



2017 Master Catalogue

Europe | Middle East | Africa | Asia-Pacific | India

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.**

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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, specialised 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, ClappDI Co, Manchester, Metal Removal, Metcut, and Rübige 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

CELEBRATING


90
YEARS

1926 - 2016



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. Resulting in flawless execution that accelerates every job, and maximises every shift.

widia.com/novo



01

THE DIGITAL SOURCE FOR DELIVERING
SMART MACHINING SOLUTIONS

widia.com/novo

NOVO  TM

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.



ToolBOSS™ Vending Solution

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

See pages J99 and P9 to learn more.



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 page viii to learn more.



Carbide Recycling

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

See pages G41 and O95 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 page I17 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 K18–K19 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.

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
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*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 Introduction	A2–A7
Turning ISO Inserts	B1–B157
Tools for External Turning and Internal Boring	C1–C84
Grooving and Cut-Off.....	D1–D106

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.





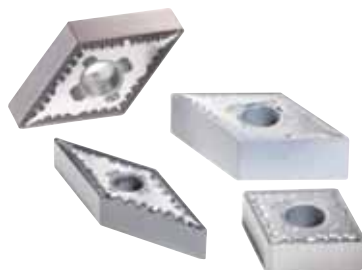
-MS Geometry

-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.



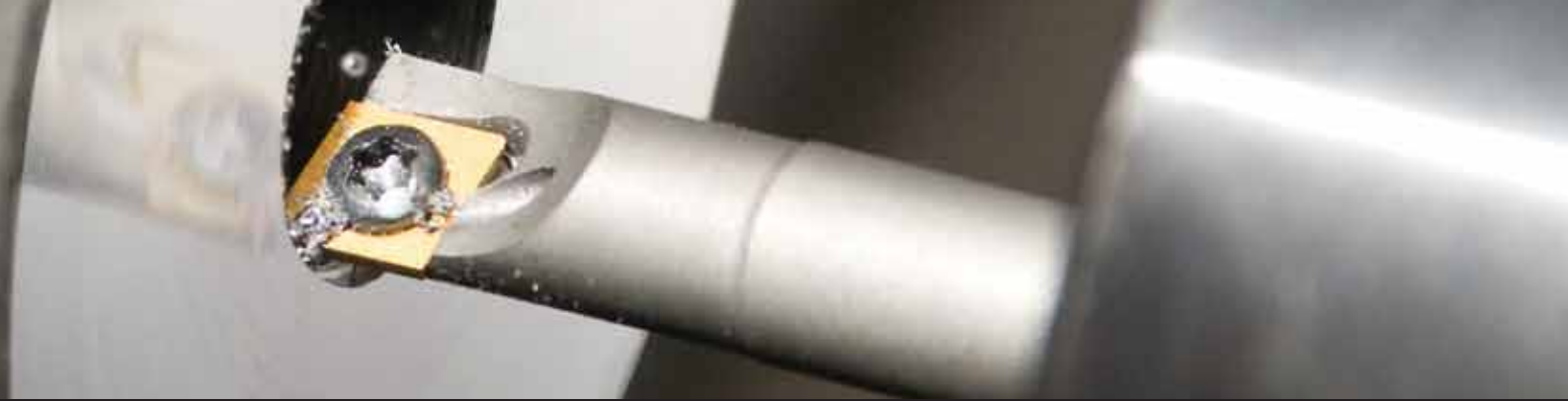
Turning Product Highlights

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:

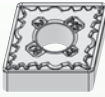
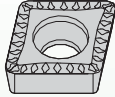
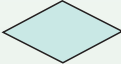
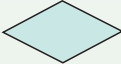



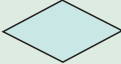

- Proven higher stability.
 - WMT insert design has the best clamping system for stability.
- Platform flexibility, with multiple geometries in single holder for multiple application types.
- Victory™ grades:
 - WU10HT™ — Uncoated
 - WU10PT, WU25PT — PVD
 - WP10CT, WP25CT — CVD
- Greater depth-of-cut (DOC) capability.

Versatile and Well Constructed

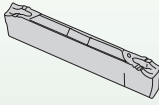
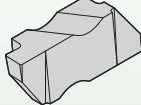

- Specifically designed to increase speeds and feeds.
- Excellent geometry for even the most demanding deep grooving applications.
- The WMT system enables heavy stock removal in turning applications.
- Ensures finer surface finishes and a long, reliable tool life.

■ ISO Turning Inserts

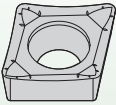
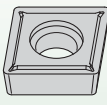
Step 1 • Select Insert Style

				
			Carbide Inserts, Negative	Carbide Inserts, Positive
C	Rhomboid 80°		B35-B45	B30-B34 B45-B46
D	Rhomboid 55°		B51-B63	B47-B50 B63-B64
R	Round		B67	B65-B66
S	Square 90°		B70-B77	B68-B70 B78-B80
T	Triangular 60°		B83-B91	B91-B93
V	Rhomboid 35°		B95-B99	B94-B95
W	Trigon 80° with enlarged corner angles		B99-B105	B105

■ Threading, Grooving, and Cut-Off

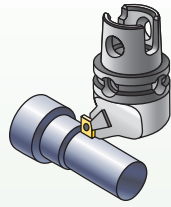
			
	WMT™	TopGroove™	ProGroove™
inserts	D12-D26	D48-D72	D94-D101
toolholders	D28-D39	D73-D79	D102-D104

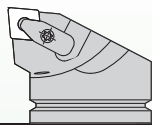
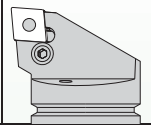
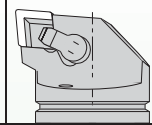

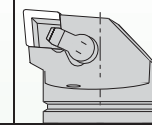
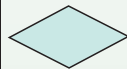





■ WIDIA™ Turning Solutions

		
	Inserts to Machine Aluminium	VariTurn™
inserts	B150-B157	B106-B149

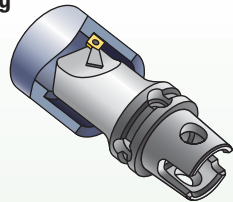
Step 2 • Select Application and Clamping System

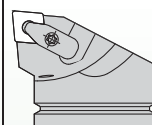
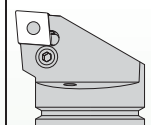
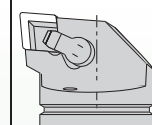

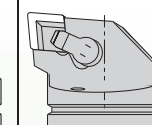




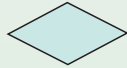

External Machining



								
			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	C42–C43	–
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

WIDIA Victory High-Performance Inserts	B2–B105
WIDIA VariTurn	B106–B149
Inserts for Machining Aluminium.....	B150–B157

A Complete High-Performance Turning Portfolio •

WIDIA™ Victory™

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 finishes.



Victory

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

Steel and Stainless Steel Grades

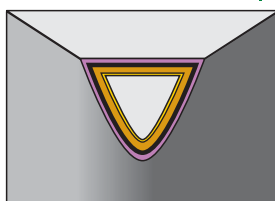
- Reduced cycle times — high speed and feed capability.
- Long tool life — new multilayer coating provides better wear resistance.
- Proven seating — smooth and secure seating surface.
- Outer layer is bronze-colored for easier wear detection.

Post-coat treatment

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

New geometry identification system.

MT-CVD/CVD-TiN-TiCN-
Al₂O₃-ZrCN



Improved edge toughness

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

Post-coat grinding

- Provides secure seating surface.

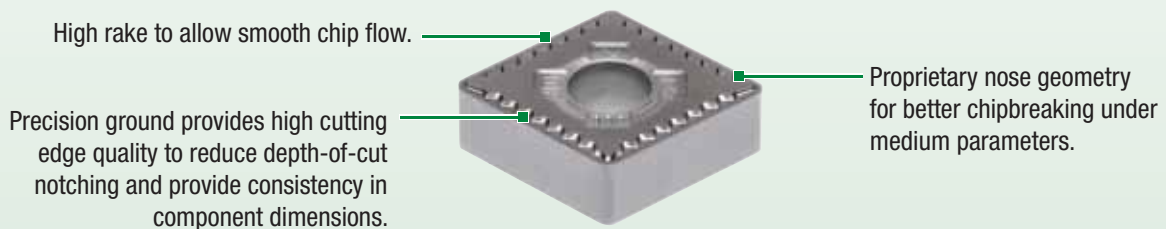
Alpha alumina layer

- 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.

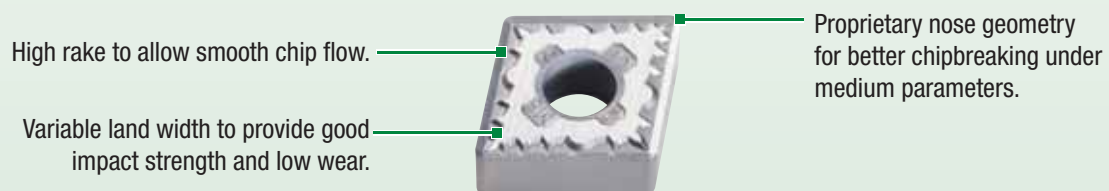
..GG-FS Geometry

- 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.



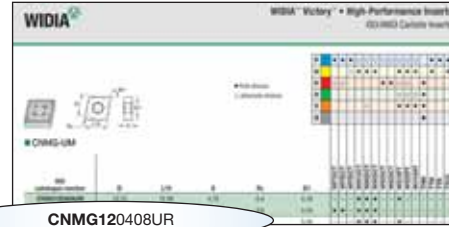
..MG-MS Geometry

- 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.

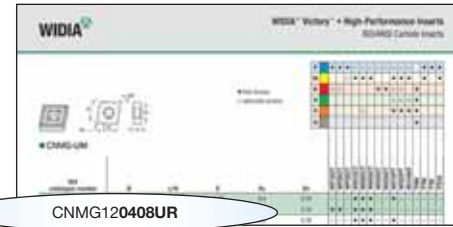


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C		N		M		G		12																																																																																																																																																																																																	
Insert Shape		Insert Clearance Angle		Tolerance Class		Insert Features		Size																																																																																																																																																																																																	
H	Hexagon 120°	A	3°	<p>Tolerances apply prior to edge prep and coating</p> <p>D = Theoretical diameter of the insert inscribed circle S = Thickness B = See figures below</p>	 X Special Design V Special Design	<p>Code for mm cutting edge length "L10"</p> <table border="1"> <thead> <tr> <th>"D"</th> <th>C</th> <th>D</th> <th>R</th> <th>S</th> <th>T</th> <th>V</th> <th>W</th> </tr> </thead> <tbody> <tr><td>3,97</td><td>S4</td><td>04</td><td>03</td><td>03</td><td>06</td><td>—</td><td>—</td></tr> <tr><td>4,76</td><td>04</td><td>05</td><td>04</td><td>04</td><td>08</td><td>08</td><td>S3</td></tr> <tr><td>5,56</td><td>05</td><td>06</td><td>05</td><td>05</td><td>09</td><td>09</td><td>03</td></tr> <tr><td>6,00</td><td>—</td><td>—</td><td>06</td><td>—</td><td>—</td><td>—</td><td>—</td></tr> <tr><td>6,35</td><td>06</td><td>07</td><td>06</td><td>06</td><td>11</td><td>11</td><td>04</td></tr> <tr><td>7,94</td><td>08</td><td>09</td><td>07</td><td>07</td><td>13</td><td>13</td><td>05</td></tr> <tr><td>8,00</td><td>—</td><td>—</td><td>08</td><td>—</td><td>—</td><td>—</td><td>—</td></tr> <tr><td>9,52</td><td>09</td><td>11</td><td>09</td><td>09</td><td>16</td><td>16</td><td>06</td></tr> <tr><td>10,00</td><td>—</td><td>—</td><td>10</td><td>—</td><td>—</td><td>—</td><td>—</td></tr> <tr><td>11,11</td><td>11</td><td>13</td><td>11</td><td>11</td><td>19</td><td>19</td><td>07</td></tr> <tr><td>12,00</td><td>—</td><td>—</td><td>12</td><td>—</td><td>—</td><td>—</td><td>—</td></tr> <tr><td>12,70</td><td>12</td><td>15</td><td>12</td><td>12</td><td>22</td><td>22</td><td>08</td></tr> <tr><td>14,29</td><td>14</td><td>17</td><td>14</td><td>14</td><td>24</td><td>24</td><td>09</td></tr> <tr><td>15,88</td><td>16</td><td>19</td><td>15</td><td>15</td><td>27</td><td>27</td><td>10</td></tr> <tr><td>16,00</td><td>—</td><td>—</td><td>16</td><td>—</td><td>—</td><td>—</td><td>—</td></tr> <tr><td>17,46</td><td>17</td><td>21</td><td>17</td><td>17</td><td>30</td><td>30</td><td>11</td></tr> <tr><td>19,05</td><td>19</td><td>23</td><td>19</td><td>19</td><td>33</td><td>33</td><td>13</td></tr> <tr><td>20,00</td><td>—</td><td>—</td><td>20</td><td>—</td><td>—</td><td>—</td><td>—</td></tr> <tr><td>22,22</td><td>22</td><td>27</td><td>22</td><td>22</td><td>38</td><td>38</td><td>15</td></tr> <tr><td>25,00</td><td>—</td><td>—</td><td>25</td><td>—</td><td>—</td><td>—</td><td>—</td></tr> <tr><td>25,40</td><td>25</td><td>31</td><td>25</td><td>25</td><td>44</td><td>44</td><td>17</td></tr> <tr><td>31,75</td><td>32</td><td>38</td><td>31</td><td>31</td><td>54</td><td>54</td><td>21</td></tr> <tr><td>32,00</td><td>—</td><td>—</td><td>32</td><td>—</td><td>—</td><td>—</td><td>—</td></tr> </tbody> </table>				"D"	C	D	R	S	T	V	W	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	—	—	—	—
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O	Octagon 135°	B	5°																																																																																																																																																																																																						
P	Pentagon 108°	C	7°																																																																																																																																																																																																						
R	Round —	D	15°																																																																																																																																																																																																						
S	Square 90°	E	20°																																																																																																																																																																																																						
T	Triangular 60°	F	25°																																																																																																																																																																																																						
C D E M V	Rhomboid 80° 55° 75° 86° 35°	G	30°																																																																																																																																																																																																						
W	Trigon 80° with enlarged corner angles	N	0°																																																																																																																																																																																																						
L	Rectangular 90°	P	11°																																																																																																																																																																																																						
A B N/K	Parallelogram 85° 82° 55°	O	Indicated for other clearance angles requiring descriptions.																																																																																																																																																																																																						

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.



CNMG120408UR

04		08						UR	
Thickness S		Corner Radius "Rε"		Hand of Insert (optional)		Cutting Edge (optional)		Chipbreaker (optional)	
symbol	thickness	symbol	corner radius	R = Right hand	F		Sharp	13	= Railroad Light
mm	mm	mm	mm	L = Left hand	E		Rounded	CT	= Copy Turning
—	0,79	X0	0,04	N = Neutral	T		Chamfered	FF	= Fine Finishing
T0	1,00	01	0,1		S		Chamfered and Rounded	FP	= Finish Positive
01	1,59	02	0,2		K		Double-Chamfered	FW	= Finish Wiper
T1	1,98	04	0,4		P		Double-Chamfered and Rounded	ML	= Medium Light
02	2,38	08	0,8					MR	= Medium Roughing
03	3,18	12	1,2					MW	= Medium Wiper
T3	3,97	16	1,6					RH	= Roughing Heavy
04	4,76	20	2,0					T	= Negative Land
05	5,56	24	2,4					UF	= Universal Finishing
06	6,35	28	2,8					UM	= Universal Medium
07	7,94	32	3,2					UR	= Universal Roughing
9	9,52	00						.NMP	= Sharp Medium
11	11,11	M0	round insert					MP	= Medium Positive
12	12,70	—						FS	= Finishing High-Temp(S)

"D"	± Tolerance on "D"				"D"	± Tolerance on "B"			
	Shapes S, T, C, R, & W	Shape D	Shape V	Class U Tolerance		Shapes S, T, C, R, & W	Shape D	Shape V	Class U Tolerance
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

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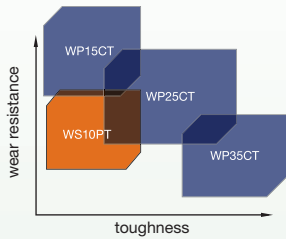
A system of grades, geometries, and application guidelines to provide optimal solutions for your metalcutting needs. It's easy to determine which WIDIA™ chip-control cutting tool will work best in your specific workpiece materials and applications!



W	P	15	C	T
Brand	Primary Workpiece Material	Application Range*	Insert Material	Application
<ul style="list-style-type: none"> P Steel M Stainless Steel K Cast Iron N Non-Ferrous S High-Temp Alloys H Hardened Materials U Universal Machining 		<ul style="list-style-type: none"> 05 = fine finishing 10 = finishing 15 = } medium to roughing 20 = } 25 = } 30 = } roughing 35 = } 40 = } 45 = } heaviest roughing 50 = } <p>*Samples shown are based on turning and will differ within applications</p>	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> T = Turning M = Milling H = Holemaking D = Solid Drills E = Solid End Mills G = Taps R = Reamer V = Thread Mills

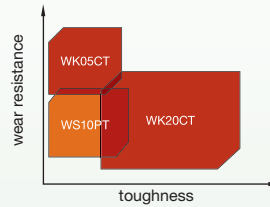


Victory Toughness/Wear Resistance



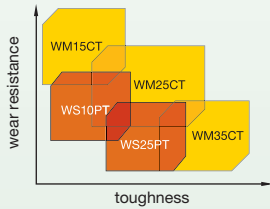
WP Grades for Steel

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



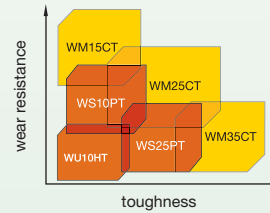
WK Grades for Cast Iron

- Two grades to cover all of your cast iron turning 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

- Three grades across 12 geometries for use in roughing to finishing 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 = 0,4mm (.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

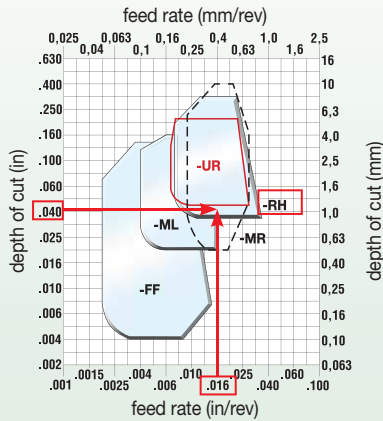
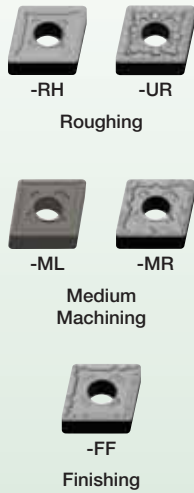
Given: grade WP35CT™ 
cutting conditions
material CK15
Unknown: cutting speed
Solution: 210 m/min

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

Negative Inserts



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

Step 2 • Select the grade

cutting condition	Negative Insert Geometry					Positive Insert Geometry		
	-FF	-ML	-MR	-UR	-RH	-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

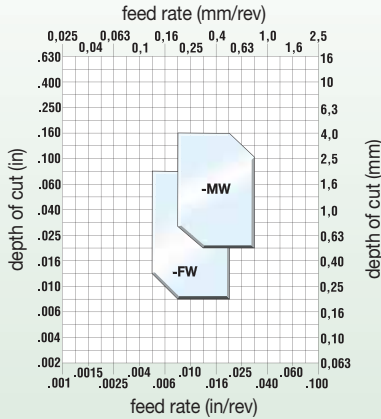
Low-Carbon (<0.3% C) and Free-Machining Steel		speed – m/min									Starting Conditions
material group	grade	135	180	225	275	320	360	410	455	495	m/min
P0/P1	WP15CT	◊									395
	WP25CT	◊									275
	WP35CT	◊									210
	WS10PT	◊									280

WIDIA Material Group Selection Guide:
To optimise speed recommendations, material subgroups have been added to each of the six workpiece material groups.

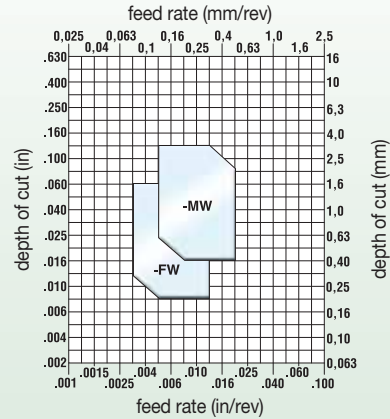
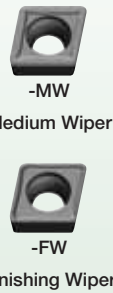
material	material group ISO code	number of material subgroups
steel	P	1–6
stainless steel	M	1–3
cast iron	K	1–3
non-ferrous materials	N	1–8
high-temp alloys	S	1–4
hardened materials	H	1

Step 1 • Select the insert geometry

Negative Wiper Inserts



Positive Wiper Inserts

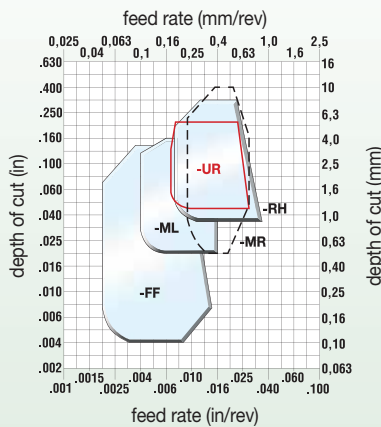
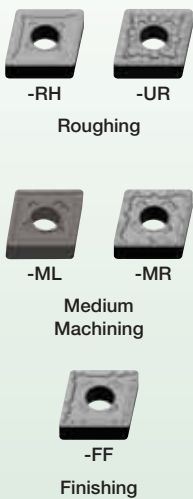


Step 2 • Select the grade

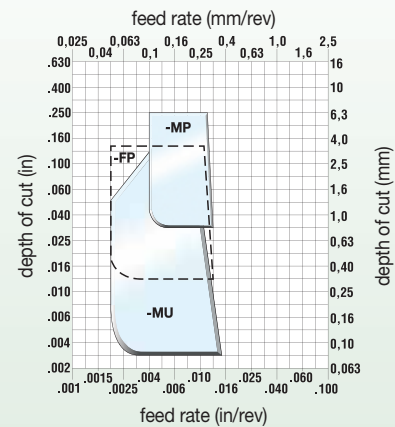
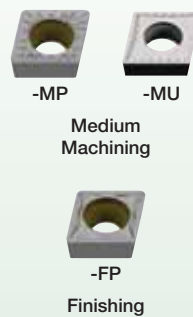
cutting condition	Negative Insert Geometry		Positive Insert Geometry	
	-FW	-MW	-FW	-MW
heavily interrupted cut	WP15CT	WP25CT	-	WP25CT
lightly interrupted cut	WP15CT	WP25CT	WP15CT	WP25CT
varying depth of cut, casting, or forging skin	WP15CT	WP15CT	WP15CT	WP15CT
smooth cut, pre-turned surface	WP15CT	WP15CT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

Step 1 • Select the insert geometry

Negative Inserts



Positive Inserts



Step 2 • Select the grade

cutting condition	Negative Insert Geometry					Positive Insert Geometry		
	-FF	-ML	-MR	-UR	-RH	-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/ WP15CT	WP25CT	WP15CT	WP25CT/ WP15CT	WP15CT
smooth cut, pre-turned surface	WP15CT	WP15CT	WP15CT	WP25CT/ WP15CT	WP25CT	WP15CT	WP25CT/ WP15CT	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 HB)

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

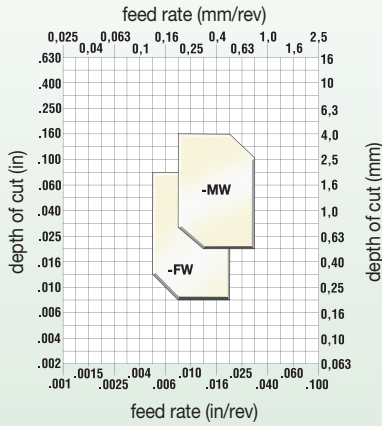
Starting Conditions

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

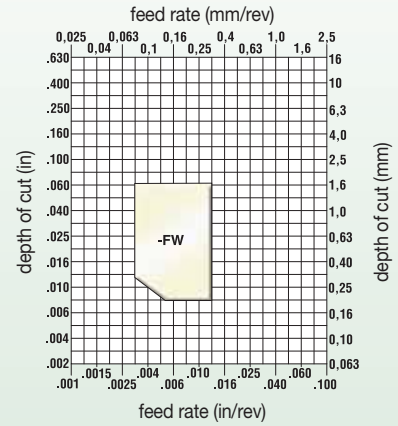
■ Step 1 • Select the insert geometry



Negative Wiper Inserts



Positive Wiper Inserts

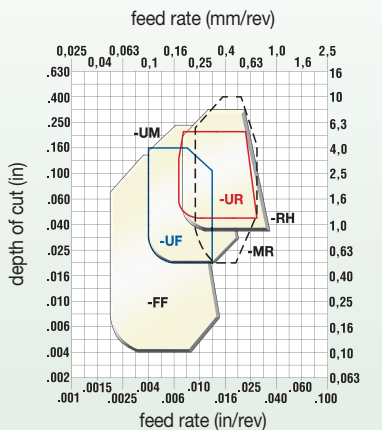
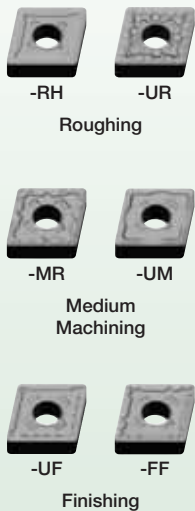


