	Plunge Milling	Ramping Blank
Slotting: Ball Nose	Slotting: Side Milling	Slotting: Side Milling with AE/AP Dimensions	Slotting: Square End	Slotting: T
Side Milling/Shoulder Milling: Ball Nose	Side Milling/Shoulder Milling: Square End	Side Milling: Square End with AE/AP Dimensions	Chamfer Milling	Side Milling: Roughing
3D Profiling	PCD Tool	Pocketing	Plain Shank	Shell Mill Shank
Weldon® Shank	Weldon Shank: 2 Flat	Screw-On Shank	Shank	Through Coolant: Radial: Indexable Milling

Solid End Milling Icons

Plunge Milling	Ramping Blank	Slotting: Ball Nose	Slotting: Ball Nose with AP Dimension	Slotting: Square End
Slotting: Square End with AP Dimension	Trochoidal Milling	Trochoidal Milling: Ball Nose	Side Milling/ Shoulder Milling: Ball Nose	Side Milling/Shoulder Milling: Ball Nose with AE/AP Dimension
Side Milling/Shoulder Milling: Square End	Side Milling/Shoulder Milling: Square End with AE/AP Dimension	Chamfer Milling	Chamfer Milling: Chamfer Milling with AE/AP Dimension	3D Profiling
PCD Tool	HSS-PM Material	HSS-M42	Corner Style: Ball Nose	Corner Style: Corner Chamfer
Corner Style: Corner Radius	Corner Style: Square End	Corner Style: Torus	Helix Angle: 0°	Helix Angle: 15°

(continued)

(continued)

Solid End Milling Icons

Helix Angle: 20°	Helix Angle: 25°	Helix Angle: 30°	Helix Angle: 35°	Helix Angle: 37°
Helix Angle: 38°	Helix Angle: 40°	Helix Angle: 45°	Helix Angle: 50°	Helix Angle: 60°
Helix Angle: 43°	DIN 6528	DIN 844	DIN 1835B	DIN 6527
Through Coolant: Radial: Drilling	Through Coolant: Axial: Solid End Mill	Tool Dimensions: Flute Configuration: X (Variable)	Tool Dimensions: Flute Configuration: 1	Tool Dimensions: Flute Configuration: 2
Tool Dimensions: Flute Configuration: 3	Tool Dimensions: Flute Configuration: 4	Tool Dimensions: Flute Configuration: 5	Tool Dimensions: Flute Configuration: 6	Tool Dimensions: Flute Configuration: 7
Manufacturer's Specs: JIS				

Holemaking Icons

Countersinking/ Stroke Chamfering	Drilling	Chain Drilling	Drilling: Cross Hole	Drilling: Half Cylinder
Drilling: Corner Drilling 45°	Drilling: Inclined Entry	Drilling: Inclined Exit	Drilling: Exit Offset	Drilling: Stacked Plates
Drilling: Convex	Drilled Hole	Reaming: Through Hole	Reaming: Blind Hole	Reaming: Through Cross
Reaming: Blind and Cross Holes	Drilling Depth: 3x	Drilling Depth: 5x	Drilling Depth: 8x	Drilling Depth: 12x
Shank: Cylindrical Plain ≤h6	Shank: Cylindrical Whistle Notch 2°	Flat Shank	Shank: Cylindrical with flat	KM™ Shank
Helix Angle 0°	Helix Angle 30°	DIN Number 212	DIN Number 6535	DIN Number 6537
Through Coolant: Radial: Drilling	Through Coolant: Radial: Drilling	Through Coolant: Radial: Indexable Drilling	Flood Coolant: Reaming	Through Coolant: MQL (Minimum Quantity Lubricant): Drilling
Axial: Drilling	Through Coolant: Axial Reaming	Tool Dimensions: 2-Flute/2-Margin/ Coolant	Tool Dimensions: 2-Flute/4-Margin/ Coolant	

(continued)

(continued)