■ Step 2 • Select the grade

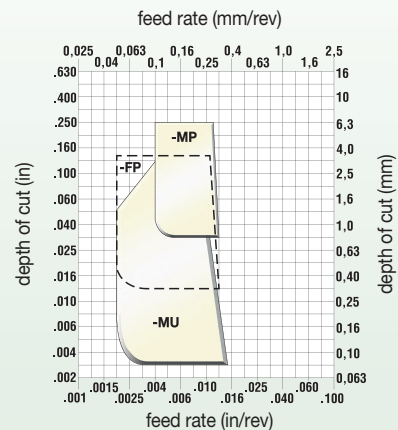
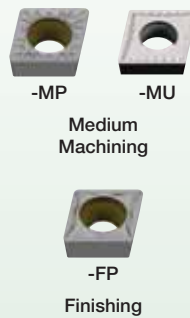
cutting condition	Negative Insert Geometry		Positive Insert Geometry
	-FW	-MW	-FW
heavily interrupted cut	WM15CT	WM15CT	WM15CT
lightly interrupted cut	WM15CT	WM25CT	WM15CT
varying depth of cut, casting, or forging skin	WM15CT	WM25CT	WM15CT
smooth cut, pre-turned surface	WM15CT	WM25CT	WM15CT

■ Step 1 • Select the insert geometry

Negative Inserts



Positive Inserts



(continued)

Step 2 • Select the grade *(continued)*

cutting condition	Negative Insert Geometry						
	-FF	-UF	-MR	-UM	-RH	-UR	
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	Positive Insert Geometry			
	-FP	-MU	-MP	
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

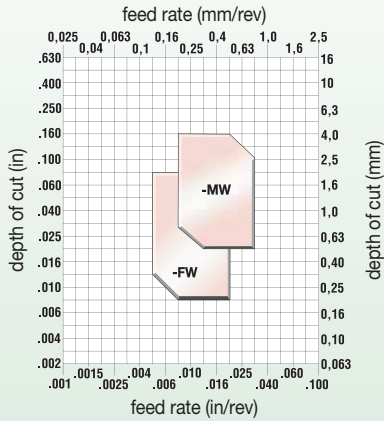
Austenitic Stainless Steel: Duplex (Ferritic and Austenitic Mixture) speed – m/min Starting Conditions

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

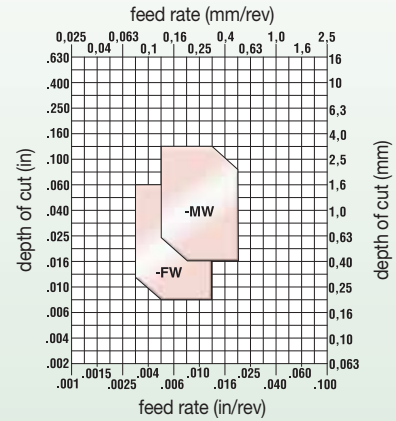
■ Step 1 • Select the insert geometry



Negative Wiper Inserts



Positive Wiper Inserts

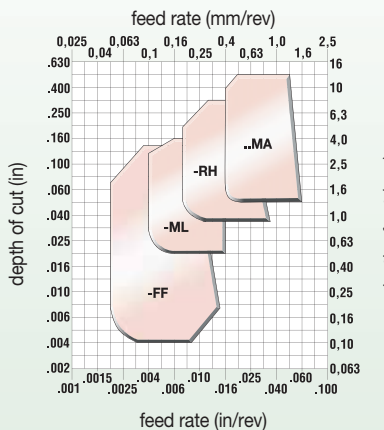


■ Step 2 • Select the grade

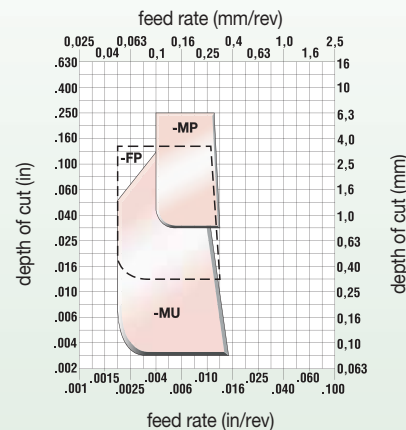
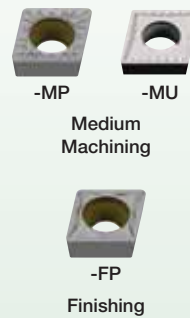
cutting condition		Negative Insert Geometry		Positive Insert Geometry	
		-FW	-MW	-FW	-MW
heavily interrupted cut		-	-	-	-
lightly interrupted cut		WK05CT	WK05CT	WK05CT	WK05CT
varying depth of cut, casting, or forging skin		WK05CT	WK05CT	WK05CT	WK05CT
smooth cut, pre-turned surface		WK05CT	WK05CT	WK05CT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

■ Step 1 • Select the insert geometry

Negative Inserts



Positive Inserts



(continued)

Step 2 • Select the grade *(continued)*

cutting condition	Negative Insert Geometry				Positive Insert Geometry			
	-FF	-ML	-UR	..MA	-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

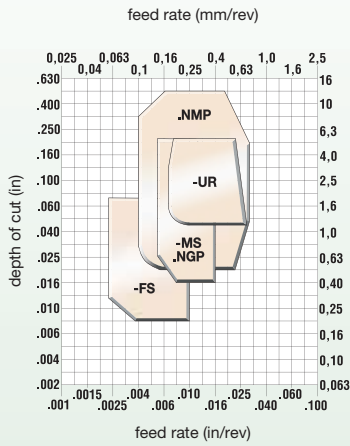
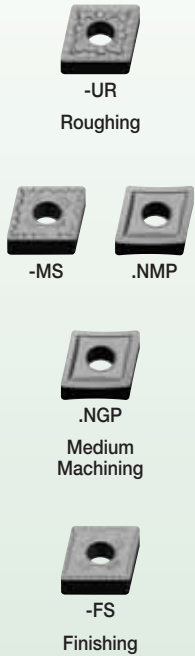
Ductile, Malleable, and Austempered Cast Irons (>600 MPa tensile strength) speed – m/min Starting Conditions

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

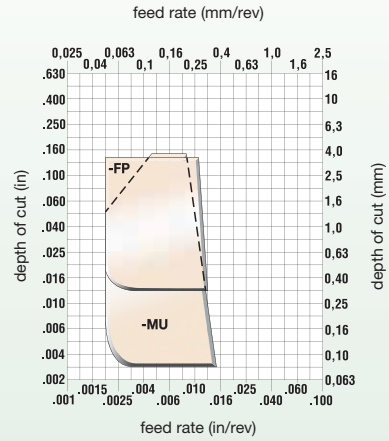
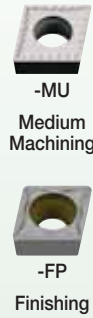
■ Step 1 • Select the insert geometry



Negative Inserts



Positive Inserts



■ Step 2 • Select the grade

cutting condition		Negative Insert Geometry				Positive Insert Geometry	
		-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	speed – m/min										Starting Conditions
		15	45	75	105	140	170	200	230	290	310	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	speed – m/min										Starting Conditions
		15	45	75	105	140	170	200	230	290	310	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	speed – m/min										Starting Conditions
		15	45	75	105	140	170	200	230	290	310	m/min
S3	WU10HT	◊										40
	WS10PT	◊										70
	WS25PT	◊										40
	WM15CT	◊										70
	WM25CT/WM35CT	◊										40

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

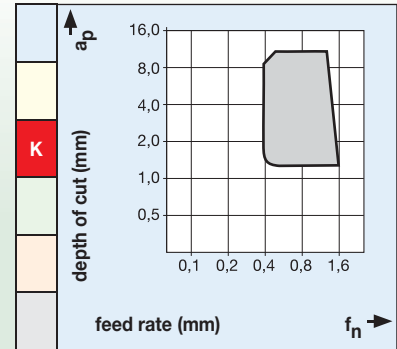
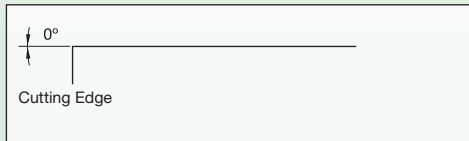
material group	grade	speed – m/min										Starting Conditions
		15	45	75	105	140	170	200	230	290	310	m/min
S4	WU10HT	◊										45
	WM15CT	◊										70
	WM25CT/WM35CT	◊										55

■ **Negative Inserts**

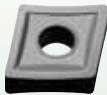
..MA



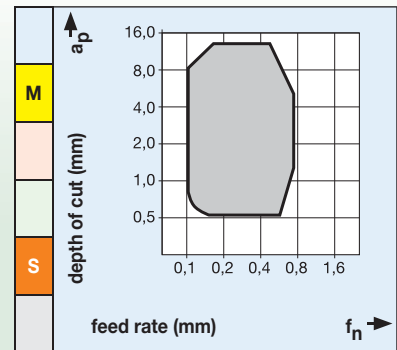
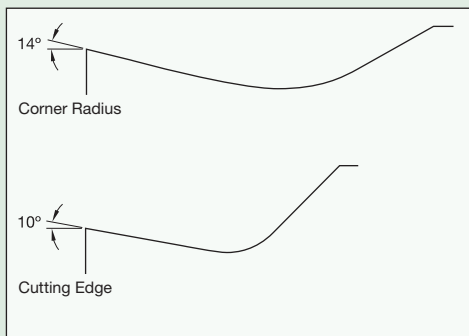
Flat top geometry for machining cast iron. For finishing to roughing applications.



.NMP



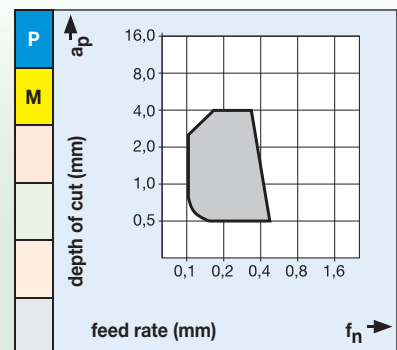
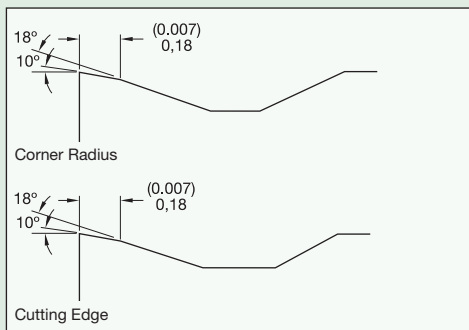
For medium-duty machining of tough work materials, such as chrome- and nickel-based alloys. Minimises tendency for materials to adhere to insert.



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.



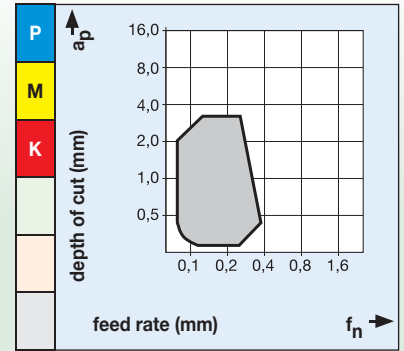
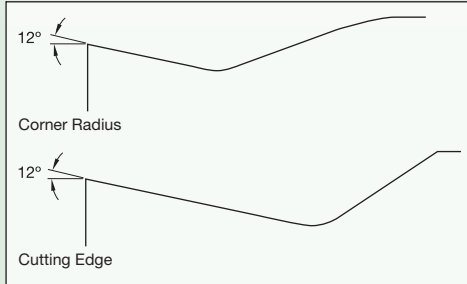
(continued)

■ **Negative Inserts** *(continued)*

22



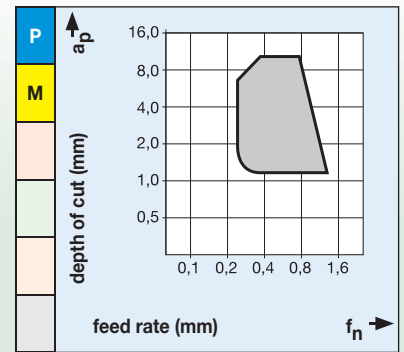
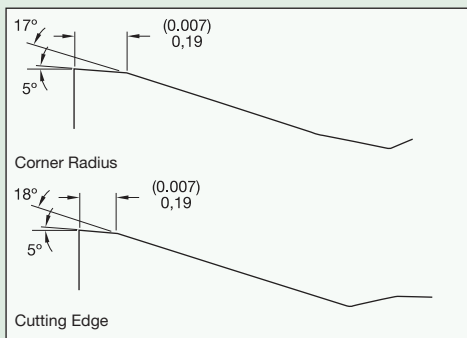
For finish turning, producing smooth, accurate surfaces. Very good chip control, especially at low depths of cut.



65



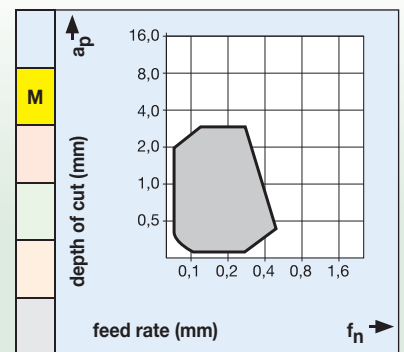
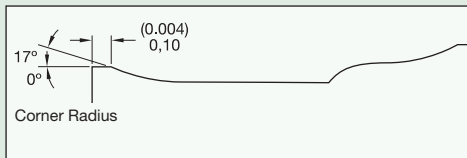
Rough-turning geometry with chip control extending to the medium-duty range. Positive rake angle lowers cutting forces, reducing power requirements. Used on low-tensile and stainless steels.



CT



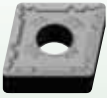
Designed for outward copy turning. Where other geometries produce long chips, the unique distribution of the cut results in good chip control.



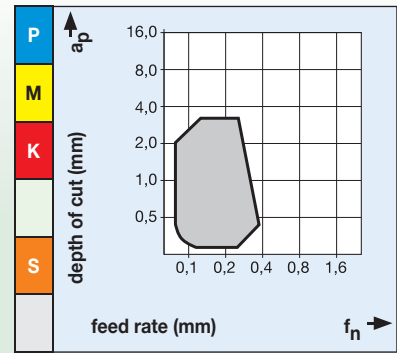
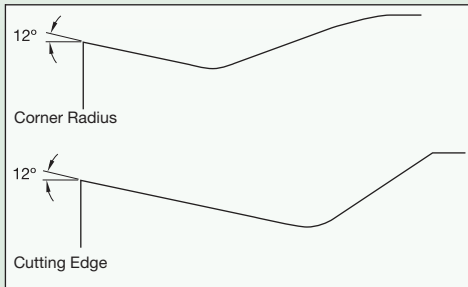
(continued)

■ **Negative Inserts** *(continued)*

FF



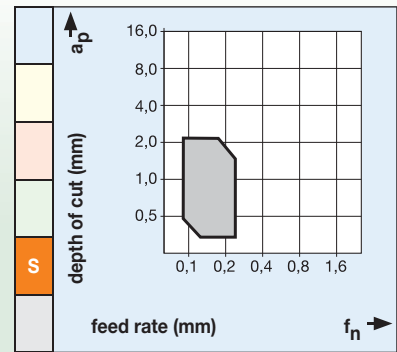
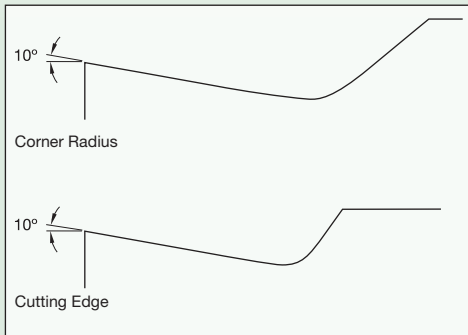
For finish turning, producing smooth, accurate surfaces. Very good chip control, especially at low depths of cut.



FS



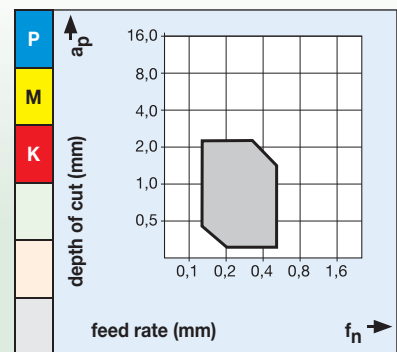
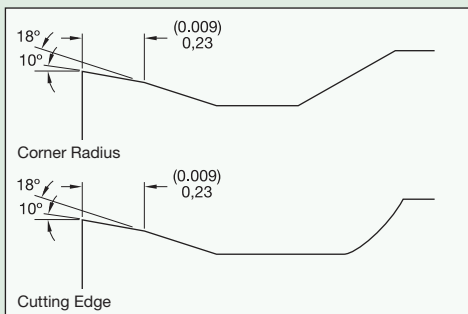
For finishing applications. Ground periphery with positive cutting edge ideally suited for high-temp alloys. Micro finished edge on the ground periphery adds just a slight hone for improved edge integrity and reliability.



FW



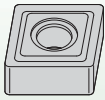
Wiper geometry for finishing when good surface finish is needed using high feed rates. First choice for high-performance finishing.



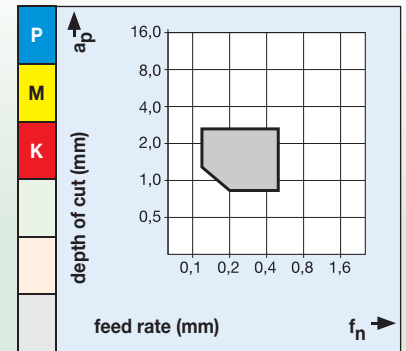
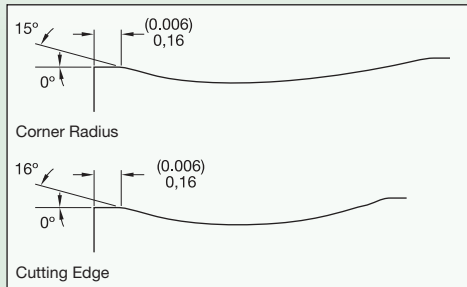
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■ **Negative Inserts** *(continued)*

MG



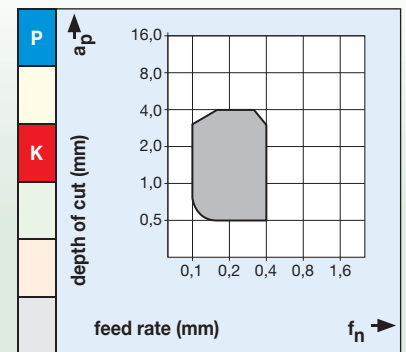
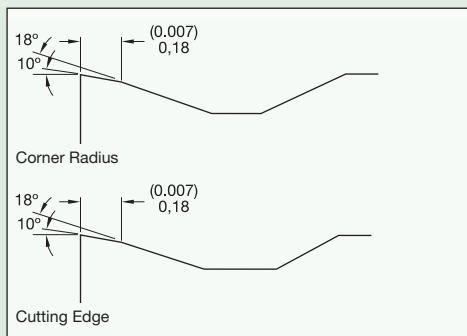
For light machining to light roughing.



ML



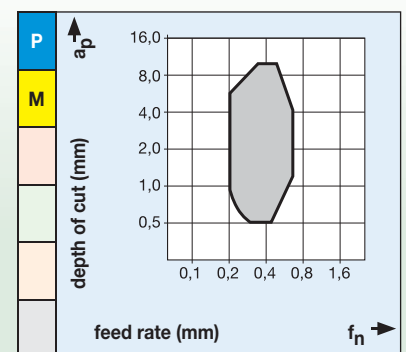
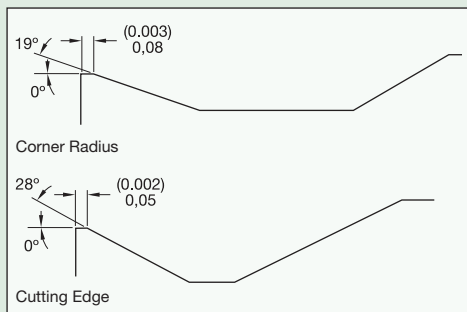
For finishing to medium machining with a negative, stable cutting edge.



MR



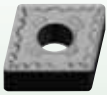
For medium to light roughing of steels, difficult-to-machine high-alloy titanium, and aluminium materials. High strength to deal with heavy chip deformation.



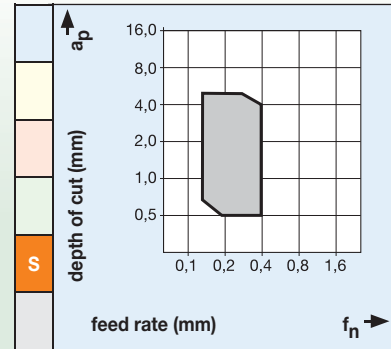
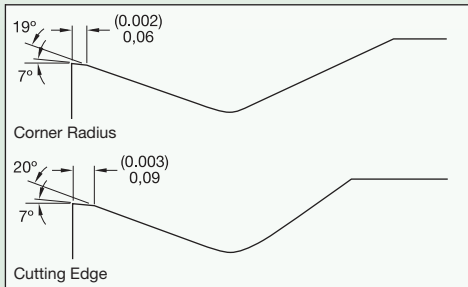
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■ Negative Inserts *(continued)*

MS



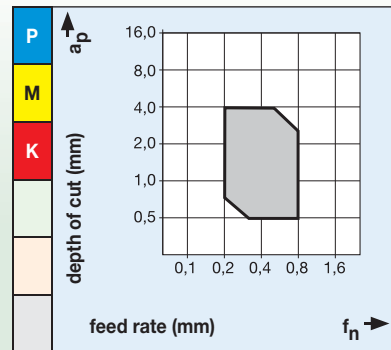
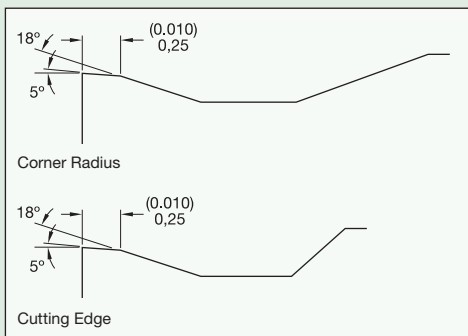
For medium machining in high-temp materials. Utilises a micro-finished edge preparation to increase edge toughness.



MW



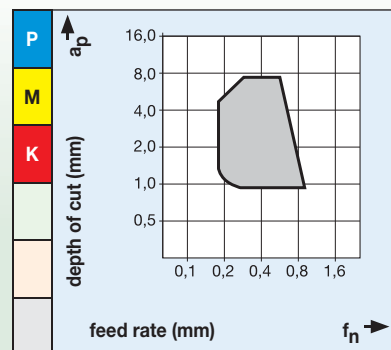
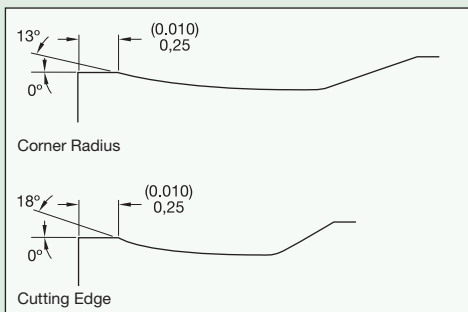
Wiper geometry for light to medium turning with high feed rates. Feed twice as high as with edges with full corner radii to produce same surface finish.



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.



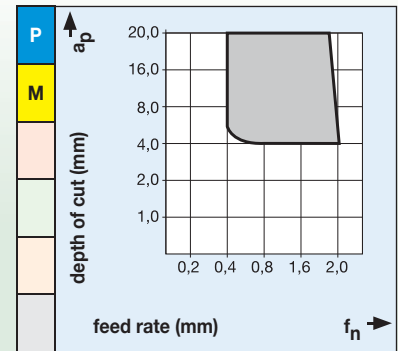
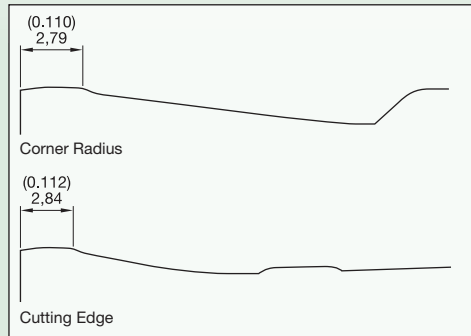
(continued)

■ **Negative Inserts** *(continued)*

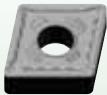
SR



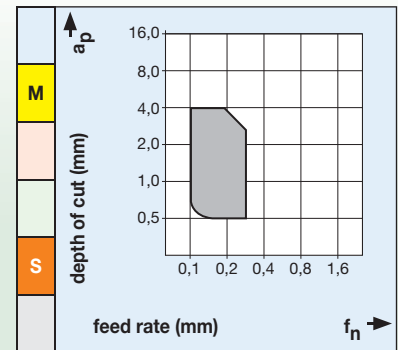
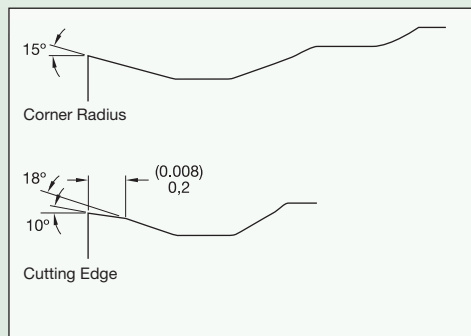
A super roughing geometry. The SR has a strong cutting edge to support high cutting loads in roughing applications. Can produce high metal removal rates.



UF



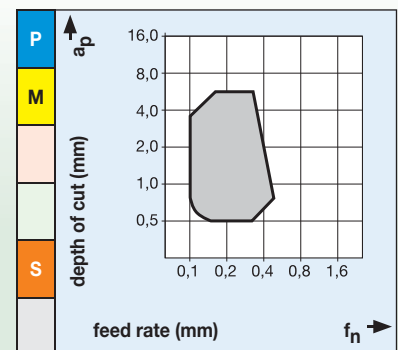
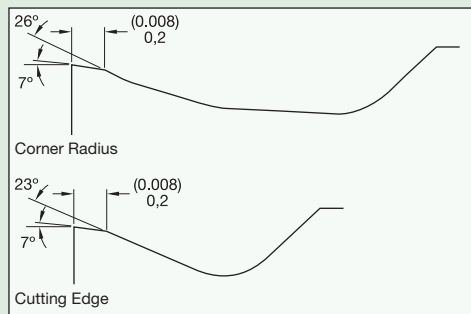
For finishing with a positive cutting edge for reduced cutting forces and superior surface quality.



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.



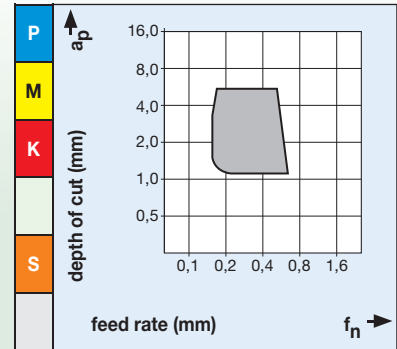
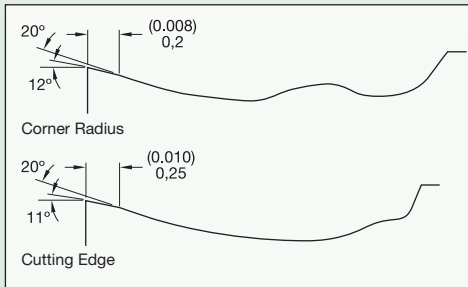
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■ **Negative Inserts** *(continued)*

UR

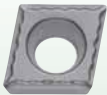


Roughing geometry with smooth chip forming and improved coolant flow for increased tool life. Positive geometry reduces cutting forces and improves depth-of-cut notching resistance. Ideally suitable for stainless steel applications and for smooth machining of steel.

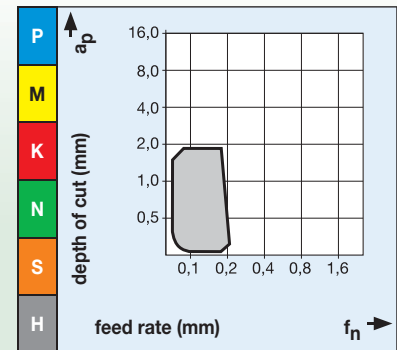
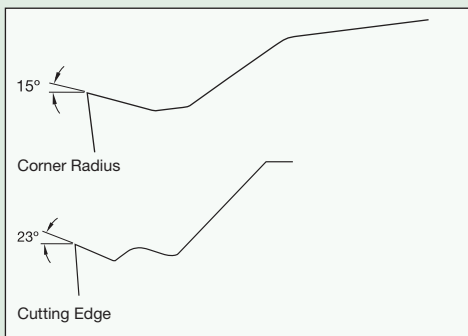


■ **Positive Inserts**

2



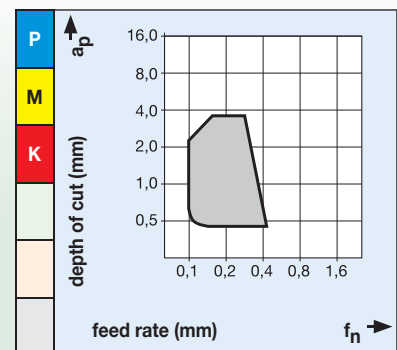
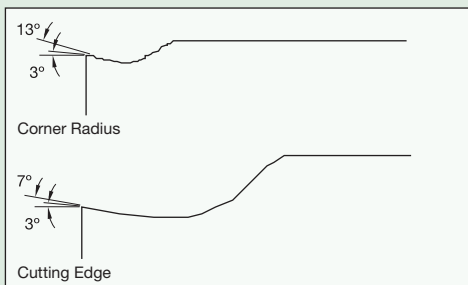
Sharp edge for finish machining. Good chip control with very small chip sections. High dimensional accuracy and smooth surface finishes. Inserts with .008" corner radius precision-ground on all sides.



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.



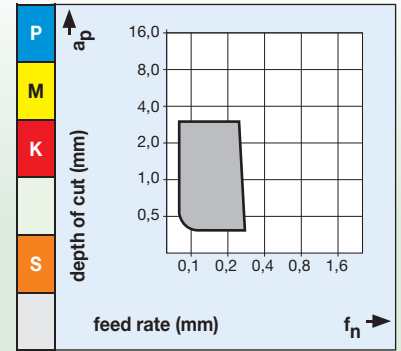
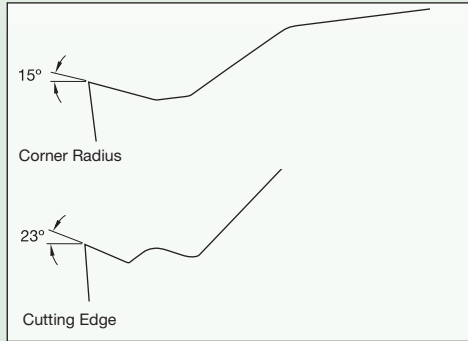
(continued)

■ Positive Inserts (continued)

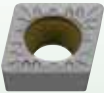
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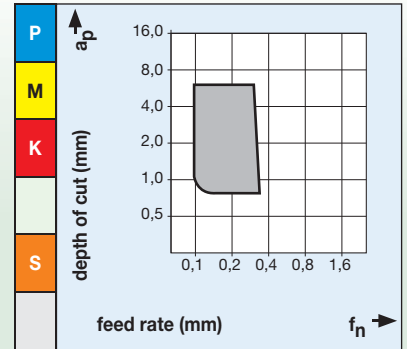
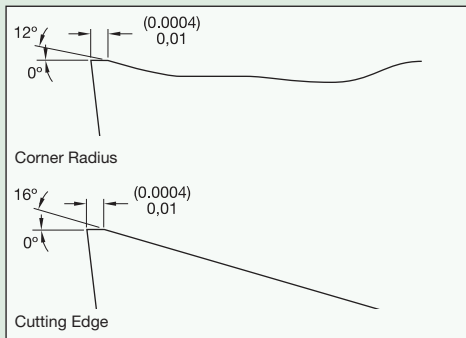
For finishing to medium turning operations with optimal chip control over a wide range of cutting conditions and workpiece materials.



MP



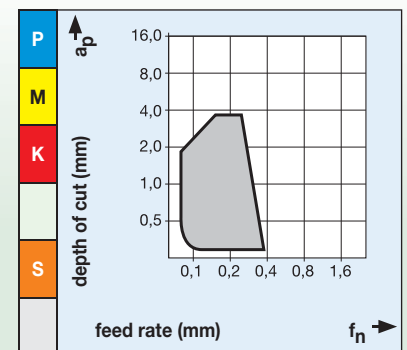
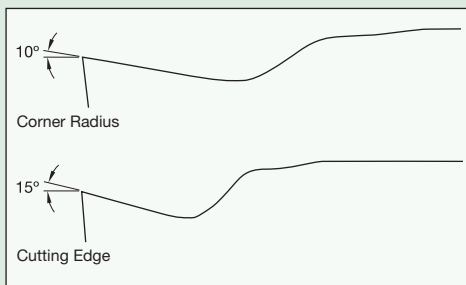
For medium to rough turning with reduced cutting forces and improved chip control for high feed rates. Suitable for high metal removal rates and spindling applications.

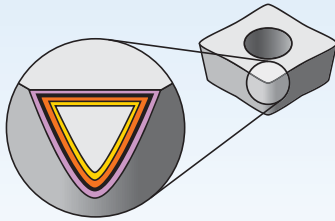


MU



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.

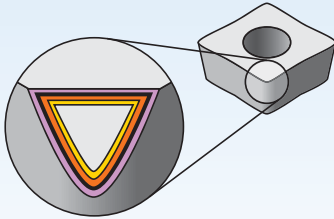




Coatings provide high-speed capability and are engineered for finishing to heavy roughing.




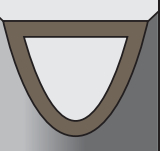
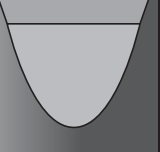
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

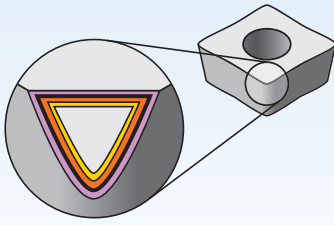
Grade	Coating	Grade Description	wear resistance ← → toughness																			
			05	10	15	20	25	30	35	40	45											
WP15CT		Coated carbide. MT-CVD/CVD – TiN-TiCN-Al ₂ O ₃ -ZrCN. Good balance of wear resistance and toughness properties. High productivity machining on smooth to lightly interrupted cuts. For steels.	P																			
	HC-P15																					
WP25CT		Coated carbide. MT-CVD/CVD – TiN-TiCN-Al ₂ O ₃ -ZrCN. Good toughness properties. Excellent first choice for steel machining, high productivity metal removal for all but the harshest interrupted cuts.	P																			
	HC-P25																					
WP35CT		Coated carbide. MT-CVD/CVD – TiN-TiCN-Al ₂ O ₃ -ZrCN. Proven on all roughing and heavy roughing operations, wet or dry, on interrupted and uninterrupted cuts.	P																			
	HC-P35																					
WM15CT		Coated carbide. MT-CVD/CVD – TiN-TiCN-Al ₂ O 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																			
	HC-M15																					
WM25CT		Coated carbide. MT-CVD/CVD – TiN-TiCN-Al ₂ O ₃ -ZrCN. Good balance of wear resistance and toughness properties. Light and medium machining. For austenitic stainless steel AISI series.	P																			
	HC-M25																					
WM35CT		Coated carbide. MT-CVD/CVD – TiN-TiCN-Al ₂ O ₃ -ZrCN. Good toughness and wear resistance balance. For medium to roughing operations with light and heavily interrupted cuts.	P																			
	HC-M35																					



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											
		05	10	15	20	25	30	35	40	45			
Grade	WK05CT  HC-K05	Coating	Grade Description										
		Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O 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										
		M											
		K											
		N											
WK20CT  HC-K20	Coating	Grade Description											
	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O 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											
	M												
	K												
	N												
WS10PT  HC-S10	Coating	Grade Description											
	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												
WS25PT  HC-S25	Coating	Grade Description											
	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												
WU10HT  C3-C4	Coating	Grade Description											
	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											
	K												
	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	Performance Matrix																					
			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																					
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																					
TT15	HT-P15	Cermets. 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.

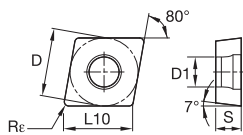
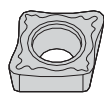
Before NOVO: The programmer would be in their CAD/CAM software, programming a part. Using the outdated method of finding a tool in a catalogue, and then manually inputting the tooling information from the catalogue into the CAD/CAM software.

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



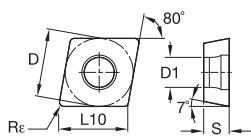


- first choice
- alternate choice

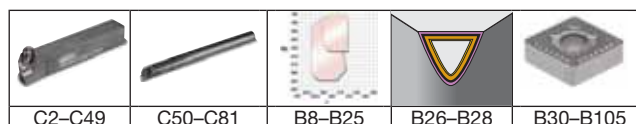
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M	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

CCMT-41

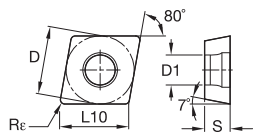
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
CCMT12040441	12,70	12,90	4,76	0,4	5,50	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CCMT12040841	12,70	12,90	4,76	0,8	5,50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○


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	4169858	4170140	4168738	4168778	-	-	-	-	-	-	-	-	-	-	-
CCMT060204FP	6,35	6,45	2,38	0,4	2,80	4169859	4170141	4170142	4168739	4168779	-	-	4170032	5684337	5684340	-	-	-	-	-	-
CCMT060208FP	6,35	6,45	2,38	0,8	2,80	4170293	4170142	4170293	4168781	4168780	-	-	4170083	5684342	5684344	-	-	-	-	-	-
CCMT09T302FP	9,53	9,67	3,97	0,2	4,40	4169860	4169861	4170294	4168740	4168782	-	-	4170084	5684341	5684343	-	-	-	-	-	-
CCMT09T304FP	9,53	9,67	3,97	0,4	4,40	4169862	4169861	4170294	4168740	4168782	-	-	4170084	5684341	5684343	-	-	-	-	-	-
CCMT09T308FP	9,53	9,67	3,97	0,8	4,40	4170298	4169861	4170295	4168741	4168783	-	-	4170085	5684338	5684343	-	-	-	-	-	-
CCMT120404FP	12,70	12,90	4,76	0,4	5,50	4169993	4169862	4170296	4168742	4168784	-	-	4170086	-	-	-	-	-	-	-	-
CCMT120408FP	12,70	12,90	4,76	0,8	5,50	4170297	4169993	4170297	4168763	4168785	-	-	4170087	-	-	-	-	-	-	-	-
CCMT120412FP	12,70	12,90	4,76	1,2	5,50	4168786	4169994	4170298	4168786	4168788	-	-	4170088	-	-	-	-	-	-	-	-



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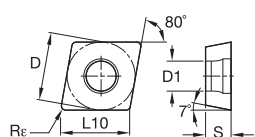
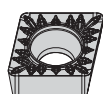


● first choice
 ○ alternate choice

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

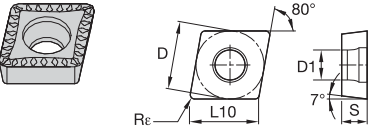
■ CCMT-FW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115	
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	TT115	
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								

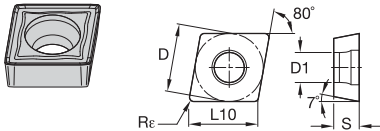


● first choice
○ alternate choice

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

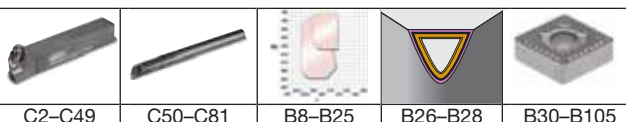
■ CCMT-MU

ISO catalogue number	D	L10	S	Re	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																
CCMT090304MU	9,53	9,67	3,18	0,4	4,40																
CCMT090308MU	9,53	9,67	3,18	0,8	4,40																
CCMT09T304MU	9,53	9,67	3,97	0,4	4,40																
CCMT09T308MU	9,53	9,67	3,97	0,8	4,40																
CCMT120408MU	12,70	12,90	4,76	0,8	5,50																



■ CCMT-MW

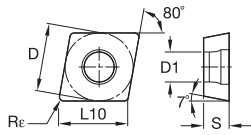
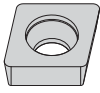
ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
CCMT09T304MW	9,53	9,67	3,97	0,4	4,40																
CCMT09T308MW	9,53	9,67	3,97	0,8	4,40																
CCMT120404MW	12,70	12,90	4,76	0,4	5,50																
CCMT120408MW	12,70	12,90	4,76	0,8	5,50																



C2-C49 C50-C81 B8-B25 B26-B28 B30-B105

Inserts

Inserts

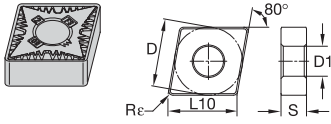


● first choice
○ alternate choice

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	TT115
CCMW060202	6,35	6,45	2,38	0,2	2,80	|	|	|	|	|	|	|	|	|	|	|	|	|	|	|
CCMW060204	6,35	6,45	2,38	0,4	2,80	|	|	|	|	|	|	4170464	4170368	|	|	|	2027507	2031733	|	|
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	|	|	|



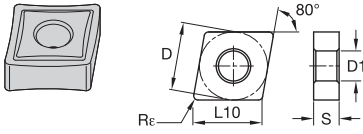
● first choice
○ alternate choice

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

Inserts

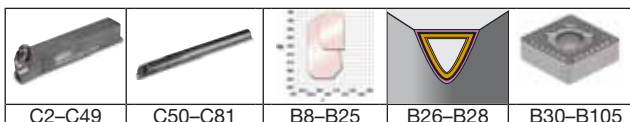
■ CNGG-FS

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	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNGG120402FS	12,70	12,90	4,76	0,2	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNGG120404FS	12,70	12,90	4,76	0,4	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNGG120408FS	12,70	12,90	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNGG120412FS	12,70	12,90	4,76	1,2	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

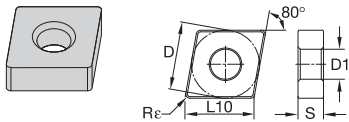


■ CNGP

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	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNGP120402	12,70	12,90	4,76	0,2	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNGP120404	12,70	12,90	4,76	0,4	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNGP120408	12,70	12,90	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



Inserts

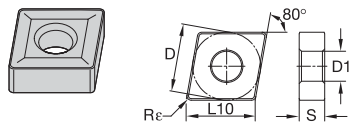


● first choice
○ alternate choice

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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CNMA120408	12,70	12,90	4,76	0,8	5,16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CNMA120412	12,70	12,90	4,76	1,2	5,16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CNMA120416	12,70	12,90	4,76	1,6	5,16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CNMA160608	15,88	16,12	6,35	0,8	6,35	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CNMA160612	15,88	16,12	6,35	1,2	6,35	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CNMA160616	15,88	16,12	6,35	1,6	6,35	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CNMA190608	19,05	19,34	6,35	0,8	7,93	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CNMA190612	19,05	19,34	6,35	1,2	7,93	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CNMA190616	19,05	19,34	6,35	1,6	7,93	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•



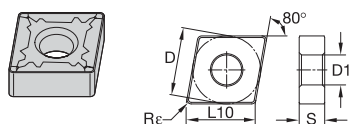
● first choice
○ alternate choice

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

Inserts

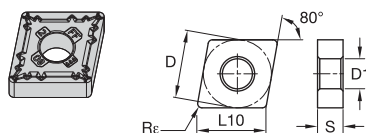
■ **CNMG**

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	■	■	■	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG120408	12,70	12,90	4,76	0,8	5,16	■	■	■	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG190612	19,05	19,34	6,35	1,2	7,93	■	■	■	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG190616	19,05	19,34	6,35	1,6	7,93	■	■	■	○	○	○	○	○	○	○	○	○	○	○	○	○



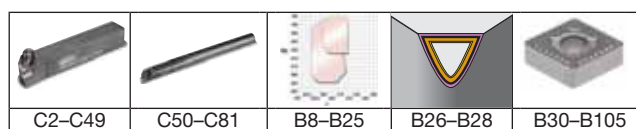
■ **CNMG-22**

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

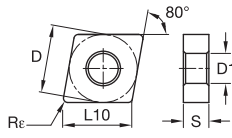
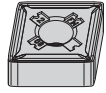


■ **CNMG-FF**

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	■	■	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG120408FF	12,70	12,90	4,76	0,8	5,16	4171026	■	■	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG120412FF	12,70	12,90	4,76	1,2	5,16	4171027	■	■	○	○	○	○	○	○	○	○	○	○	○	○	○



Inserts

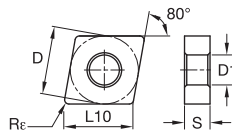
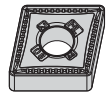


● first choice
○ alternate choice

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

■ CNMG-FW

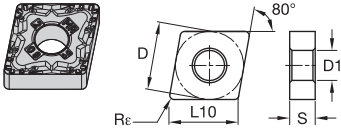
ISO catalogue number	D	L10	S	Rε	D1
CNMG120404FW	12,70	12,90	4,76	0,4	5,16
CNMG120408FW	12,70	12,90	4,76	0,8	5,16
CNMG120412FW	12,70	12,90	4,76	1,2	5,16



■ CNMG-ML

ISO catalogue number	D	L10	S	Rε	D1
CNMG120404ML	12,70	12,90	4,76	0,4	5,16
CNMG120408ML	12,70	12,90	4,76	0,8	5,16
CNMG120412ML	12,70	12,90	4,76	1,2	5,16
CNMG120416ML	12,70	12,90	4,76	1,6	5,16

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT15

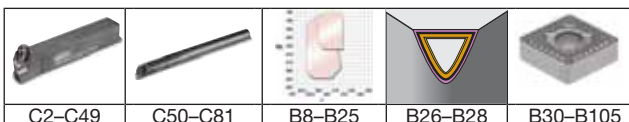


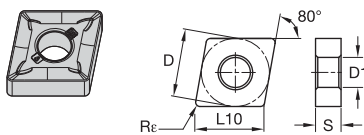
● first choice
○ alternate choice

ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TMM	TTR	TT115	
CNMG120404MR	12,70	12,90	4,76	0,4	5,16	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
						●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG120408MR	12,70	12,90	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
						○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG120412MR	12,70	12,90	4,76	1,2	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
						○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG120416MR	12,70	12,90	4,76	1,6	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
						○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG160608MR	15,88	16,12	6,35	0,8	6,35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
						○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG160612MR	15,88	16,12	6,35	1,2	6,35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
						○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG160616MR	15,88	16,12	6,35	1,6	6,35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
						○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG190612MR	19,05	19,34	6,35	1,2	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
						○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG190616MR	19,05	19,34	6,35	1,6	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
						○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

■ CNMG-MR

ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TMM	TTR	TT115
CNMG120404MR	12,70	12,90	4,76	0,4	5,16	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG120408MR	12,70	12,90	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG120412MR	12,70	12,90	4,76	1,2	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG120416MR	12,70	12,90	4,76	1,6	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG160608MR	15,88	16,12	6,35	0,8	6,35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG160612MR	15,88	16,12	6,35	1,2	6,35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG160616MR	15,88	16,12	6,35	1,6	6,35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG190612MR	19,05	19,34	6,35	1,2	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CNMG190616MR	19,05	19,34	6,35	1,6	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



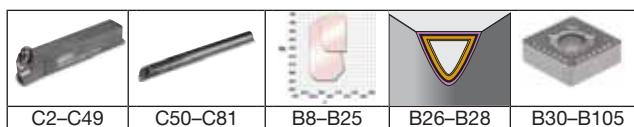


● first choice
○ alternate choice

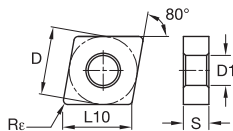
P	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
M	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

■ CNMG-RH

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115							
CNMG120408RH	12,70	12,90	4,76	0,8	5,16	4170979	4170981	4170980	4170980	4171505	4171504	4171504	4171504	4171698	5684356	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	
CNMG120412RH	12,70	12,90	4,76	1,2	5,16	4170980	4171505	4171504	4171698	5684356	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035	4173035
CNMG120416RH	12,70	12,90	4,76	1,6	5,16	4170981	4171506	4171699	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037	4173037
CNMG160608RH	15,88	16,12	6,35	0,8	6,35	4170982	4171507	4171700	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038	4173038
CNMG160612RH	15,88	16,12	6,35	1,2	6,35	4170983	4171508	4171701	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039	4173039
CNMG160616RH	15,88	16,12	6,35	1,6	6,35	4170984	4171509	4171702	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040	4173040
CNMG190608RH	19,05	19,34	6,35	0,8	7,93	4170985	4171510	4171703	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041	4173041
CNMG190612RH	19,05	19,34	6,35	1,2	7,93	4170986	4171511	4171704	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042	4173042
CNMG190616RH	19,05	19,34	6,35	1,6	7,93	4170987	4171512	4171705	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043	4173043
CNMG190624RH	19,05	19,34	6,35	2,4	7,93	4170988	4171523	4171706	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044	4173044



Inserts

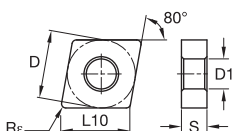
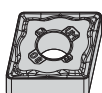