Tapping Icons

Tapping: Blind Hole	Threading: Through Hole	Threading: Blind Hole	HSS-E: High-Speed Steel with Cobalt Alloy for Materials with Higher Hardness	HSS-E-PM: High-Speed Steel with Cobalt Alloy for Materials with Higher Hardness (PM = Power Metal Steel)
HM: (Carbide)	Square Shank	Chamfer Form C (2–3)	Chamfer Form D (3.5–5)	Chamfer Form E (1.5–2)
Plug Chamfer (3–5)	Tapping Helix: Angle: 0°	Tapping Helix: Angle: 10°	Tapping Helix: Angle: L8°	Tapping Helix: Angle: 15°
Tapping Helix: Angle: L15°	Tapping Helix: Angle: 25°	Tapping Helix: Angle: 30°	Tapping Helix: Angle: 42°	Tapping Helix: Angle: 45°
DIN Number 371	DIN Number 374	DIN Number 2174	DIN Number 376	Tapping: Through Coolant
Flood Coolant: Tapping	Through Coolant: Axial: Tapping	ISO 2	Manufacturer's Specs: JIS	Class of Fit: 2B
Class of Fit: 3B	Class of Fit: 6H	Class of Fit: 6HX	Class of Fit: 6G	ANSI
Unified Course Thread: J Profile	Unified Fine Thread: J Profile	Unified Fine Thread	Unified Course Thread	ISO Metric Coarse Thread
ISO Metric Fine Thread				

DIN — German Institute for Standardisation

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P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

material group	description	content	tensile strength RM (MPa)*	hardness (HB)	hardness (HRC)	material number
P0	Low-Carbon Steels, Long Chipping	C <0,25%	<530	<125	–	–
P1	Low-Carbon Steels, Short Chipping, Free Machining	C <0,25%	<530	<125	–	C15, Ck22, ST37-2, S235JR, 9SMnPb28, GS38
P2	Medium- and High-Carbon Steels	C >0,25%	>530	<220	<25	ST52, S355JR, C35, GS60, Cf53
P3	Alloy Steels and Tool Steels	C >0,25%	600–850	<330	<35	16MnCr5, Ck45, 21CrMoV5-7, 38SMn28
P4	Alloy Steels and Tool Steels	C >0,25%	850–1400	340–450	35–48	100Cr6, 30CrNiMo8, 42CrMo4, C70W2, S6525, X120Mn12
P5	Ferritic, Martensitic, and PH Stainless Steels	–	600–900	<330	<35	100Cr6, 30CrNiMo8, 42CrMo4, C70W2, S6525, X120Mn12
P6	High-Strength Ferritic, Martensitic, and PH Stainless Steels	–	900–1350	350–450	35–48	X102CrMo17, G-X120Cr29
M1	Austenitic Stainless Steel	–	<600	130–200	–	X5CrNi 18 10, X2CrNiMo 17 13 2, G-X25CrNiSi18 9, X15CrNiSi 20 12
M2	High-Strength Austenitic Stainless and Cast Stainless Steels	–	600–800	150–230	<25	X2CrNiMo 13 4, X5NiCr 32 21, X5CrNiNb 18 10, G-X15CrNi 25-20
M3	Duplex Stainless Steel	–	<800	135–275	<30	X8CrNiMo27 5, X2CrNiMoN22 5 3, X20CrNiSi25 4, G-X40CrNiSi27 4
K1	Grey Cast Iron	–	125–500	120–290	<32	GG15, GG25, GG30, GG40, GTW40
K2	Low- and Medium-Strength Ductile Irons (Nodular Irons) and Compacted Graphite Irons (CGI)	–	<600	130–260	<28	GGG40, GTS35
K3	High-Strength Ductile Irons and Austempered Ductile Iron (ADI)	–	>600	180–350	<43	GGG60, GTW55, GTS65
N1	Wrought Aluminium	–	–	–	–	AlMg1, Al99.5, AlCuMg1, AlCuBiPb, AlMgSi1, ALMgSiPb
N2	Low-Silicon Aluminium Alloys and Magnesium Alloys	Si <12,2%	–	–	–	GAlSiCu4, GDAlSi10Mg
N3	High-Silicon Aluminium Alloys and Magnesium Alloys	Si >12,2%	–	–	–	G-ALSi12, G-AlSi17Cu4, G-AlSi21CuNiMg
N4	Copper-, Brass-, Zinc-Based on Machinability Index Range of 70–100	–	–	–	–	CuZn40, Ms60, G-CuSn5ZnPb, CuZn37, CuSi3Mn
N5	Nylon, Plastics, Rubbers, Phenolics, Resins, Fibreglass	–	–	–	–	Lexan®, Hostalen™, Polystyrol, Makrolon®
N6	Carbon, Graphite Composites, CFRP	–	–	–	–	CFK, GFK
N7	Metal Matrix Composites (MMC)	–	–	–	–	–
S1	Iron-Based, Heat-Resistant Alloys	–	500–1200	160–260	25–48	X1NiCrMoCu32 28 7, X12NiCrSi36 16, X5NiCrAlTi31 20, X40CoCrNi20 20
S2	Cobalt-Based, Heat-Resistant Alloys	–	1000–1450	250–450	25–48	Haynes® 188, Stellite® 6,21,31
S3	Nickel-Based, Heat-Resistant Alloys	–	600–1700	160–450	<48	INCONEL® 690, INCONEL 625, Hastelloy®, NIMONIC® 75
S4	Titanium and Titanium Alloys	–	900–1600	300–400	33–48	Ti1, TiAl5Sn2, TiAl6V4, TiAl4Mo4Sn2
H1	Hardened Materials	–	–	–	44–48	GX260NiCr42, GX330NiCr42, GX300CrNiSi952, GX300CrMo153, Hardox® 400
H2	Hardened Materials	–	–	–	48–55	–
H3	Hardened Materials	–	–	–	56–60	–
H4	Hardened Materials	–	–	–	>60	–