● first choice
○ alternate choice

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

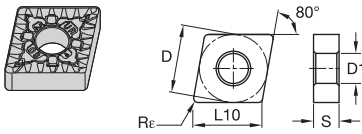
■ CNMG-UF

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	—	—	—	5645588	5645600	—	—	—	—	—	—
CNMG120408UF	12,70	12,90	4,76	0,8	5,16	—	—	—	4169354	4169380	—	—	—	—	—	—	—	—	—	—	—
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	—	—	—	5645217	—	—	—	—	—	—	—
CNMG120408UM	12,70	12,90	4,76	0,8	5,16	5645250	5645219	—	4172335	4172381	—	—	—	—	—	—	—	—	—	—	—
CNMG120412UM	12,70	12,90	4,76	1,2	5,16	—	—	—	4172336	4172382	—	—	—	5301414	—	—	—	—	—	—	—



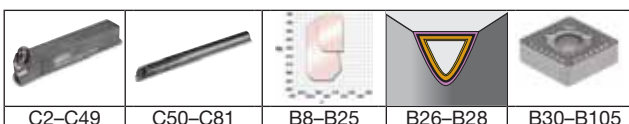
● first choice
○ alternate choice

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

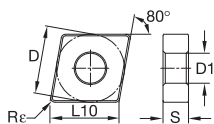
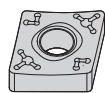
Inserts

■ CNMG-UR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115	
CNMG120404UR	12,70	12,90	4,76	0,4	5,16	4171022	4171022	-	4169406	4169444	4169479	-	-	5301400	5578899	-	-	-	-	-	-
CNMG120408UR	12,70	12,90	4,76	0,8	5,16	4171093	4170501	4169960	4169407	4169445	4169480	5680086	5680085	5301400	5578899	-	-	-	-	-	-
CNMG120412UR	12,70	12,90	4,76	1,2	5,16	4171094	4170502	4169961	4169408	4169446	4169481	5680087	4171419	5301413	5578899	-	-	-	-	-	-
CNMG120416UR	12,70	12,90	4,76	1,6	5,16	4171095	4170503	-	4169409	4169447	4169482	-	4171420	5680089	5301413	5578899	-	-	-	-	-
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	4169451	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	-	-	-	-	-	-



Inserts

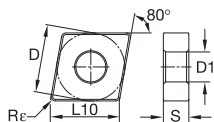


● first choice
○ alternate choice

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M	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

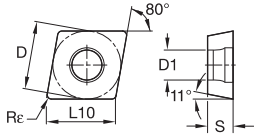
■ CNMM-65

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													

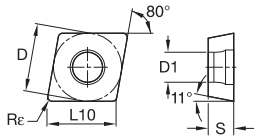


- first choice
- alternate choice

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

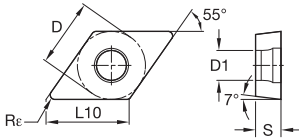
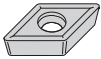
■ CPMT-FP

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	4170015	4170015	-	-	-	-	-	-	-	-	-	-	-	-	-
CPMT060204FP	6,35	6,45	2,38	0,4	2,80	4170016	4170016	4170326	4168812	4168823	4168822	-	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	4170018	4170328	4168814	4168826	-	-	4170107	-	-	-	-	-	-	-	-
CPMT09T308FP	9,53	9,67	3,97	0,8	4,40	4170019	4170329	4170328	4168815	4168827	-	-	4170108	-	-	-	-	-	-	-	-



■ CPMT-MP

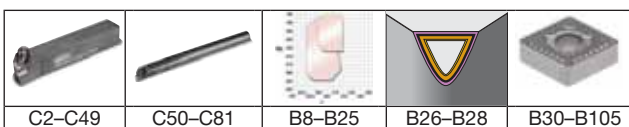
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CPMT060208MP	6,35	6,45	2,38	0,8	2,80	4170255	4170255	4170257	-	-	-	-	-	-	-	-	-	-	-	-	-
CPMT09T308MP	9,53	9,67	3,97	0,8	4,40	4170256	4170258	-	4168923	4168926	-	-	4170266	-	-	-	-	-	-	-	-
CPMT09T312MP	9,53	9,67	3,97	1,2	4,40	-	4170259	-	4168924	-	-	-	4170267	-	-	-	-	-	-	-	-



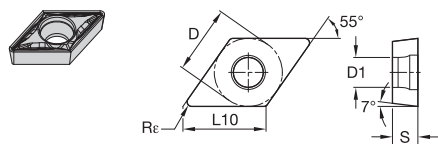
• first choice
○ alternate choice

	P	M	K	N	S	H	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
ISO catalogue number	D	L10	S	Rε	D1																	
DCMT070204	6,35	7,75	2,38	0,4	2,80		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DCMT11T304	9,53	11,63	3,97	0,4	4,40		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DCMT11T308	9,53	11,63	3,97	0,8	4,40		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DCMT11T312	9,53	11,63	3,97	1,2	4,40		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DCMT150404	12,70	15,50	4,76	0,4	5,50		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DCMT150408	12,70	15,50	4,76	0,8	5,50		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DCMT150412	12,70	15,50	4,76	1,2	5,50		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DCMT150416	12,70	15,50	4,76	1,6	5,50		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

DCMT



Inserts

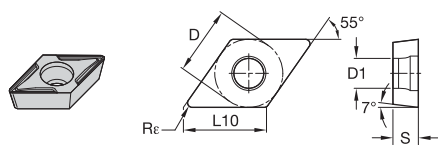


- first choice
- alternate choice

P	M	K	N	S	H																		
●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
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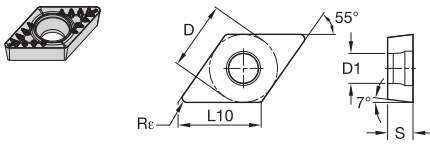
■ DCMT-FP

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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DCMT070204FP	6,35	7,75	2,38	0,4	2,80	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DCMT070208FP	6,35	7,75	2,38	0,8	2,80	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DCMT11T302FP	9,53	11,63	3,97	0,2	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DCMT11T304FP	9,53	11,63	3,97	0,4	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DCMT11T308FP	9,53	11,63	3,97	0,8	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DCMT11T312FP	9,53	11,63	3,97	1,2	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DCMT150404FP	12,70	15,50	4,76	0,4	5,50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DCMT150408FP	12,70	15,50	4,76	0,8	5,50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



■ 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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DCMT11T308FW	9,53	11,63	3,97	0,8	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

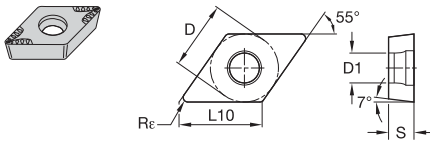


● first choice
○ alternate choice

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M	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

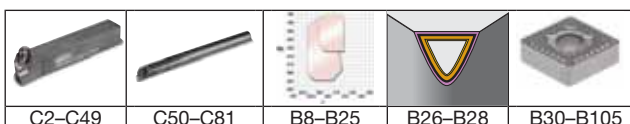
DCMT-MP

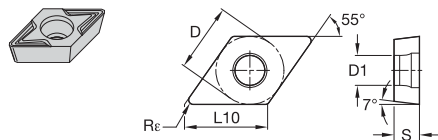
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
DCMT11T304MP	9,53	11,63	3,97	0,4	4,40	4170201	4170223	-	-	-	-	-	4170242	-	-	-	-	-	-	-	-
DCMT11T308MP	9,53	11,63	3,97	0,8	4,40	4170202	4170224	-	4168898	4168912	-	-	4170243	-	-	-	-	-	-	-	-
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	-	-	-	-	-	5623586	5623587	5623582	5623584	-	-	-	-	-
DCMT11T308MU	9,52	11,63	3,97	0,8	4,40	5623600	-	-	5623588	5623581	-	-	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	-	-	-	-	-	-	-



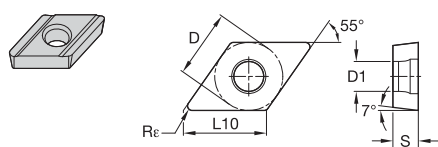


- first choice
- alternate choice

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M	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
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S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
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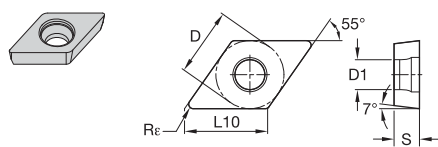
■ **DCMT-MW**

ISO catalogue number	D	L10	S	Rε	D1
DCMT11T304MW	9,52	11,63	3,97	0,2	4,40
DCMT11T308MW	9,53	11,63	3,97	0,8	4,40



■ **DCMX-18**

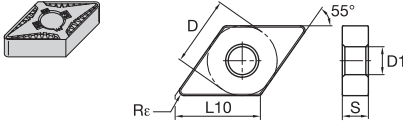
ISO catalogue number	D	L10	S	Rε	D1
DCMX11T302R18	9,53	11,63	3,97	0,2	4,30



■ **DCMW**

ISO catalogue number	D	L10	S	Rε	D1
DCMW070204	6,35	7,75	2,38	0,4	2,80
DCMW11T304	9,53	11,63	3,97	0,4	4,40
DCMW150408	12,70	15,50	4,76	0,8	5,50

WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
5623484	5623485	-	-	-	-	-	-	-	-	-	-	-	-	-
5623488	5623489	-	-	-	-	-	-	-	-	-	-	-	-	-
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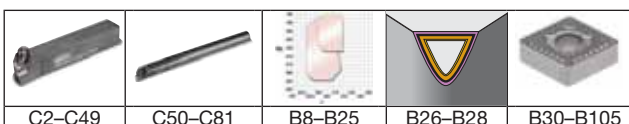
● first choice
○ alternate choice

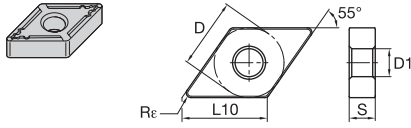
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S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

■ DNGG-FS

ISO catalogue number	D	L10	S	Rϵ	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS29PT	WU10HT	THM	TTM	TTR	TTI15
DNGG110402FS	9,52	11,63	4,76	0,2	3,81	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DNGG110404FS	9,52	11,63	4,76	0,4	3,81	•	•	•	•	•	•	•	•	○	○	○	•	•	•	•
DNGG110408FS	9,52	11,63	4,76	0,8	3,81	•	•	•	•	•	•	•	•	○	○	○	•	•	•	•
DNGG150401FS	12,70	15,50	4,76	0,1	5,16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DNGG150402FS	12,70	15,50	4,76	0,2	5,16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DNGG150404FS	12,70	15,50	4,76	0,4	5,16	•	•	•	•	•	•	•	•	○	○	○	•	•	•	•
DNGG150408FS	12,70	15,50	4,76	0,8	5,16	•	•	•	•	•	•	•	•	○	○	○	•	•	•	•
DNGG150412FS	12,70	15,50	4,76	1,2	5,16	•	•	•	•	•	•	•	•	○	○	○	•	•	•	•
DNGG150604FS	12,70	15,50	6,35	0,4	5,16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
DNGG150608FS	12,70	15,50	6,35	0,8	5,16	•	•	•	•	•	•	•	•	○	○	○	•	•	•	•

Inserts



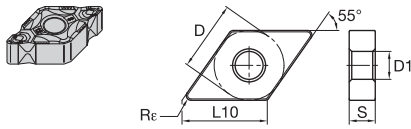


● first choice
○ alternate choice

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M	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
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S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

■ DNMG-22

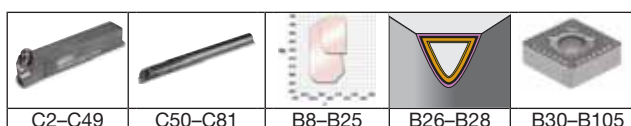
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
DNMG11040822	9,53	11,63	4,76	0,8	3,81	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	2022221



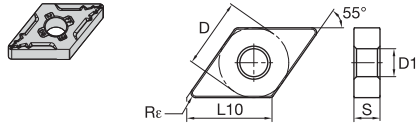
■ DNMG-CT

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	■	■	■	■	■	■	■	■	■	■	■

Inserts



Inserts

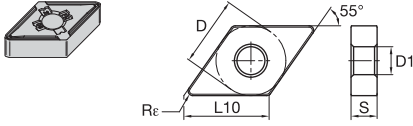


- first choice
- alternate choice

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M	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
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S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
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■ 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	4171028	4171028	4172348	4172348	4172348	4171321	4171321	5684273							
DNMG110408FF	9,53	11,63	4,76	0,8	3,81	4171029	4171029	4171029	4172349	4172349	4172349	4171322	4171322	5684273							
DNMG110412FF	9,53	11,63	4,76	1,2	3,81				4172350	4172350	4172350										
DNMG150404FF	12,70	15,50	4,76	0,4	5,16	4171030	4171030	4171030	4172351	4172351	4172351			5684274							
DNMG150408FF	12,70	15,50	4,76	0,8	5,16	4171031	4171031	4171031	4172352	4172352	4172352	4171373	4171373	5684275							
DNMG150412FF	12,70	15,50	4,76	1,2	5,16							4171374	4171374								
DNMG150604FF	12,70	15,50	6,35	0,4	5,16	4171032	4171032	4171032	4172683	4172683	4172683	4171375	4171375	5684276							
DNMG150608FF	12,70	15,50	6,35	0,8	5,16	4171043	4171043	4171043	4172684	4172684	4172684	4171376	4171376								
DNMG150612FF	12,70	15,50	6,35	1,2	5,16	4171044	4171044	4171044	4172685	4172685	4172685	4171377	4171377								



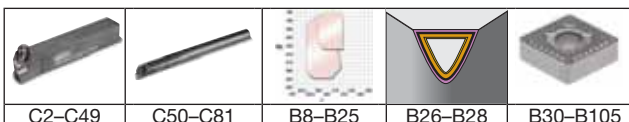
● first choice
○ alternate choice

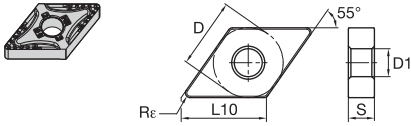
P	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
M	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Inserts

DNMG-FW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP36CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS29PT	WU10HT	THM	TTM	TTR	TT15	
DNMG110404FW	9,53	11,63	4,76	0,4	3,81	5623490	5623491														
DNMG110408FW	9,53	11,63	4,76	0,8	3,81	5623491	5623491														
DNMG150404FW	12,70	15,50	4,76	0,4	5,16	5623492	5623492	4171758	4171758												
DNMG150408FW	12,70	15,50	4,76	0,4	5,16	5623493	5623493	4173106	4173106	4173105											
DNMG150604FW	12,70	15,50	6,35	0,4	5,16	5623496	5623496	4171760	4171760	4173107											
DNMG150608FW	12,70	15,50	6,35	0,4	5,16	5623497	5623497	4171761	4171761	4173108	4171690	4171689	4171689								





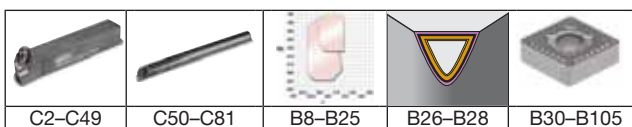
● first choice
○ alternate choice

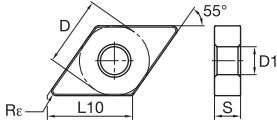
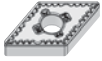
P	M	K	N	S	H	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
●	●	○				○	○	○					○	○	○	○	○				
	○	○																●			
																		●			

Inserts

■ 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	4171139	4170564	4170050	4171140	4171139	4170564	4170050								
DNMG150404MR	12,70	15,50	4,76	0,4	5,16	4171140	4170565	4170051		4171140	4170565	4170051									
DNMG150408MR	12,70	15,50	4,76	0,8	5,16	4171141	4170566	4170052		4171141	4170566	4170052									
DNMG150412MR	12,70	15,50	4,76	1,2	5,16	4171142	4170567	4170053		4171142	4170567	4170053									
DNMG150604MR	12,70	15,50	6,35	0,4	5,16	4171143	4170568	4170054		4171143	4170568	4170054									
DNMG150608MR	12,70	15,50	6,35	0,8	5,16	4171144	4170569	4170055		4171144	4170569	4170055									
DNMG150612MR	12,70	15,50	6,35	1,2	5,16	4171145	4170570	4170056		4171145	4170570	4170056									



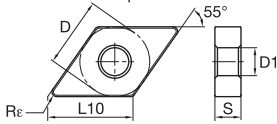
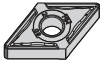


● first choice
○ alternate choice

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

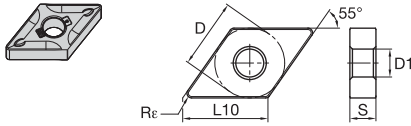
■ DNMG-MS

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	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150404MS	12,70	15,50	4,76	0,4	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150408MS	12,70	15,50	4,76	0,8	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150412MS	12,70	15,50	4,76	1,2	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150604MS	12,70	15,50	6,35	0,4	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150608MS	12,70	15,50	6,35	0,8	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150612MS	12,70	15,50	6,35	1,2	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○



■ 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	●	●	○	○	○	○	○	○	○	○	○	○	○
DNMG150412MW	12,70	15,50	4,76	1,2	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150608MW	12,70	15,50	6,35	0,4	5,16	5623498	5623499	●	●	○	○	○	○	○	○	○	○	○	○	○
DNMG150612MW	12,70	15,50	6,35	1,2	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○

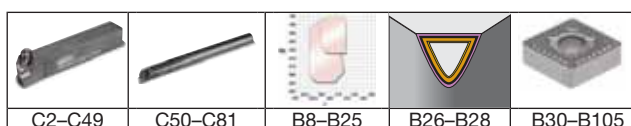


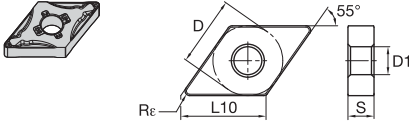
● first choice
○ alternate choice

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	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	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	-	-	-	-	-	-	-	-	-	-	-	-



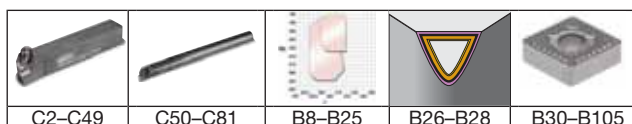


● first choice
○ alternate choice

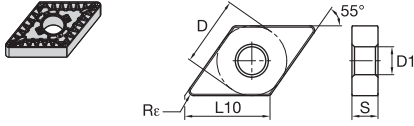
P	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
M	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

■ **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	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG110408UM	9,53	11,63	4,76	0,8	3,81	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG110412UM	9,53	11,63	4,76	1,2	3,81	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150404UM	12,70	15,50	4,76	0,4	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150408UM	12,70	15,50	4,76	0,8	5,16	5645260	5645261	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150412UM	12,70	15,50	4,76	1,2	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150604UM	12,70	15,50	6,35	0,4	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150608UM	12,70	15,50	6,35	0,8	5,16	5645262	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150612UM	12,70	15,50	6,35	1,2	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
DNMG150616UM	12,70	15,50	6,35	1,6	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○



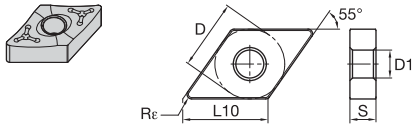
Inserts



● first choice
○ alternate choice

■ DNMG-UR

ISO catalogue number	D	L10	S	Rε	D1
DNMG110408UR	9,53	11,63	4,76	0,8	3,81
DNMG110412UR	9,53	11,63	4,76	1,2	3,81
DNMG150408UR	12,70	15,50	4,76	0,8	5,16
DNMG150412UR	12,70	15,50	4,76	1,2	5,16
DNMG150416UR	12,70	15,50	4,76	1,6	5,16
DNMG150608UR	12,70	15,50	6,35	0,8	5,16
DNMG150612UR	12,70	15,50	6,35	1,2	5,16
DNMG150616UR	12,70	15,50	6,35	1,6	5,16

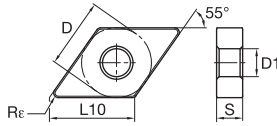
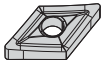


■ DNMM-65

ISO catalogue number	D	L10	S	Rε	D1
DNMM15060865	12,70	15,50	6,35	0,8	5,16
DNMM15061265	12,70	15,50	6,35	1,2	5,16
DNMM15061665	12,70	15,50	6,35	1,6	5,16

P	M	K	N	S	H
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WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
4171101	4171009	4169966	4169424	4169453	4169488									
4171102	4170510		4169425				4171427							
4171103	4170511	4169967	4169426	4169454	4169489		4171428		5579271					
4171104	4170512	4169968		4169455	4169490		4171429		5579282					
							4171430	5680171						
4171105	4170513	4169969	4169427	4169456	4169492	4169491	4171431	4171430	5579276					
4171106	4170514	4169970	4169428	4169457	4169493	5680172	4171432							
4171107	4170515	4169971			4169494		4171433							



- first choice
- alternate choice

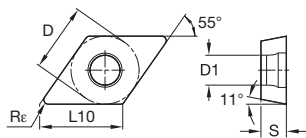
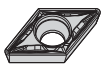
P	M	K	N	S	H	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
●	●	○																			
●	○	○							○				○	○							
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Inserts

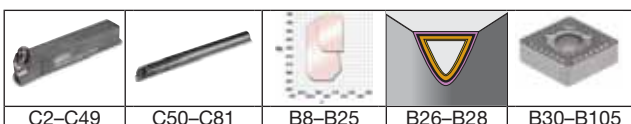
DNMP

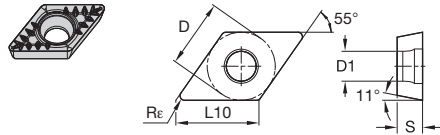
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
DNMP150404	12,70	15,50	4,76	0,4	5,16	●	●	○	○	○	○										
DNMP150408	12,70	15,50	4,76	0,8	5,16	●	●	○	○	○	○			○							
DNMP150412	12,70	15,50	4,76	1,2	5,16	●	●	○	○	○	○										
DNMP150604	12,70	15,50	6,35	0,4	5,16	●	●	○	○	○	○										
DNMP150608	12,70	15,50	6,35	0,8	5,16	●	●	○	○	○	○										
DNMP150612	12,70	15,50	6,35	1,2	5,16	●	●	○	○	○	○										

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	4170021	4170030	4168816	4168828	●										
DPMT11T304FP	9,53	11,63	3,97	0,4	4,40	4170022	4170021	4170331	4168817	4168829	●										
DPMT11T308FP	9,53	11,63	3,97	0,8	4,40	4170022	4170021	4170332	4168830	●			4170109								



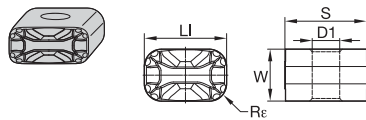


● first choice
 ○ alternate choice

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

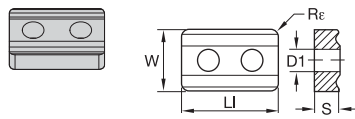
■ DPMT-MP

ISO catalogue number	D	L10	S	Re	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	○	○	○	○	○	○	○	○



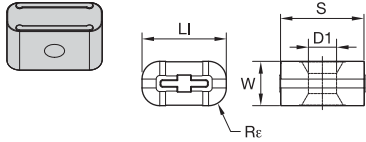
■ LNUX-13

ISO catalogue number	W	LI	S	Re	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	Re	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	○

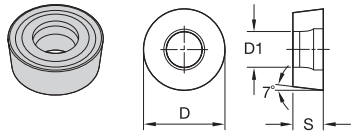


● first choice
○ alternate choice

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

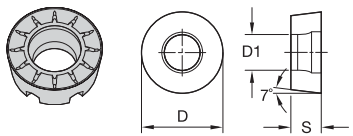
■ LNUX-T

ISO catalogue number	W	LI	S	Re	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	●							○								
LNUX301940T	12,00	30,00	19,05	4,0	6,35								○								



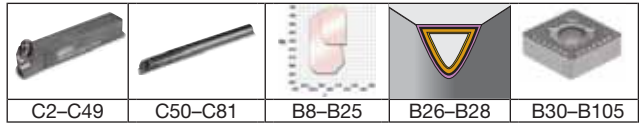
■ RCMT

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	○	○														
RCMT0803M0	8,00	3,18	3,40	○	○														
RCMT10T3M0	10,00	3,97	4,40	○	○														
RCMT1204M0	12,00	4,76	4,40	○	○														
RCMT1606M0	16,00	6,35	5,50	○	○														

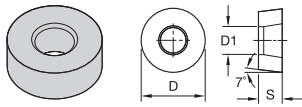


■ RCMT-43

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																



Inserts

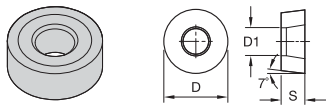


● first choice
○ alternate choice

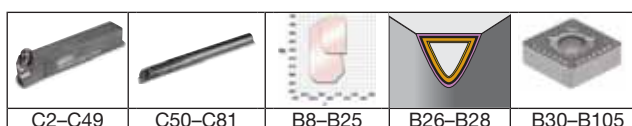
P	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
M	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

■ RNMA

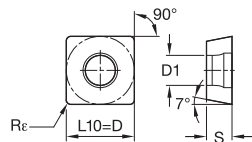
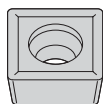
ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT15	
RNMA120400	12,70	4,76	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○


■ RNMG-RH

ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT15	
RNMG090300RH	9,53	3,18	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
RNMG120400RH	12,70	4,76	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
RNMG190600RH	19,05	6,35	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



Inserts

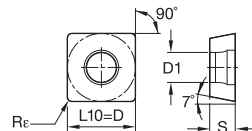
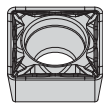


● first choice
○ alternate choice

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

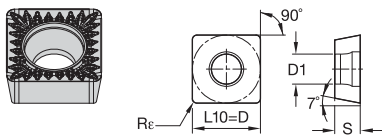
■ SCMT

ISO catalogue number	D	L10	S	R _ε	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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SCMT09T304	9,53	9,53	3,97	0,4	4,40	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SCMT09T308	9,53	9,53	3,97	0,8	4,40	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SCMT120408	12,70	12,70	4,76	0,8	5,50	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SCMT120412	12,70	12,70	4,76	1,2	5,50	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SCMT150512	15,88	15,88	5,56	1,2	5,50	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•



■ SCMT-FP

ISO catalogue number	D	L10	S	R _ε	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	4170002	4170308	4168767	4168795		4170093									
SCMT09T308FP	9,53	9,53	3,97	0,8	4,40	4170003	4170309	4170308	4168768	4168796		4170094									
SCMT120404FP	12,70	12,70	4,76	0,4	5,50		4170310	4170310		4168797											
SCMT120408FP	12,70	12,70	4,76	0,8	5,50	4170004	4170311	4170310	4168769	4168798		4170095									
SCMT120412FP	12,70	12,70	4,76	1,2	5,50	4170005	4170312		4168799			4170096									

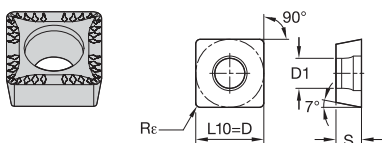
● first choice
○ alternate choice

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

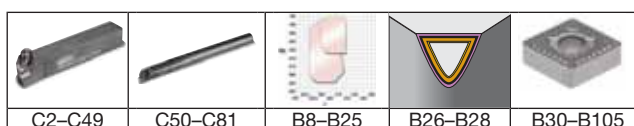
Inserts

■ SCMT-MP

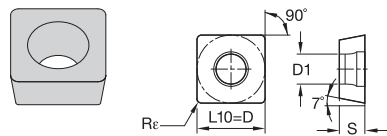
ISO catalogue number	D	L10	S	R _ε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
SCMT09T304MP	9,53	9,53	3,97	0,4	4,40																
SCMT09T308MP	9,53	9,53	3,97	0,8	4,40	4170214	4170226		4168899	4168913			4170244								
SCMT120404MP	12,70	12,70	4,76	0,4	5,50				4168901	4168915			4170246								
SCMT120408MP	12,70	12,70	4,76	0,8	5,50	4170215	4170228		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	R _ε	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							



Inserts

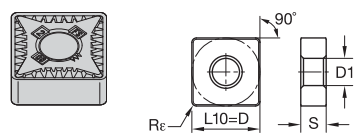


● first choice
○ alternate choice

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

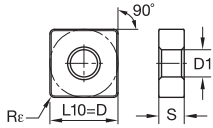
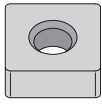
■ **SCMW**

ISO catalogue number	D	L10	S	R _e	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	R _e	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	■	■	■	■	■



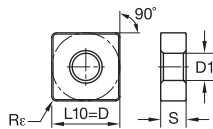
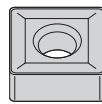
● first choice
○ alternate choice

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

Inserts

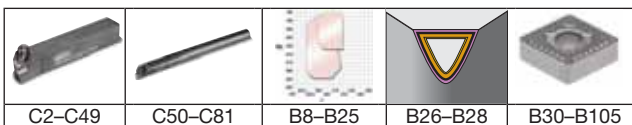
■ SNMA

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	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMA120412	12,70	12,70	4,76	1,2	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMA120416	12,70	12,70	4,76	1,6	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMA150608	15,88	15,88	6,35	0,8	6,35	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMA150612	15,88	15,88	6,35	1,2	6,35	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMA150616	15,88	15,88	6,35	1,6	6,35	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMA190612	19,05	19,05	6,35	1,2	7,93	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMA190616	19,05	19,05	6,35	1,6	7,93	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○

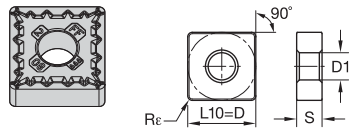


■ SNMG

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	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○



Inserts

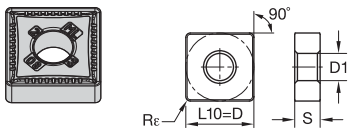


● first choice
○ alternate choice

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

■ SNMG-FF

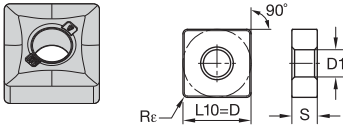
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
SNMG090304FF	9,53	9,53	3,18	0,4	3,81	4171045	4171046						4171378	4171379	5684277						
SNMG090308FF	9,53	9,53	3,18	0,8	3,81	4171046			4172686				4171379	5684277							
SNMG120404FF	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								

Inserts

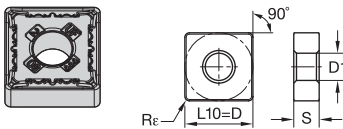


● first choice
○ alternate choice

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

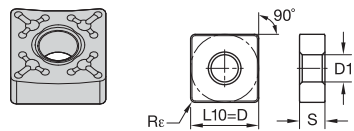
■ SNMG-RH

ISO catalogue number	D	L10	S	Re	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	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○
SNMG120412RH	12,70	12,70	4,76	1,2	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMG120416RH	12,70	12,70	4,76	1,6	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMG150608RH	15,88	15,88	6,35	0,8	6,35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMG150612RH	15,88	15,88	6,35	1,2	6,35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMG150616RH	15,88	15,88	6,35	1,6	6,35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMG190608RH	19,05	19,05	6,35	0,8	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMG190612RH	19,05	19,05	6,35	1,2	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMG190616RH	19,05	19,05	6,35	1,6	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



■ SNMG-UF

ISO catalogue number	D	L10	S	Re	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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMG120408UF	12,70	12,70	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMG120412UF	12,70	12,70	4,76	1,2	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

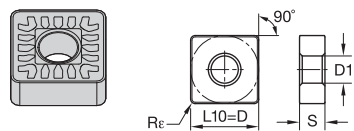


● first choice
○ alternate choice

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

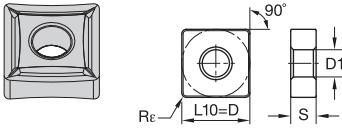
■ SNMM-65

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	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMM12041265	12,70	12,70	4,76	1,2	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMM15061665	15,88	15,88	6,35	1,6	6,35	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMM19061265	19,05	19,05	6,35	1,2	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMM19061665	19,05	19,05	6,35	1,6	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMM19062465	19,05	19,05	6,35	2,4	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



■ 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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMM190624SR	19,05	19,05	6,35	2,4	7,93	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

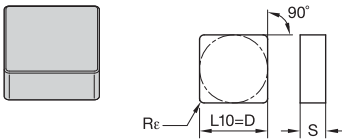


- first choice
- alternate choice

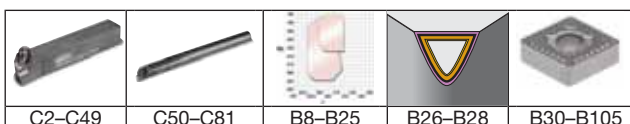
P	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
M	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

■ SNMP

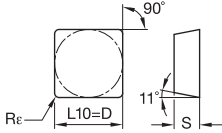
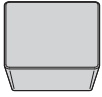
ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
SNMP120408	12,70	12,70	4,76	0,8	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMP120412	12,70	12,70	4,76	1,2	5,16	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMP150608	15,88	15,88	6,35	0,8	6,35	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMP150612	15,88	15,88	6,35	1,2	6,35	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMP150616	15,88	15,88	6,35	1,6	6,35	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SNMP190616	19,05	19,05	6,35	1,6	7,93	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○


■ SNU

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

Inserts


Inserts

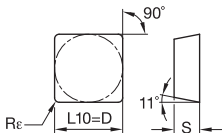
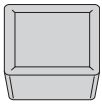


• first choice
○ alternate choice

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

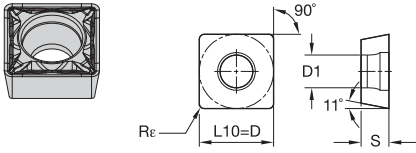
■ SPG

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



■ SPMR

ISO catalogue number	D	L10	S	Re	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	○	○	○	•	•	•	•

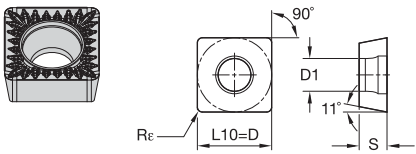


● first choice
○ alternate choice

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

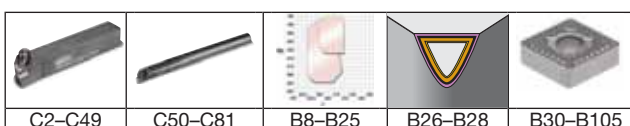
■ SPMT-FP

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	—	—	—	—	—	—	—	—

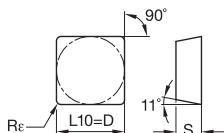

■ SPMT-MP

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	—	—	—	—	—	—	—	—

Inserts



Inserts

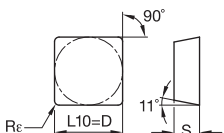
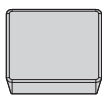


● first choice
○ alternate choice

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

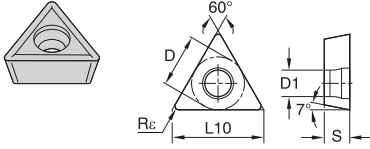
■ SPU

ISO catalogue number	D	L10	S	Re	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPUN090308	9,53	9,53	3,18	0,8	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
SPUN120304	12,70	12,70	3,18	0,4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SPUN120308	12,70	12,70	3,18	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SPUN120312	12,70	12,70	3,18	1,2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SPUN120412	12,70	12,70	4,76	1,2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SPUN150412	15,88	15,88	4,76	1,2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SPUN190412	19,05	19,05	4,76	1,2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SPUN190416	19,05	19,05	4,76	1,6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



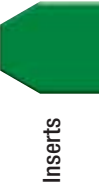
■ SPU-T

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



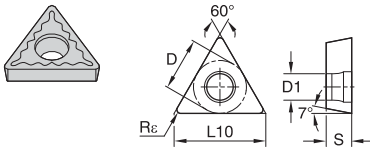
● first choice
○ alternate choice

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



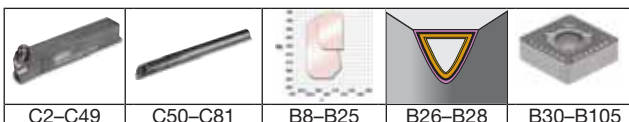
TCMT

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	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
TCMT110204	6,35	11,00	2,38	0,4	2,80	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT16T304	9,53	16,50	3,97	0,4	4,40	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
TCMT16T308	9,53	16,50	3,97	0,8	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT220408	12,70	22,00	4,76	0,8	5,50	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

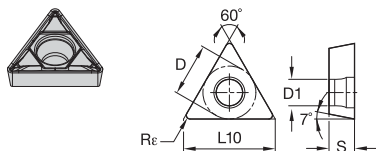


TCMT-2

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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



Inserts

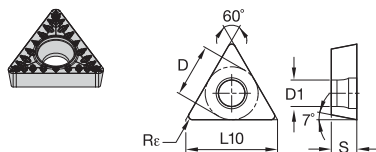


● first choice
○ alternate choice

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

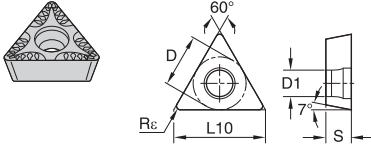
TCMT-FP

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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT110204FP	6,35	11,00	2,38	0,4	2,80	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT110208FP	6,35	11,00	2,38	0,8	2,80	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT16T304FP	9,53	16,50	3,97	0,4	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT16T308FP	9,53	16,50	3,97	0,8	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT16T312FP	9,53	16,50	3,97	1,2	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT220408FP	12,70	22,00	4,76	0,8	5,50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT16T304MP	9,53	16,50	3,97	0,4	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT16T308MP	9,53	16,50	3,97	0,8	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT16T312MP	9,53	16,50	3,97	1,2	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

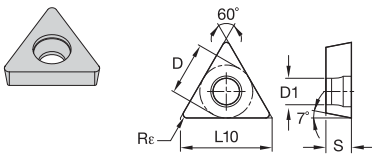


● first choice
○ alternate choice

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

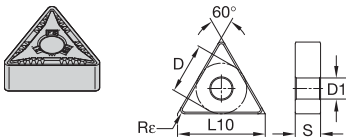
TCMT-MU

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	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMT16T308MU	9,53	16,50	3,97	0,8	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



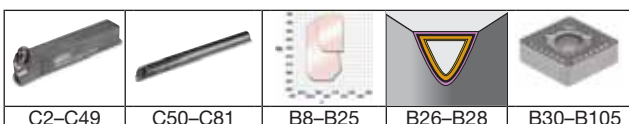
TCMW

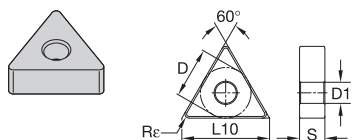
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
TCMW110204	6,35	11,00	2,38	0,4	2,80	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TCMW16T304	9,53	16,50	3,97	0,4	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNGG220408FS	12,70	22,00	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



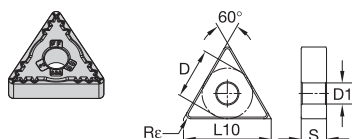


- first choice
- alternate choice

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

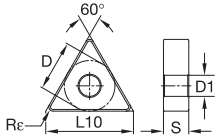
TNMA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115	
TNMA160408	9,53	16,50	4,76	0,8	3,81	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMA160412	9,53	16,50	4,76	1,2	3,81	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMA160416	9,53	16,50	4,76	1,6	3,81	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMA220408	12,70	22,00	4,76	0,8	5,16	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMA220412	12,70	22,00	4,76	1,2	5,16	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMA220416	12,70	22,00	4,76	1,6	5,16	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMA270616	15,88	27,50	6,35	1,6	6,35	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○



TNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115	
TNMG110304FF	6,35	11,00	3,18	0,4	2,26	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG110308FF	6,35	11,00	3,18	0,8	2,26	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160404FF	9,53	16,50	4,76	0,4	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160408FF	9,53	16,50	4,76	0,8	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160412FF	9,53	16,50	4,76	1,2	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

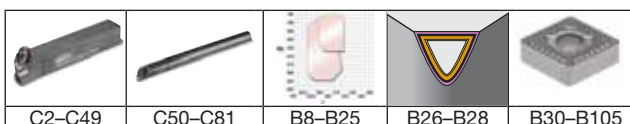


● first choice
○ alternate choice

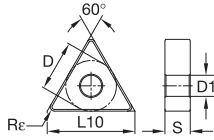
ISO catalogue number	D	L10	S	Rε	D1	P	M	K	N	S	H	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
						●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG110304ML	6,35	11,00	3,18	0,4	2,26	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG110308ML	6,35	11,00	3,18	0,8	2,26	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160404ML	9,53	16,50	4,76	0,4	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160408ML	9,53	16,50	4,76	0,8	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160412ML	9,53	16,50	4,76	1,2	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG220404ML	12,70	22,00	4,76	0,4	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG220408ML	12,70	22,00	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

■ TNMG-ML

Inserts



Inserts

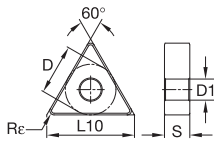


- first choice
- alternate choice

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

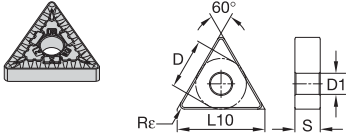
TNMG-UF

ISO catalogue number	D	L10	S	Re	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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160408UF	9,53	16,50	4,76	0,8	3,81	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160412UF	9,53	16,50	4,76	1,2	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG220404UF	12,70	22,00	4,76	0,4	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG220408UF	12,70	22,00	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



TNMG-UM

ISO catalogue number	D	L10	S	Re	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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160408UM	9,53	16,50	4,76	0,8	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160412UM	9,53	16,50	4,76	1,2	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG160416UM	9,53	16,50	4,76	1,6	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG220404UM	12,70	22,00	4,76	0,4	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG220408UM	12,70	22,00	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMG220412UM	12,70	22,00	4,76	1,2	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

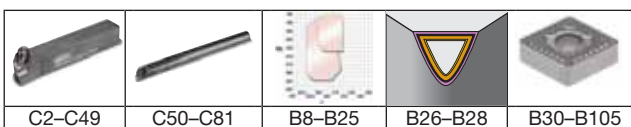


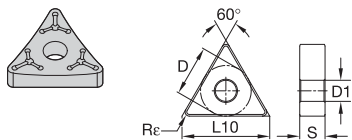
● first choice
○ alternate choice

■ TNMG-UR

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

Inserts



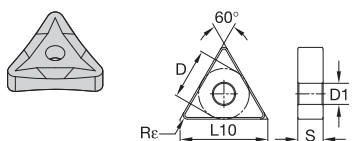


● first choice
○ alternate choice

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

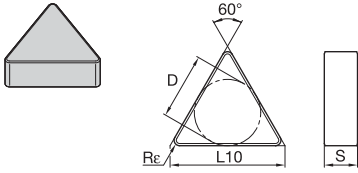
TNMM-65

ISO catalogue number	D	L10	S	R _ε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS28PT	WU10HT	THM	TTM	TTR	TTI15	
TNMM16040865	9,53	16,50	4,76	0,8	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMM16041265	9,53	16,50	4,76	1,2	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMM22040865	12,70	22,00	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMM22041265	12,70	22,00	4,76	1,2	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMM22041665	12,70	22,00	4,76	1,6	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



TNMP

ISO catalogue number	D	L10	S	R _ε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS28PT	WU10HT	THM	TTM	TTR	TTI15	
TNMP160404	9,53	16,50	4,76	0,4	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMP160408	9,53	16,50	4,76	0,8	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMP160412	9,53	16,50	4,76	1,2	3,81	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMP220404	12,70	22,00	4,76	0,4	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMP220408	12,70	22,00	4,76	0,8	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TNMP220412	12,70	22,00	4,76	1,2	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

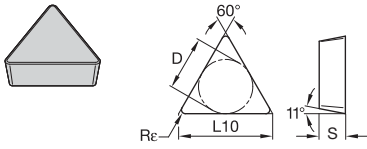


● first choice
○ alternate choice

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

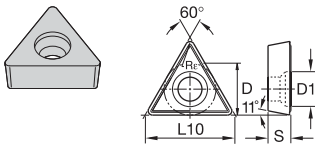
TNU

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



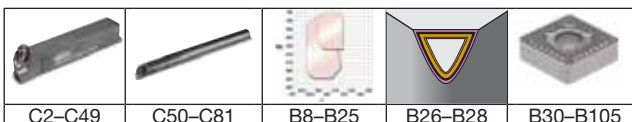
TPG

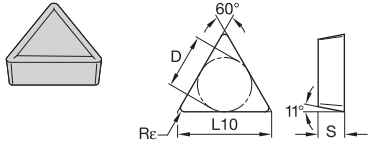
ISO catalogue number	D	L10	S	Re	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
TPGN110308	6,35	11,00	3,18	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPGN160308	9,53	16,50	3,18	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



TPGA

ISO catalogue number	D	L10	S	Re	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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPGA110208	6,35	11,00	2,38	0,8	2,80	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



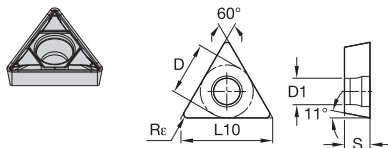


● first choice
○ alternate choice

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

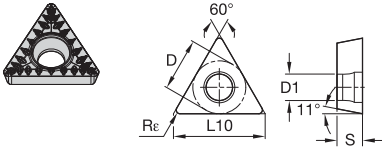
■ TPMPR

ISO catalogue number	D	L10	S	Re	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115
TPMR110304	6,35	11,00	3,18	0,4	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMR110308	6,35	11,00	3,18	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMR160304	9,53	16,50	3,18	0,4	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMR160308	9,53	16,50	3,18	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMR160312	9,53	16,50	3,18	1,2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



■ TPMT-FP

ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115
TPMT090208FP	5,56	9,63	2,38	0,8	2,50	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMT110204FP	6,35	11,00	2,38	0,4	2,80	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMT110208FP	6,35	11,00	2,38	0,8	2,80	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMT16T304FP	9,53	16,50	3,97	0,4	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMT16T308FP	9,53	16,50	3,97	0,8	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMT16T312FP	9,53	16,50	3,97	1,2	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMT220408FP	12,70	22,00	4,76	0,8	5,50	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

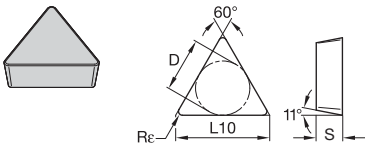


● first choice
○ alternate choice

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

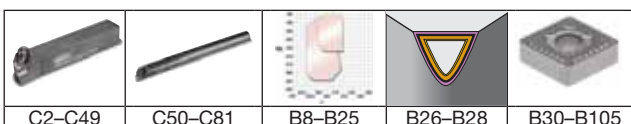
■ TPMT-MP

ISO catalogue number	D	L10	S	Re	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	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMT16T308MP	9,53	16,50	3,97	0,8	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPMT16T312MP	9,53	16,50	3,97	1,2	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

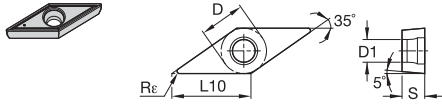


■ TPU

ISO catalogue number	D	L10	S	Re	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
TPUN110304	6,35	11,00	3,18	0,4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPUN110308	6,35	11,00	3,18	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPUN160304	9,53	16,50	3,18	0,4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPUN160308	9,53	16,50	3,18	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPUN160312	9,53	16,50	3,18	1,2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPUN220408	12,70	22,00	4,76	0,8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TPUN220412	12,70	22,00	4,76	1,2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



Inserts

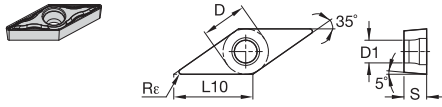


● first choice
○ alternate choice

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

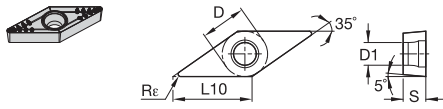
■ VBMT

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	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	—	—	—	—	—	—	—	—	—	—	—	—	—	—

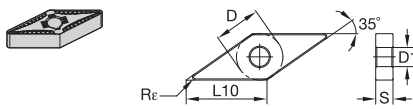


● first choice
○ alternate choice

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

■ VBMT-MP

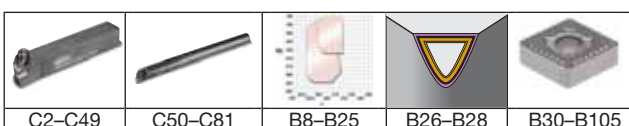
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15	
VBMT160404MP	9,53	16,61	4,76	0,4	4,40	|	4170235	|	|	4168921	|	|	4170253	|	|	|	|	|	|	|	|
VBMT160408MP	9,53	16,61	4,76	0,8	4,40	|	4170236	|	|	4168922	|	|	4170254	|	|	|	|	|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

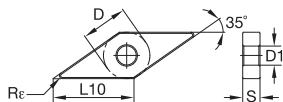


■ VNGG-FS

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	5548684	|	|	|	|	|	|
VNGG160402FS	9,53	16,61	4,76	0,2	3,81	|	|	|	|	|	|	|	|	5548683	5548683	5549999	5550000	|	|	|	|
VNGG160404FS	9,53	16,61	4,76	0,4	3,81	|	|	|	|	|	|	|	|	5548685	5548685	5538232	5550001	|	|	|	|
VNGG160408FS	9,53	16,61	4,76	0,8	3,81									5548686	5548686	5538233	5550002				

Inserts



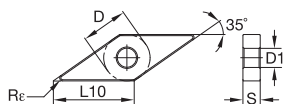


● first choice
○ alternate choice

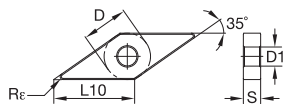
P	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
M	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

VNMG-FF

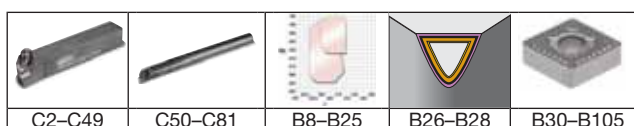
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VNMG160404FF	9,53	16,61	4,76	0,4	3,81	4171053															
VNMG160408FF	9,53	16,61	4,76	0,8	3,81	4171054				4172694				5684334							

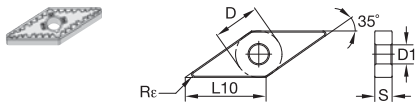
**VNMG-ML**

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															
VNMG160408ML	9,53	16,61	4,76	0,8	3,81	4171080	4170495														