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IMPORTANT SAFETY INSTRUCTIONS: Read before using the tools in this catalogue

METALCUTTING SAFETY

Projectile and Fragmentation Hazards

Modern metalcutting operations involve high spindle and cutter speeds and high temperatures and cutting forces. Hot metal chips may fly off the workpiece during metalcutting. Although cutting tools are designed and manufactured to withstand high cutting forces and temperatures, they can sometimes fragment, particularly if they are subjected to over-stress, severe impact, or other abuse.

To avoid injury:

- Always wear appropriate personal protective equipment, including safety goggles, when operating metalcutting machines or working nearby.
- Always make sure all machine guards are in place.

Breathing and Skin Contact Hazards

Grinding carbide or other advanced cutting tool materials produces dust or mist containing metallic particles. Breathing this dust or mist — especially over an extended period — can cause temporary or permanent lung disease or make existing medical conditions worse. Contact with this dust or mist can irritate eyes, skin, and mucous membranes and may make existing skin conditions worse.

To avoid injury:

- Always wear breathing protection and safety goggles when grinding.
- Provide ventilation control and collect and properly dispose of dust, mist, or sludge from grinding.
- Avoid skin contact with dust or mist.

For more information, read the applicable Material Safety Data Sheet provided by WIDIA and consult General Industry Safety and Health Regulations, Part 1910, Title 29 of the Code of Federal Regulations.

These safety instructions are general guidelines. Many variables affect machining operations. It is impossible to cover every specific situation. The technical information included in this catalogue and recommendations on machining practices may not apply to your particular operation.

For more information, consult WIDIA's Metalcutting Safety booklet, available free from WIDIA at +1 724 539 5747 or fax +1 724 539 5439. For specific product safety and environmental questions, contact our Corporate Environmental Health and Safety Office at +1 724 539 5066 or fax +1 724 539 5372.

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