**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															

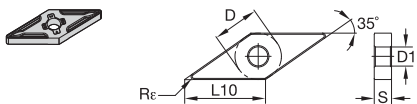




- first choice
- alternate choice

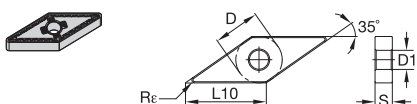
■ VNMG-MS

ISO catalogue number	D	L10	S	Re	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	●								○	○	○				
VNMG160408MS	9,53	16,61	4,76	0,8	3,81	○			○	○				○	○	○	●			
VNMG220404MS	12,70	22,14	4,76	0,4	5,16	○								○	○	○				
VNMG220408MS	12,70	22,14	4,76	0,8	5,16	○								○	○	○				



■ VNMG-RH

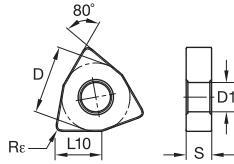
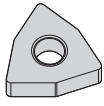
ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160408RH	9,53	16,61	4,76	0,8	3,81		○	○												
VNMG220408RH	12,70	22,14	4,76	0,8	5,16		○	○												
VNMG220412RH	12,70	22,14	4,76	1,2	5,16		○	○												



■ VNMG-UF

ISO catalogue number	D	L10	S	Re	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															
VNMG160408UF	9,53	16,61	4,76	0,8	3,81															

Inserts

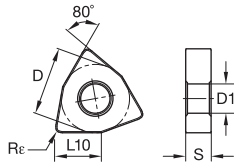


• first choice
○ alternate choice

P	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
M	•	•	○	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
K	•	•	○	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
N	•	•	○	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
S	•	•	○	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H	•	•	○	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

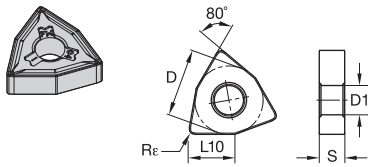
■ WNMA

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	4171898	|	|	|	|	|	|	|	|	|	|	|
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	|	|	|	|	|	|	|	|	|	|	|



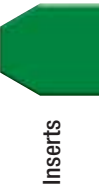
■ WNMG-FF

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	4171055	|	|	4172696	|	|	4171388	|	|	|	|	|	|	|	|	|	|	|
WNMG060408FF	9,53	6,52	4,76	0,8	3,81	4171056	4171056	|	|	|	|	4171389	4171388	|	|	|	|	|	|	|	|	|	|	|
WNMG080404FF	12,70	8,69	4,76	0,4	5,16	4171057	4171057	|	|	4172697	|	|	|	5684336	|	|	|	|	|	|	|	|	|	|
WNMG080408FF	12,70	8,69	4,76	0,8	5,16	4171058	4171058						5684335	5684336										

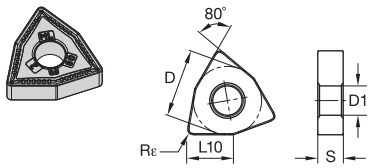


- first choice
- alternate choice

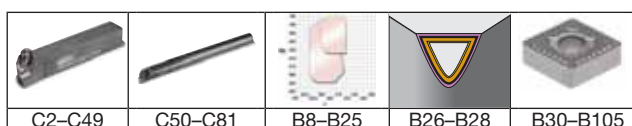
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M	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○


WNUMG-FW

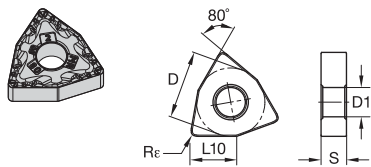
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WNUMG060404FW	9,53	6,52	4,76	0,4	3,81	5623510															
WNUMG060408FW	9,53	6,52	4,76	0,8	3,81	5623511															
WNUMG080404FW	12,70	8,69	4,76	0,4	5,16	5623514			4171762	4173109		4171693									
WNUMG080408FW	12,70	8,69	4,76	0,8	5,16	5623515			4171763	4173110		4171694									
WNUMG080412FW	12,70	8,69	4,76	1,2	5,16				4171764	4173111		4171696									


WNUMG-ML

ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT15	
WNUMG060404ML	9,53	6,52	4,76	0,4	3,81	4171081						4171676	4171415								
WNUMG060408ML	9,53	6,52	4,76	0,8	3,81	4171082	4170497					4171677	4171416								
WNUMG080404ML	12,70	8,69	4,76	0,4	5,16	4171083	4170498					4171678	4171417								
WNUMG080408ML	12,70	8,69	4,76	0,8	5,16	4171084	4170499					4171679	4171418								



Inserts

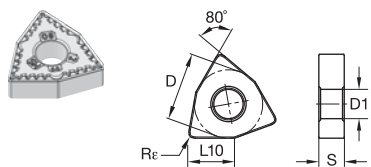


● first choice
○ alternate choice

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

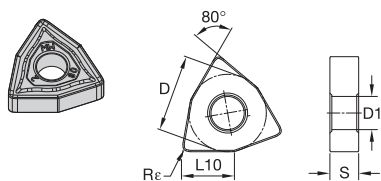
■ WNMG-MR

ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115
WNMG080408MR	12,70	8,69	4,76	0,8	5,16	4171158	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													



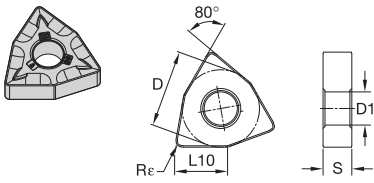
■ WNMG-MS

ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115
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	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115
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								

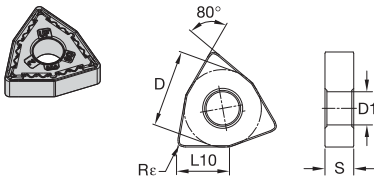


● first choice
○ alternate choice

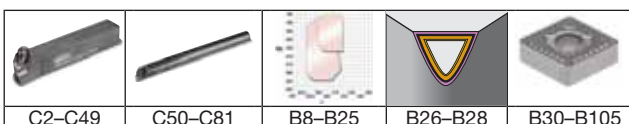
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K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

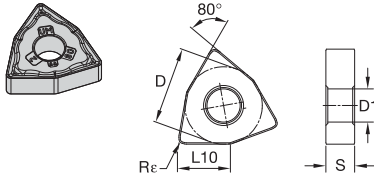
■ WNMG-RH

ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115	
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	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TT115	
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							



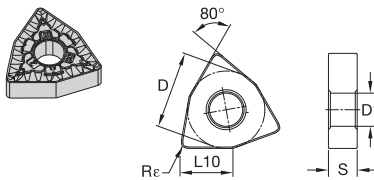


- first choice
- alternate choice

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H																			

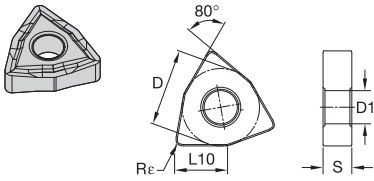
WNUMG-UM

ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS29PT	WU10HT	THM	TTM	TTR	TTI15	
WNUMG060404UM	9,53	6,52	4,76	0,4	3,81																
WNUMG060408UM	9,53	6,52	4,76	0,8	3,81				4172376	4172404	4172433			5645267							
WNUMG060412UM	9,53	6,52	4,76	1,2	3,81																
WNUMG080404UM	12,70	8,69	4,76	0,4	5,16				4172377	4172406	4172435										
WNUMG080408UM	12,70	8,69	4,76	0,8	5,16		5645270		4172378	4172407	4172436										
WNUMG080412UM	12,70	8,69	4,76	1,2	5,16	5645271			4172379	4172408	4172437			5645269							
WNUMG080416UM	12,70	8,69	4,76	1,6	5,16					4172409	4172438										



WNUMG-UR

ISO catalogue number	D	L10	S	Re	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS29PT	WU10HT	THM	TTM	TTR	TTI15	
WNUMG060408UR	9,53	6,52	4,76	0,8	3,81		4171125	4170531	4170039	4169441											
WNUMG060412UR	9,53	6,52	4,76	1,2	3,81		4171126	4170532													
WNUMG080408UR	12,70	8,69	4,76	0,8	5,16		4171127	4170533	4170040	4169442	4169476										
WNUMG080412UR	12,70	8,69	4,76	1,2	5,16		4171128	4170534	4170041	4169443	4169510										
WNUMG080416UR	12,70	8,69	4,76	1,6	5,16		4171129	4170535	4170042	4169478	4169511										

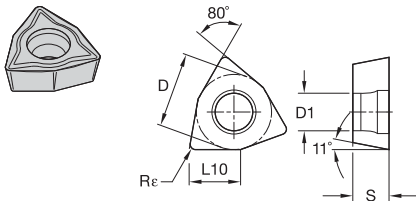


● first choice
○ alternate choice

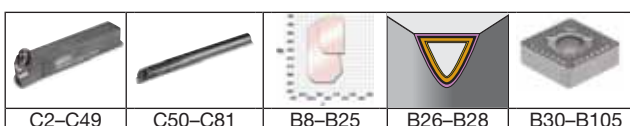
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K	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○


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	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
WNMP080412	12,70	8,69	4,76	1,2	5,16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○


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	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
WPMT06T304FP	9,53	6,52	3,97	0,4	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
WPMT06T308FP	9,53	6,52	3,97	0,8	4,40	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
WPMTS3T104FP	4,76	3,25	1,98	0,4	2,15	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

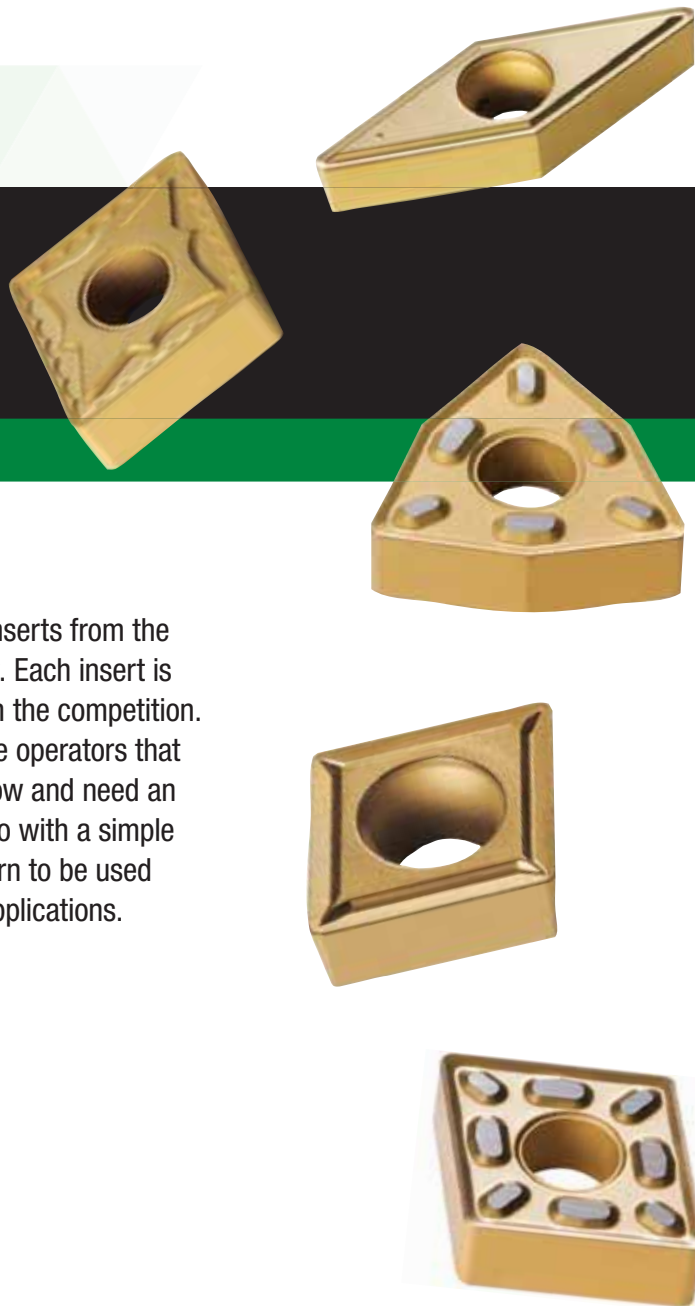


The Gold Standard for Value •
WIDIA™ VariTurn™

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.

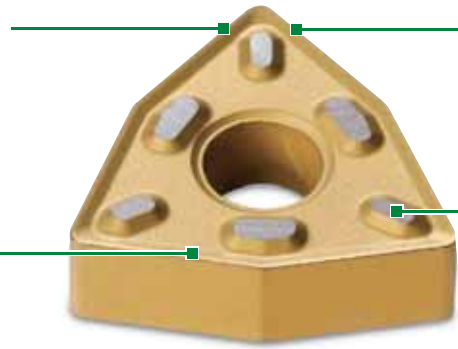
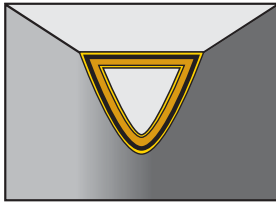
- Engineered to optimise performance.
- Gold coating on every insert.
- Proven grade technologies.



Post-coat treatment

- Improves edge toughness.
- Wide range of applications.

MT-CVD/CVD-
TiN-TiCN-Al2O3-TiN



Improved edge toughness

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

Post-coat grinding

- Provides secure seating surface.

Getting the Most from Every Insert

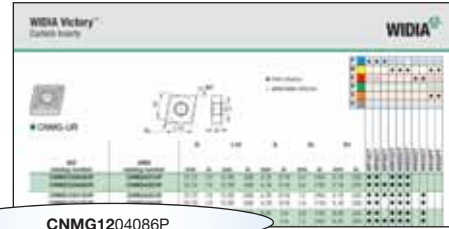
WIDIA™ VariTurn™ products make it simple to get the most out of your inserts, and your money. Every insert is gold, which exposes wear as the tool continues to be used. This makes it easy to detect when an insert is ready to be changed — maximising the product's value and protecting the workpiece. Also, 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.

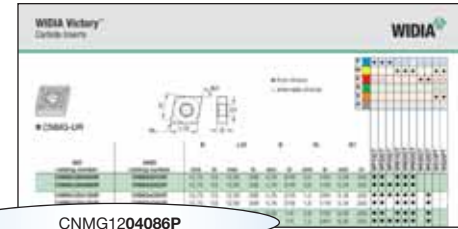


CNMG1204086P

C		N		M		G		12																																																																																																																																																																																																	
Insert Shape		Insert Clearance Angle		Tolerance Class		Insert Features		Size																																																																																																																																																																																																	
H	Hexagon 120°	A	3°	<p>Tolerances apply prior to edge prep and coating</p> <p>D = Theoretical diameter of the insert inscribed circle S = Thickness B = See figures below</p>	N		<p>"Code for mm cutting edge length "L10"</p> <table border="1"> <thead> <tr> <th>"D"</th> <th>C</th> <th>D</th> <th>R</th> <th>S</th> <th>T</th> <th>V</th> <th>W</th> </tr> </thead> <tbody> <tr><td>3,97</td><td>S4</td><td>04</td><td>03</td><td>03</td><td>06</td><td>-</td><td>-</td></tr> <tr><td>4,76</td><td>04</td><td>05</td><td>04</td><td>04</td><td>08</td><td>08</td><td>S3</td></tr> <tr><td>5,56</td><td>05</td><td>06</td><td>05</td><td>05</td><td>09</td><td>09</td><td>03</td></tr> <tr><td>6,00</td><td>-</td><td>-</td><td>06</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>6,35</td><td>06</td><td>07</td><td>06</td><td>06</td><td>11</td><td>11</td><td>04</td></tr> <tr><td>7,94</td><td>08</td><td>09</td><td>07</td><td>07</td><td>13</td><td>13</td><td>05</td></tr> <tr><td>8,00</td><td>-</td><td>-</td><td>08</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>9,52</td><td>09</td><td>11</td><td>09</td><td>09</td><td>16</td><td>16</td><td>06</td></tr> <tr><td>10,00</td><td>-</td><td>-</td><td>10</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>11,11</td><td>11</td><td>13</td><td>11</td><td>11</td><td>19</td><td>19</td><td>07</td></tr> <tr><td>12,00</td><td>-</td><td>-</td><td>12</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>12,70</td><td>12</td><td>15</td><td>12</td><td>12</td><td>22</td><td>22</td><td>08</td></tr> <tr><td>14,29</td><td>14</td><td>17</td><td>14</td><td>14</td><td>24</td><td>24</td><td>09</td></tr> <tr><td>15,88</td><td>16</td><td>19</td><td>15</td><td>15</td><td>27</td><td>27</td><td>10</td></tr> <tr><td>16,00</td><td>-</td><td>-</td><td>16</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>17,46</td><td>17</td><td>21</td><td>17</td><td>17</td><td>30</td><td>30</td><td>11</td></tr> <tr><td>19,05</td><td>19</td><td>23</td><td>19</td><td>19</td><td>33</td><td>33</td><td>13</td></tr> <tr><td>20,00</td><td>-</td><td>-</td><td>20</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>22,22</td><td>22</td><td>27</td><td>22</td><td>22</td><td>38</td><td>38</td><td>15</td></tr> <tr><td>25,00</td><td>-</td><td>-</td><td>25</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>25,40</td><td>25</td><td>31</td><td>25</td><td>25</td><td>44</td><td>44</td><td>17</td></tr> <tr><td>31,75</td><td>32</td><td>38</td><td>31</td><td>31</td><td>54</td><td>54</td><td>21</td></tr> <tr><td>32,00</td><td>-</td><td>-</td><td>32</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	"D"	C	D	R	S	T	V	W	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	-	-	-	-	R	
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P	Pentagon 108°	C	7°	A																																																																																																																																																																																																					
R	Round	D	15°	M																																																																																																																																																																																																					
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M	86°			B																																																																																																																																																																																																					
V	35°			H																																																																																																																																																																																																					
W	Trigon 80° with enlarged corner angles			C																																																																																																																																																																																																					
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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.



CNMG1204086P

<p>04</p> <p>Thickness S</p> <table border="1"> <thead> <tr> <th>symbol</th> <th>thickness</th> </tr> <tr> <th>mm</th> <th>mm</th> </tr> </thead> <tbody> <tr><td>—</td><td>0,79</td></tr> <tr><td>T0</td><td>1,00</td></tr> <tr><td>01</td><td>1,59</td></tr> <tr><td>T1</td><td>1,98</td></tr> <tr><td>02</td><td>2,38</td></tr> <tr><td>03</td><td>3,18</td></tr> <tr><td>T3</td><td>3,97</td></tr> <tr><td>04</td><td>4,76</td></tr> <tr><td>05</td><td>5,56</td></tr> <tr><td>06</td><td>6,35</td></tr> <tr><td>07</td><td>7,94</td></tr> <tr><td>09</td><td>9,52</td></tr> <tr><td>11</td><td>11,11</td></tr> <tr><td>12</td><td>12,70</td></tr> </tbody> </table>	symbol	thickness	mm	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	<p>08</p> <p>Corner Radius "Re"</p> <table border="1"> <thead> <tr> <th>symbol</th> <th>corner radius</th> </tr> <tr> <th>mm</th> <th>mm</th> </tr> </thead> <tbody> <tr><td>X0</td><td>0,04</td></tr> <tr><td>01</td><td>0,1</td></tr> <tr><td>02</td><td>0,2</td></tr> <tr><td>04</td><td>0,4</td></tr> <tr><td>08</td><td>0,8</td></tr> <tr><td>12</td><td>1,2</td></tr> <tr><td>16</td><td>1,6</td></tr> <tr><td>20</td><td>2,0</td></tr> <tr><td>24</td><td>2,4</td></tr> <tr><td>28</td><td>2,8</td></tr> <tr><td>32</td><td>3,2</td></tr> <tr><td>00</td><td rowspan="2">round insert</td></tr> <tr><td>M0</td></tr> <tr><td>—</td><td></td></tr> </tbody> </table>	symbol	corner radius	mm	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	—		<p>Hand of Insert (optional)</p> <p>R = Right hand L = Left hand N = Neutral</p>	<p>Cutting Edge (optional)</p> <table border="1"> <tbody> <tr><td>F</td><td>Sharp</td></tr> <tr><td>E</td><td>Rounded</td></tr> <tr><td>T</td><td>Chamfered</td></tr> <tr><td>S</td><td>Chamfered and Rounded</td></tr> <tr><td>K</td><td>Double-Chamfered</td></tr> <tr><td>P</td><td>Double-Chamfered and Rounded</td></tr> </tbody> </table>	F	Sharp	E	Rounded	T	Chamfered	S	Chamfered and Rounded	K	Double-Chamfered	P	Double-Chamfered and Rounded	<p>6P</p> <p>Chipbreaker (optional)</p> <table border="1"> <tbody> <tr><td>1P</td><td>Finishing</td></tr> <tr><td>2P</td><td>Finishing</td></tr> <tr><td>..GP</td><td>Medium Machining</td></tr> <tr><td>4P</td><td>Medium Machining</td></tr> <tr><td>6P</td><td>Medium Roughing</td></tr> <tr><td>..MA</td><td>Roughing</td></tr> <tr><td>7N</td><td>Heavy Roughing</td></tr> </tbody> </table>	1P	Finishing	2P	Finishing	..GP	Medium Machining	4P	Medium Machining	6P	Medium Roughing	..MA	Roughing	7N	Heavy Roughing
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	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	
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

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)														
<p>TN = WIDIA</p>	<p>01 = Hardest</p> <p>10</p> <p>20</p> <p>30</p> <p>40</p> <p>50 = Toughest</p>	<table border="1"> <tr> <td>P</td> <td>Steel</td> </tr> <tr> <td>M</td> <td>Stainless Steel</td> </tr> <tr> <td>K</td> <td>Cast Iron</td> </tr> <tr> <td>N</td> <td>Non-Ferrous</td> </tr> <tr> <td>S</td> <td>High-Temp Alloys</td> </tr> <tr> <td>H</td> <td>Hardened Materials</td> </tr> <tr> <td>U</td> <td>Universal Machining</td> </tr> </table>	P	Steel	M	Stainless Steel	K	Cast Iron	N	Non-Ferrous	S	High-Temp Alloys	H	Hardened Materials	U	Universal Machining
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WIDIA™ Tunable Tooling



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

Internal dampening package eliminates chatter, vibration, and harmonics in all your deep-hole boring applications!

- Proprietary features provide superior surface finish and increased productivity.
- Wide product offering — from boring bars, extensions, and holders to rotating adaptors and modular sections.
- Reduce setup time with KM™ Quick Change Tooling — now an ISO Standard!
- Customise WIDIA pre-tuned boring bars — after they're on the machine — to optimise performance in your specific machining operations.

For tighter tolerances, reduced scrap rates, and improved tool life, you can rely on WIDIA Tunable Tooling!

To learn more, contact your local Authorised Distributor or visit widia.com

WIDIA 

■ Step 1 • Select the insert geometry

Negative Inserts



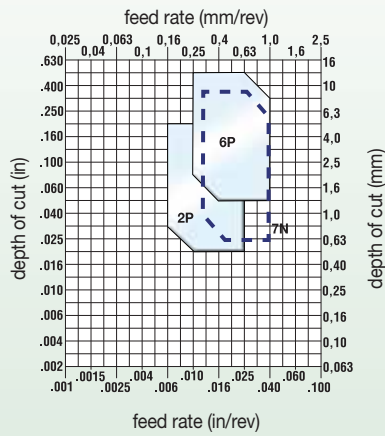
2P
Finishing



6P
Roughing



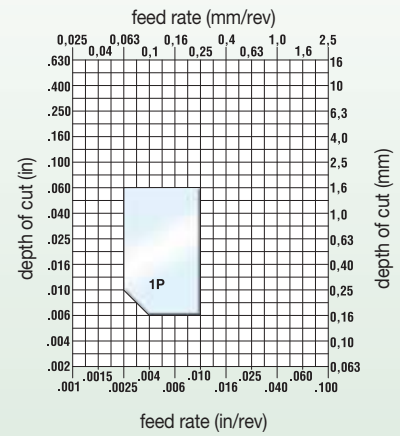
7N
Heavy Roughing



Positive Inserts



1P
Finishing



■ Step 2 • Select the grade

cutting condition	Negative Insert Geometry			Positive Insert Geometry
	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

Material Group	grade	speed – m/min									Starting Conditions
		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)

Material Group	grade	speed – m/min									Starting Conditions
		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)

Material Group	grade	speed – m/min									Starting Conditions
		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)

Material Group	grade	speed – m/min									Starting Conditions
		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)

Material Group	grade	speed – m/min									Starting Conditions
		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)

Material Group	grade	speed – m/min									Starting Conditions
		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



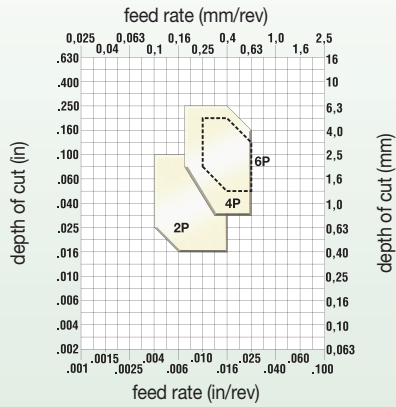
2P
Finishing



4P
Medium



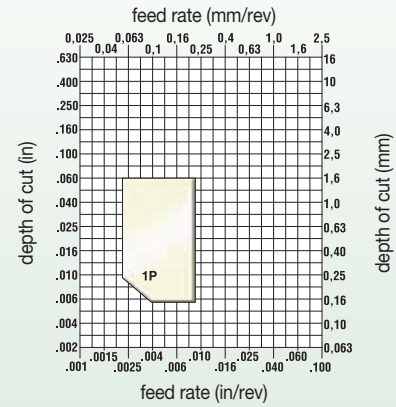
6P
Roughing



Positive Inserts



1P
Finishing



Step 2 • Select the grade

cutting condition	Negative Insert Geometry			Positive Insert Geometry
	2P	4P	6P	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



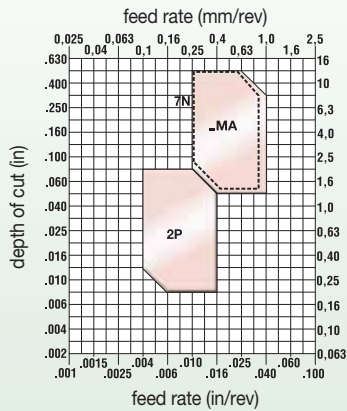
2P
Finishing



..MA
Heavy Roughing



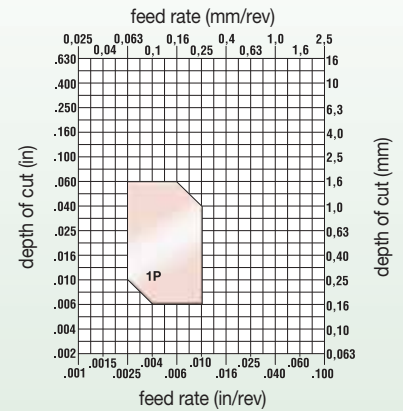
7N
Heavy Roughing



Positive Inserts



1P
Finishing



Step 2 • Select the grade

cutting condition	Negative Insert Geometry			Positive Insert Geometry
	2P	..MA	7N	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

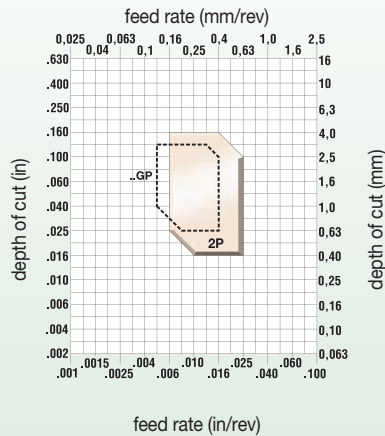
Grey Cast Iron		speed – m/min									Starting Conditions
Material Group	grade	60	150	240	330	420	510	600	690	780	m/min
K1	TN20K										270

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

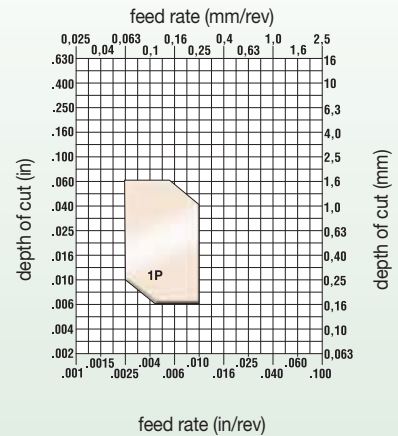
Ductile, Compacted Graphite, and Malleable Cast Irons (>80 KSI tensile strength)		speed – m/min									Starting Conditions
Material Group	grade	60	150	240	330	420	510	600	690	780	m/min
K3	TN20K										189

■ Step 1 • Select the insert geometry

Negative Inserts



Positive Inserts



■ Step 2 • Select the grade

cutting condition	Negative Insert Geometry		Positive Insert Geometry
	2P	..GP	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	speed – m/min									Starting Conditions
		15	45	75	105	140	170	200	230	260	m/min
S1	TN10U										50
	TN15U										33

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

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

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

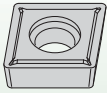
Material Group	grade	speed – m/min									Starting Conditions
		15	45	75	105	140	170	200	230	260	m/min
S3	TN10U										63
	TN15U										42

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

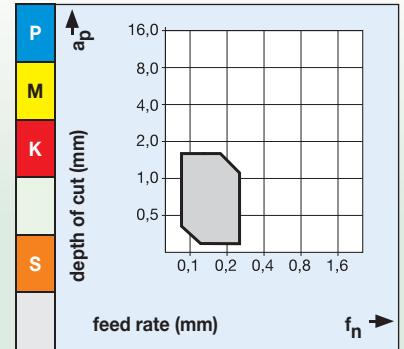
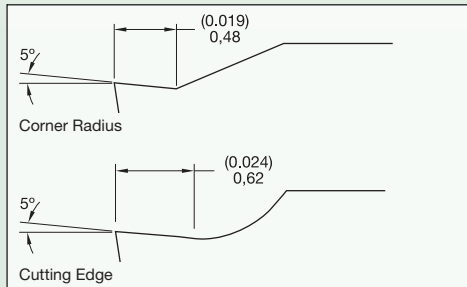
Material Group	grade	speed – m/min									Starting Conditions
		15	45	75	105	140	170	200	230	260	m/min
S4	TN10U										63
	TN15U										42

■ Positive and Negative Inserts

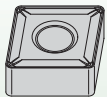
1P



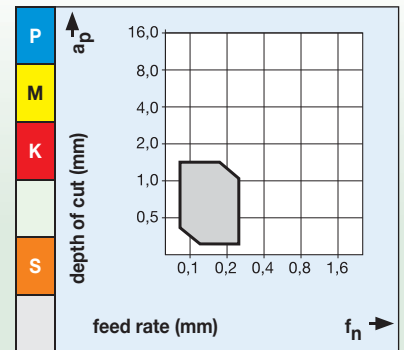
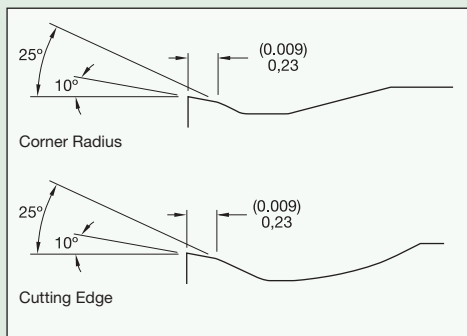
Preferred for light finishing. Low cutting forces and reduced power requirements due to positive rake angle. Good chip control over a wide range.



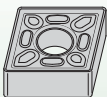
2P



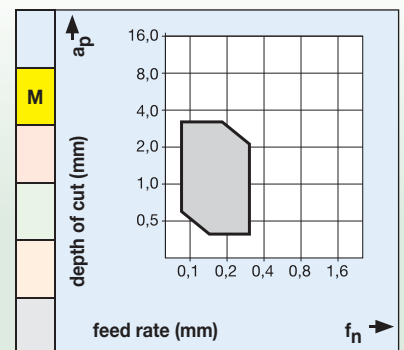
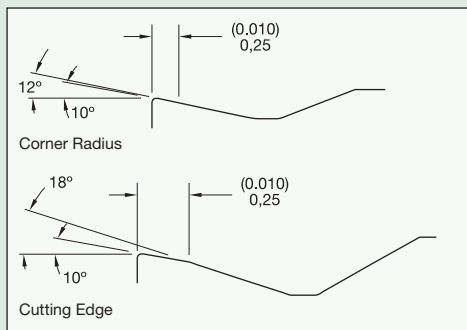
For finish turning, producing smooth, accurate surfaces. Very good chip control, especially at low depths of cut.



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.



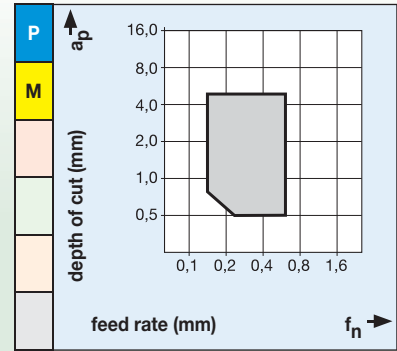
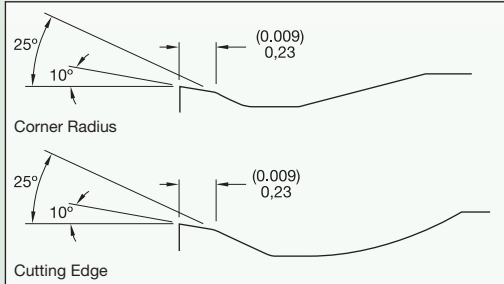
(continued)

■ Positive and Negative Inserts (continued)

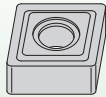
6P



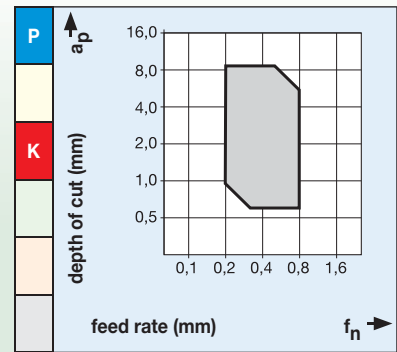
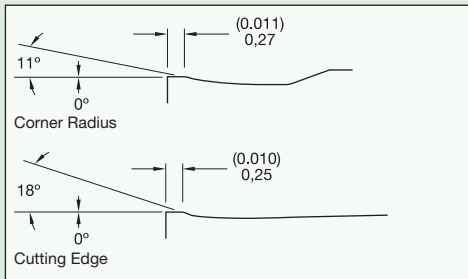
For medium to rough turning. Outstanding chip control due to specially configured chipbreaker element in corner area. Good chip forming with low depths of cut.



7N



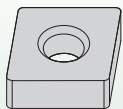
For medium-duty to roughing. Outstanding chip control. High edge strength for interrupted cuts, forging skin, or scale. Preferred for all cast iron such as grey, malleable, and nodular.



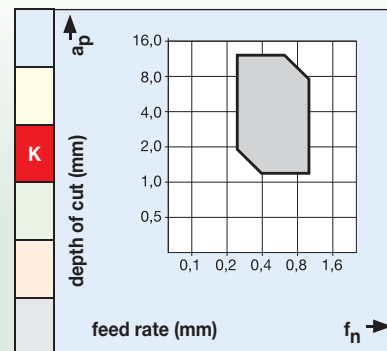
(continued)

■ Positive and Negative Inserts (continued)

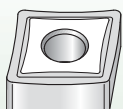
..MA



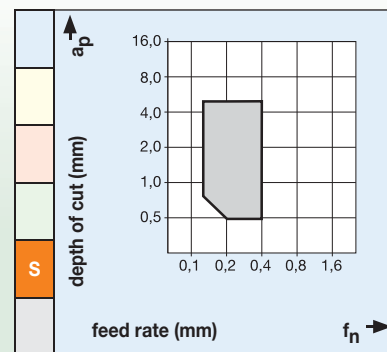
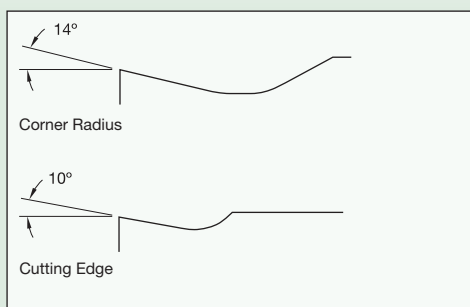
Flat top geometry for machining cast iron. For finishing to roughing applications.

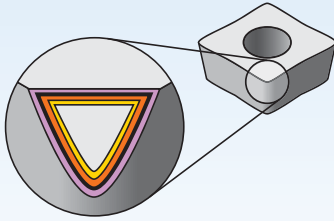


..GP



For light machining to light roughing.



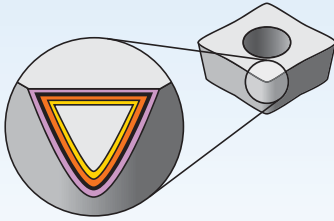


Coatings provide high-speed capability and are engineered for finishing to light roughing.

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

wear resistance ← → toughness



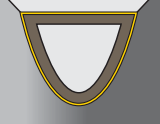
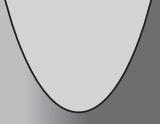
Grade	Coating	Grade Description	Performance Chart																			
				05	10	15	20	25	30	35	40	45										
TN10P		Coated carbide. MTCVD-TiN-TiCN-Al ₂ O ₃ -TiN. Ideal for light finishing to medium machining applications. Superior wear resistance.	P																			
	HC-P10		K																			
TN20P		Coated carbide. MTCVD-TiN-TiCN-Al ₂ O ₃ -TiN. Great general-purpose turning grade for steels. Ideal for semi-finishing to moderately heavy roughing.	P																			
	HC-P20		K																			
TN30P		Coated carbide. MTCVD-TiN-TiCN-Al ₂ O ₃ -TiN. Tough carbide grade. Ideal for roughing and heavy roughing applications.	P																			
	HC-P30																					
TN15M		Coated carbide. MTCVD-TiN-TiCN-Al ₂ O ₃ -TiN. Ideal for general-purpose machining of stainless steels.	P																			
			M																			
			S																			
	HC-M15																					



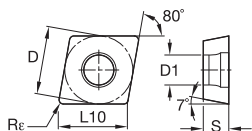
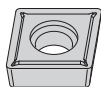
Coatings provide high-speed capability and are engineered for finishing to light roughing.

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	Material Group																				
			P	M	K	N	S	H	05	10	15	20	25	30	35	40	45						
TN30M		Coated carbide. MTCVD-TiN-TiCN-Al ₂ O ₃ -TiN. Ideal for general-purpose machining of stainless steels.	P																				
	HC-M30		M																				
TN20K		Coated carbide. MTCVD-TiN-TiCN-Al ₂ O ₃ -TiN. Great when used for straight or lightly interrupted cut applications of ductile and cast irons.	P																				
	HC-K20		K																				
TN10U		Coated carbide. PVD-TiAlN-TiN. Ideal for finishing of difficult to machine alloys and stainless steels.	P																				
			M																				
			K																				
			N																				
			S																				
TN15U		Uncoated carbide. Excellent abarasion resistance for machining cast irons, austentic stainless steels, and most high-temperature alloys.	P																				
			M																				
			K																				
			N																				
			S																				

Inserts

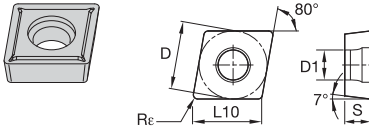


● first choice
○ alternate choice

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



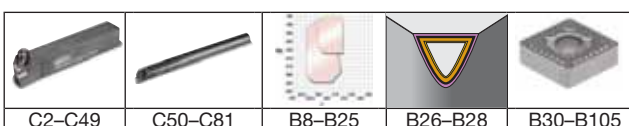
● first choice
○ alternate choice

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

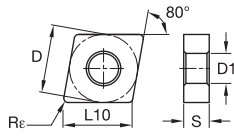
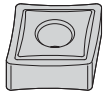


■ **CCMT-1P**

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	4166244	-	-	4166242	4166323	4166245	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	4166358	-
CCMT1204081P	12,70	12,90	4,76	0,8	5,50	4166559	4166560	-	4166562	4166563	4166561	4166562	-



Inserts

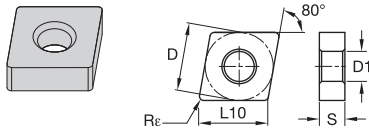


● first choice
○ alternate choice

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	|	|	|	|	|	|	4164564	4164565
CNGP120402	12,70	12,90	4,76	0,2	5,16	|	|	|	|	|	|	4164564	4164565
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



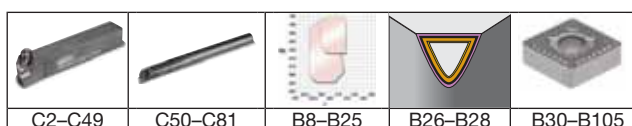
● first choice
○ alternate choice

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

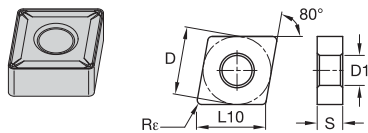


■ CNMA

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	●	●	●	○	○	○	○	○
CNMA120408	12,70	12,90	4,76	0,8	5,16	●	●	●	○	○	○	○	○
CNMA120412	12,70	12,90	4,76	1,2	5,16	●	●	●	○	○	○	○	○
CNMA120416	12,70	12,90	4,76	1,6	5,16	●	●	●	○	○	○	○	○
CNMA160612	15,88	16,12	6,35	1,2	6,35	●	●	●	○	○	○	○	○
CNMA160616	15,88	16,12	6,35	1,6	6,35	●	●	●	○	○	○	○	○
CNMA190612	19,05	19,34	6,35	1,2	7,93	●	●	●	○	○	○	○	○
CNMA190616	19,05	19,34	6,35	1,6	7,93	●	●	●	○	○	○	○	○



Inserts

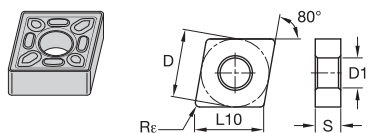


● first choice
○ alternate choice

P	●	●	●	○	○	○	○	○
M	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○
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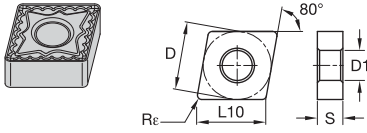
■ CNMG-2P

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	-	-	-



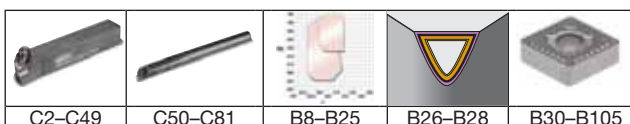
● first choice
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P	●	●	●	○	○	○	○	○	○	○
M	●	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○
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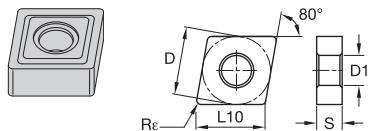


■ CNMG-6P

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	-	-	-



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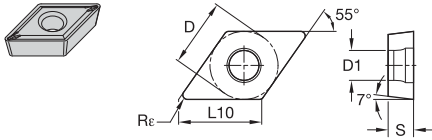


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K	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○
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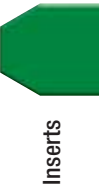
■ CNMG-7N

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	—	—	—	—	—	—	—	—



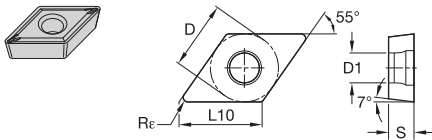
● first choice
○ alternate choice

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



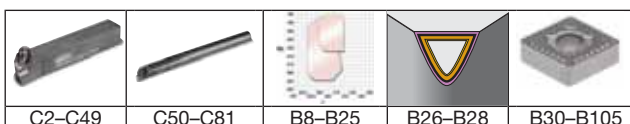
■ **DCGT-1P**

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	●	●	○	○	○	○	○	○
DCGT11T3011P	9,53	11,63	3,97	0,1	4,40	○	○	○	○	○	○	○	○
DCGT1504081P	12,70	15,50	4,76	0,8	5,50	○	○	○	○	○	○	○	○

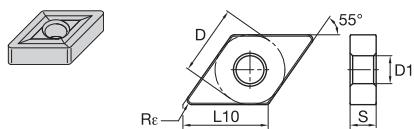


■ **DCMT-1P**

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	○	○	○	○	○	○	○	○
DCMT0702041P	6,35	7,75	2,38	0,4	2,80	4166627	4166628	○	4166630	4166631	4166629	4166632	4166626
DCMT11T3021P	9,53	11,63	3,97	0,2	4,40	○	○	○	○	○	○	○	○
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	4166655	○	○
DCMT1504041P	12,70	15,50	4,76	0,4	5,50	4166653	4166654	○	○	○	○	○	○
DCMT1504081P	12,70	15,50	4,76	0,8	5,50	4166656	○	○	○	○	○	○	○



Inserts

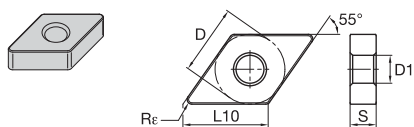


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M	●	●	●	●	●	●	●	●	●
K	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○
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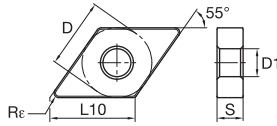
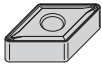
■ DNGP

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	■	■



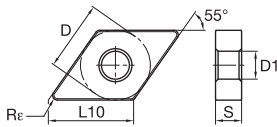
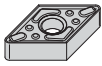
● first choice
○ alternate choice

P	●	●	●	○	○	○	○	○	○
M	●	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○
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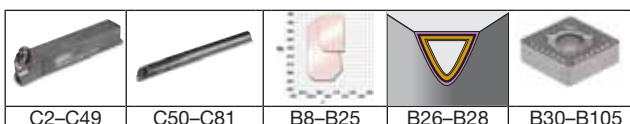
■ **DNMG-2P**

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	-

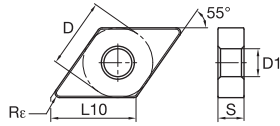
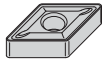


■ **DNMG-4P**

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	-	-	-



Inserts

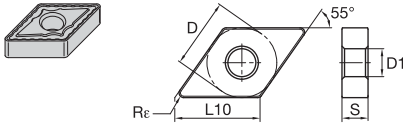


● first choice
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M	●	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○
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■ DNMG-6P

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	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-



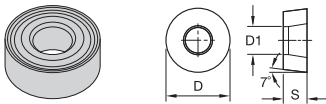
● first choice
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P	●	●	●	○	○	○	○	○	○
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K	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○
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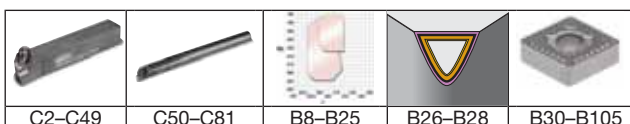
■ **DNMG-7N**

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	-	-	-	-	-

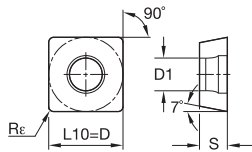
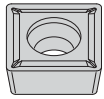


■ **RNMG-7N**

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	-	-	-	-	-	-



Inserts

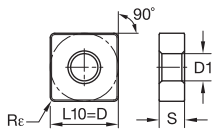
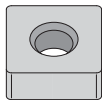


● first choice
○ alternate choice

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K	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○
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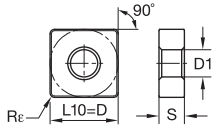
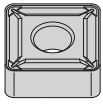
■ SCMT-1P

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	-	-	-	-	-	-	-	-
SCMT1204081P	12,70	12,70	4,76	0,8	5,50	4166405	4166406	-	4166408	4166409	4166407	4166410	-



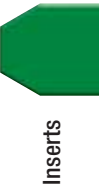
■ SNMA

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	-	-



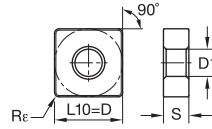
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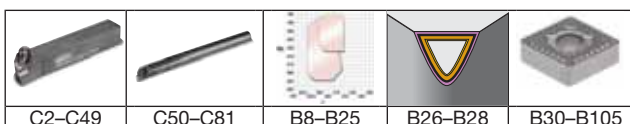
■ **SNMG-2P**

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

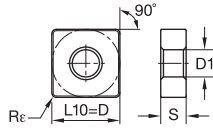
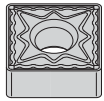


■ **SNMG-4P**

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	-	-	-



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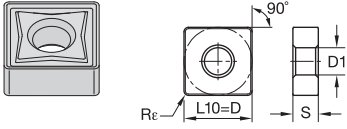


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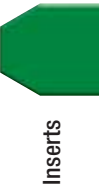
■ SNMG-6P

ISO catalogue number	D	L10	S	R _ε	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	-	-	-	-	-
SNMG1204126P	12,70	12,70	4,76	1,2	5,16	4166813	4166814	4166815	4166811	4166812	-	-	-
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	-	-	-	-



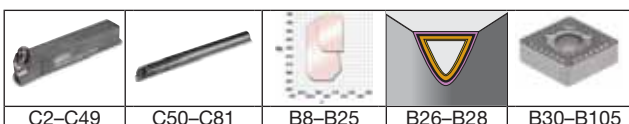
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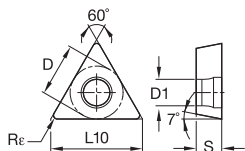
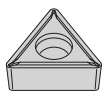


■ **SNMG-7N**

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	—	—	—



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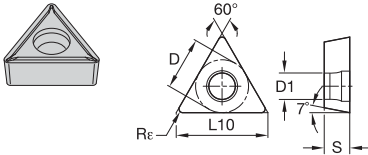


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■ TCGT-1P

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	|	|	|	|	|	|	4164526	4164527
TCGT1102041P	6,35	11,00	2,38	0,4	2,80	|	|	|	|	|	|	4164528	4164529
TCGT16T3021P	9,53	16,50	3,97	0,2	4,40	|	|	|	|	|	|	4164530	-
TCGT16T3041P	9,53	16,50	3,97	0,4	4,40							4164531	4164532
TCGT16T3081P	9,53	16,50	3,97	0,8	4,40							4164543	-



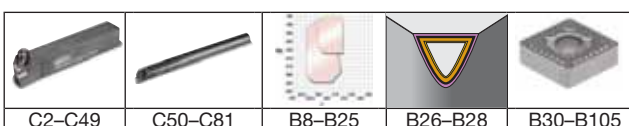
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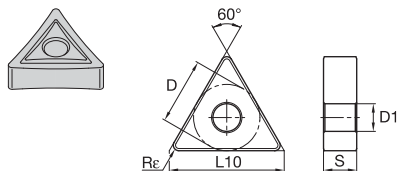


■ **TCMT-1P**

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	-



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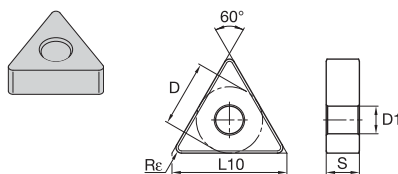


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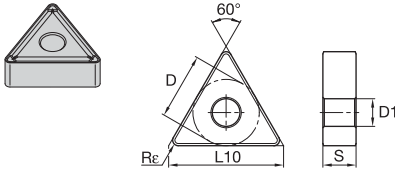
■ TNGP

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	■



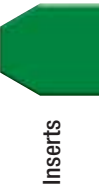
■ TNMA

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	■	■



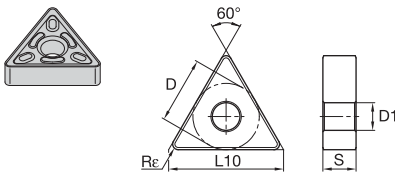
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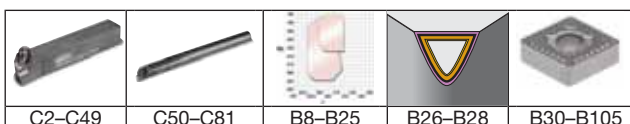
■ **TNMG-2P**

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	-	-	-
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

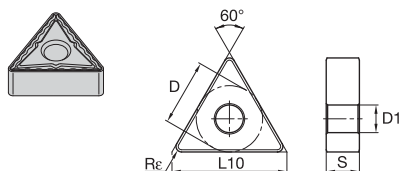


■ **TNMG-4P**

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	-	-	-	-	-	-	-	-



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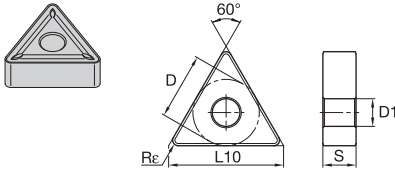


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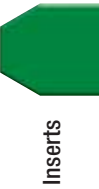
■ TNMG-6P

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	-	-	-



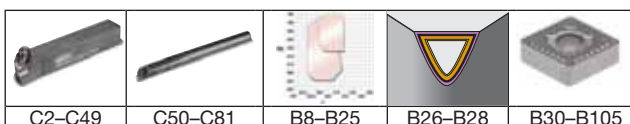
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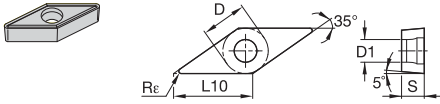


■ **TNMG-7N**

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	-	-



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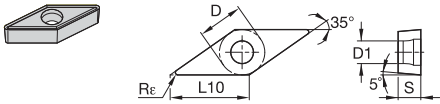


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S	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○

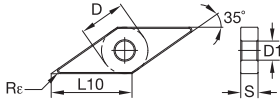
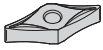
■ VBGT-1P

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	●	●	●	○	○	○	○	○
VBGT1103021P	6,35	11,07	3,18	0,2	2,80	●	●	●	○	○	○	○	○
VBGT1103041P	6,35	11,07	3,18	0,4	2,80	●	●	●	○	○	○	○	○
VBGT1604011P	9,53	16,61	4,76	0,1	4,40	●	●	●	○	○	○	○	○
VBGT1604021P	9,53	16,61	4,76	0,2	4,40	●	●	●	○	○	○	○	○
VBGT1604041P	9,53	16,61	4,76	0,4	4,40	●	●	●	○	○	○	○	○



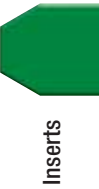
■ VBMT-1P

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	●	●	●	○	○	○	○	○
VBMT1103041P	6,35	11,07	3,18	0,4	2,80	●	●	●	○	○	○	○	○
VBMT1103081P	6,35	11,07	3,18	0,8	2,80	●	●	●	○	○	○	○	○
VBMT1604021P	9,53	16,61	4,76	0,2	4,40	●	●	●	○	○	○	○	○
VBMT1604041P	9,53	16,61	4,76	0,4	4,40	●	●	●	○	○	○	○	○
VBMT1604081P	9,53	16,61	4,76	0,8	4,40	●	●	●	○	○	○	○	○



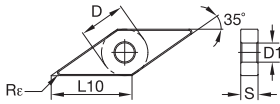
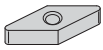
● first choice
○ alternate choice

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



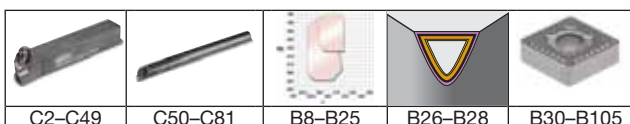
■ VNGP

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	●	●	○	○	○	○	○	○
VNGP160402	9,53	16,61	4,76	0,2	3,81	●	●	○	○	○	○	○	○
VNGP220404	12,70	22,14	4,76	0,4	5,16	●	●	○	○	○	○	○	○
VNGP220408	12,70	22,14	4,76	0,8	5,16	●	●	○	○	○	○	○	○

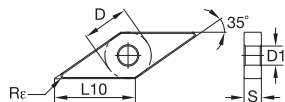
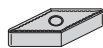


■ VNMA

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	●	●	○	○	○	○	○	○



Inserts

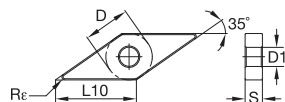


● first choice
○ alternate choice

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

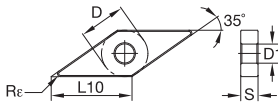
■ VNMG-2P

ISO catalogue number	D	L10	S	Re	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNMG160402P	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



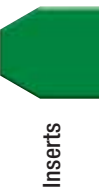
■ VNMG-4P

ISO catalogue number	D	L10	S	Re	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	-



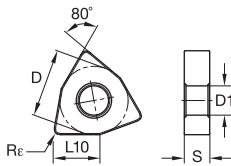
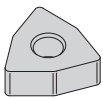
● first choice
○ alternate choice

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



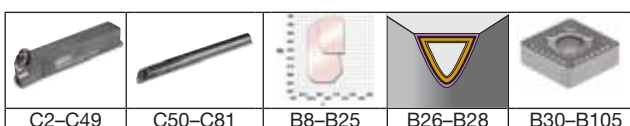
■ **VNMG-6P**

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	-	-	-

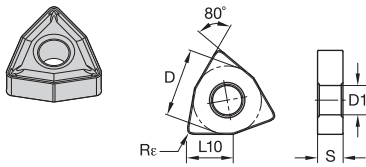


■ **WNMA**

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	-	-



Inserts

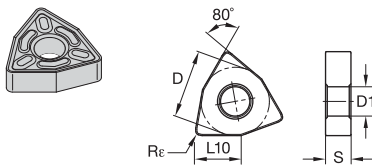


● first choice
○ alternate choice

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

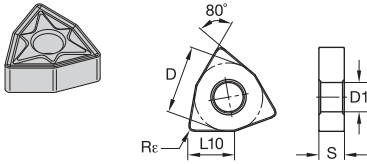
■ WNMG-2P

ISO catalogue number	D	L10	S	Re	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	Re	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	-	-	-	-



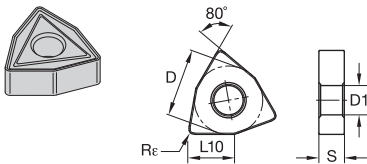
● first choice
○ alternate choice

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



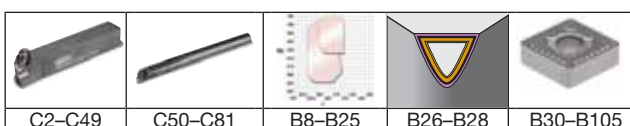
■ **WNMG-6P**

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	-	-



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 — two geometry and three grades.
- Longer tool life.

High positive rake for smooth chip flow.

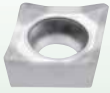
G tolerance inserts for better precision.

High polish inserts to prevent built-up edge and for longer tool life.

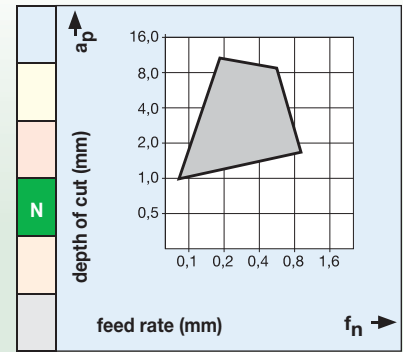


■ Positive Inserts

AL1



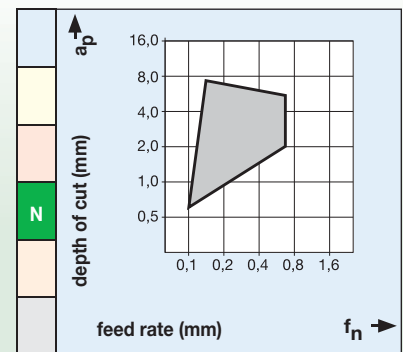
For turning cast aluminium, light alloys, non-ferrous metals, high-melting metals, plastics, glass fibre, reinforced plastics, laminated board, carbon, and fine ceramics.



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

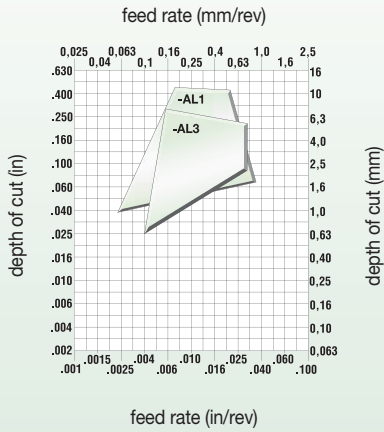
Positive Inserts



AL1



AL3



Step 2 • Select the grade

Positive Insert Geometry

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

Step 3 • Selecting the cutting speed

Low-Silicon Aluminium Alloys

(hypoeutectic <12,2% Si) and Magnesium Alloys

speed – m/min

Starting Conditions

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

High-Silicon Aluminium Alloys

(hypereutectic >12,2% Si) and Magnesium Alloys

speed – m/min

Starting Conditions

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

■ Additional cutting speed recommendations for miscellaneous workpiece materials

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

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

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

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

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

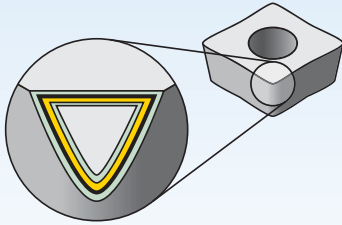
Material Group	grade	speed – m/min				Starting Conditions
		250	500	750	1000	m/min
N6	HCK10	◇				200

MMCs (Aluminium-Based Metal Matrix Composites)

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

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

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

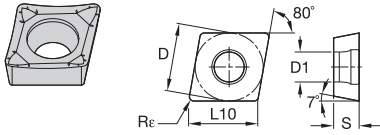


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

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

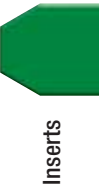
wear resistance ← → toughness

Coating		Grade Description		05	10	15	20	25	30	35	40	45
HCK10		Coated carbide. PVD — TIALN-Al ₂ O ₃ on micro-grain carbide. Light and medium machining. For aluminium alloys.										
	HC-N10											
HWK10		Uncoated carbide. Micro-grain carbide with high cutting edge stability. Light machining. For non-ferrous metals and non-metals.										
	HF-N10											
HWK15		Uncoated carbide. Micro-grain carbide with high cutting edge stability. Light and medium machining. For non-ferrous metals and non-metals.										
	HF-N15											



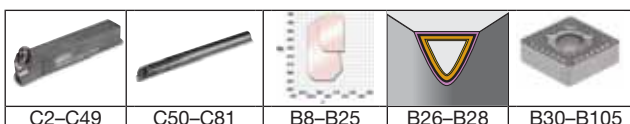
● first choice
○ alternate choice

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

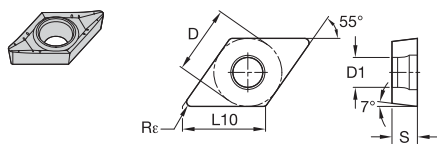


■ CCGT-AL3

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



Inserts

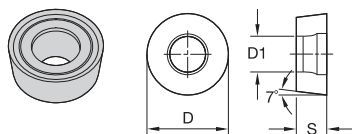


● first choice
○ alternate choice

P			
M			
K			
N	●	●	●
S			
H			

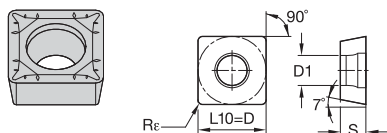
■ DCGT-AL3

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



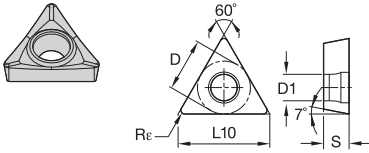
■ RCGT-AL1

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



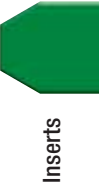
■ SCGT-AL3

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



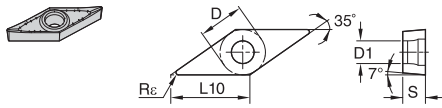
● first choice
○ alternate choice

P			
M			
K			
N	●	●	●
S			
H			



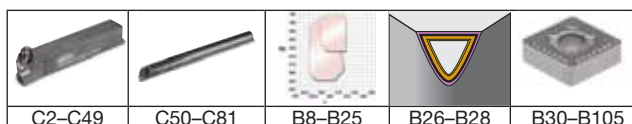
■ TCGT-AL1

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





Turning • Tools for External Turning and Internal Boring

Tools for External Turning	C2–C49
Tools for Internal Boring	C50–C81
Tunable Boring Bars.....	C82–C84

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

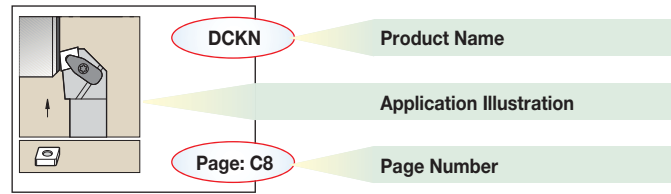
- Screw clamping system for positive indexable inserts.
- Compact design for high reliability and cost efficiency.
- Carbide shim for additional tool protection.

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.

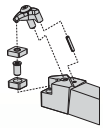


Each unique clamping system offers product options to fill your specific toolholder needs. Find the illustration that fits your application and navigate to the corresponding page to get the correct solution.



D-Style Clamping

D

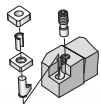


One-piece clamp assembly holder for use with negative style inserts. An extremely rigid clamping system. The tool is protected by a carbide shim.

	DCKN 75° Page: C8		DCLN 95° Page: C9		DCRN 75° Page: C10		DCSN 45° Page: C10
	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

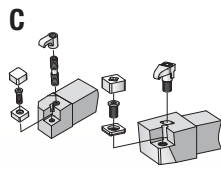
P



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

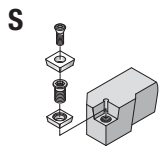


Top clamping system for negative and positive indexable inserts to DIN 4968. This universal clamping system is robust and easy to handle. Some height-adjustable clamps enable the use of additional chipbreakers. A carbide shim provides additional tool protection. Toolholders with cutting edge heights 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

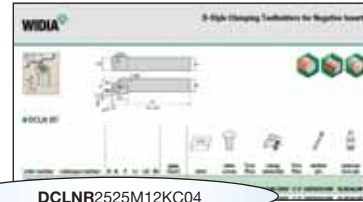


Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967. Compact design using a minimum of spare parts for high reliability and cost efficiency. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of 16mm and insert iCs from 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?

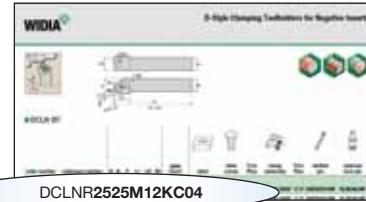
Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



DCLNR2525M12KC04

D	C	L	N	R	
Insert Holding Method	Insert Shape	Tool Style or Lead Angle	Insert Clearance Angle	Hand of Tool	Additional Information
<p>D</p>	<p>A </p> <p>B </p> <p>C </p> <p>D </p> <p>E </p> <p>H </p> <p>K </p> <p>L </p> <p>M </p> <p>O </p> <p>P </p> <p>R </p> <p>S </p> <p>T </p> <p>V </p> <p>W </p>	<p>A </p> <p>B </p> <p>C </p> <p>D </p> <p>E </p> <p>F </p> <p>G </p> <p>L </p> <p>P </p> <p>Q </p> <p>R </p> <p>S </p> <p>U </p> <p>V </p> <p>Y </p>	<p>N </p> <p>B </p> <p>C </p> <p>P </p> <p>D </p> <p>E </p> <p>F </p>	<p>R =</p> <p>Right hand</p> <p>L =</p> <p>Left hand</p> <p>N =</p> <p>Neutral</p> <p>R</p> <p>L</p> <p>N</p>	<p>C =</p> <p>Deep pocket for ceramic insert</p> <p>S =</p> <p>Single pocket locating wall</p> <p>F =</p> <p>Straight shank, no offset</p>

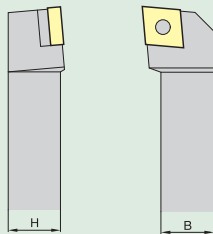
By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



DCLNR2525M12KC04

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

25

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

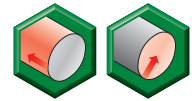
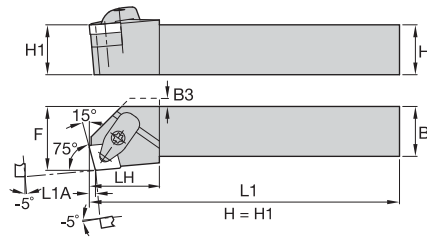
04

Insert Thickness (optional)

04 = 4,76mm
06 = 6,35mm

Cutting Edge Length L10

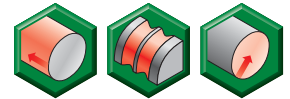
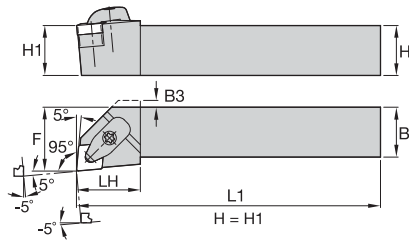
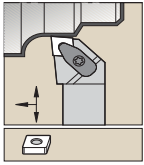
H Hexagon 120°		C Rhomboid 80°	
O Octagon 135°		D 55°	
P Pentagon 108°		E 75°	
S Square 90°		M 86°	
T Triangular 60°		V 35°	
R Round —		W Trigon 80° with enlarged corner angles	
		L Rectangular 90°	
		A Parallelogram 85°	
		B 82°	
		K 55°	



Tools for External Turning and Internal Boring

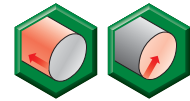
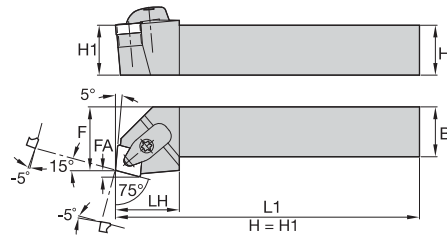
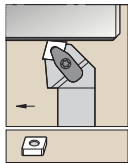
■ DCKN 75°

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



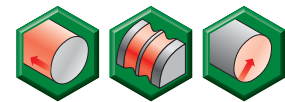
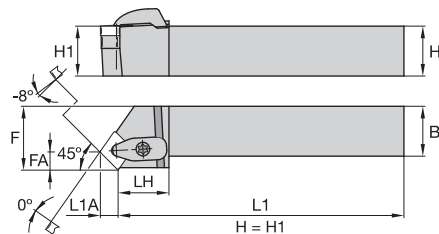
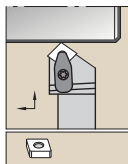
■ DCLN 95°

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



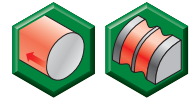
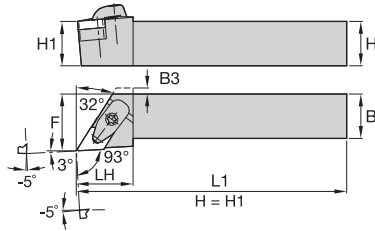
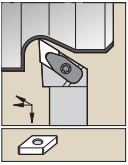
■ DCRN 75°

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



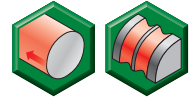
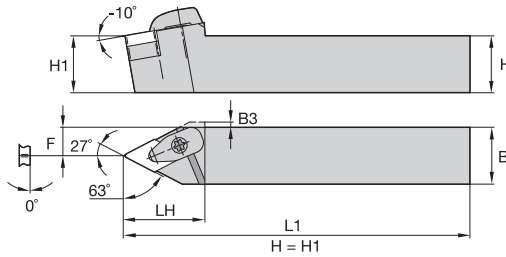
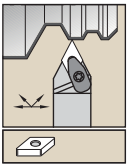
■ DCSN 45°

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



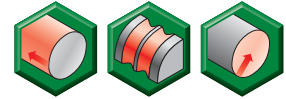
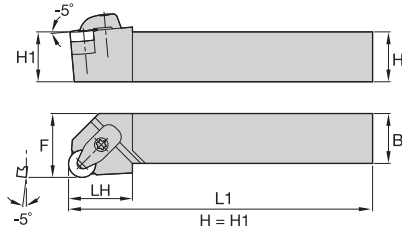
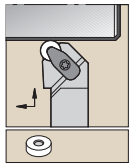
DDJN 93°

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



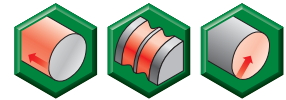
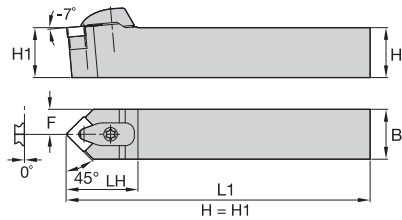
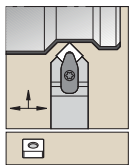
DDNN 63°

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



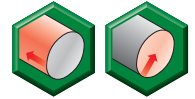
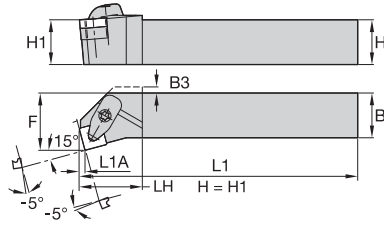
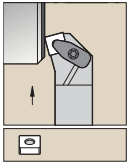
■ DRGN

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	



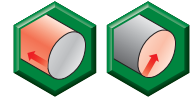
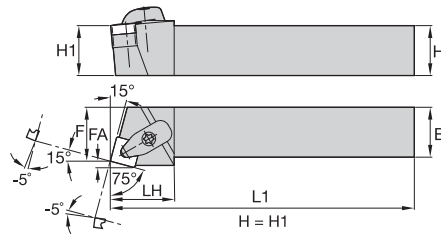
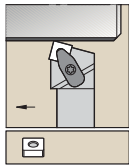
■ DSDN 45°

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	KLM46L15IP
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



■ DSKN 75°

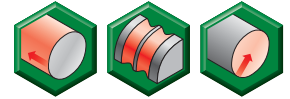
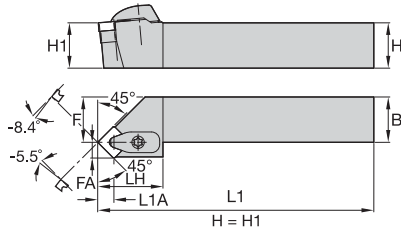
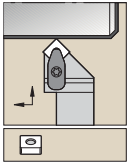
order number	catalogue number	H	B	F	L1	LH	L1A	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand																
5696685	DSKNR2020K12KC04	20	20	25,0	125	32,0	3,1	8,0	SN..120408	ISSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5696686	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



Tools for External Turning and Internal Boring

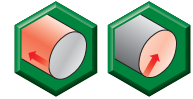
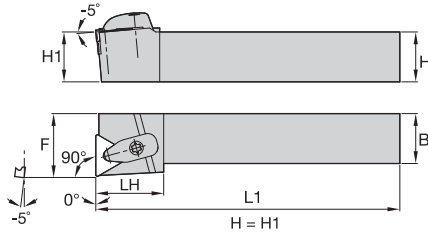
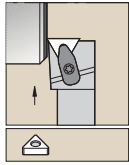
■ DSRN 75°

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



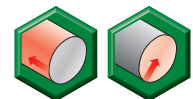
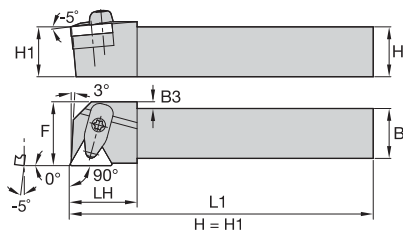
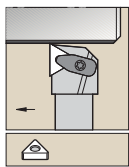
■ DSSN 45°

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



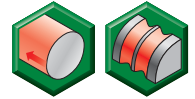
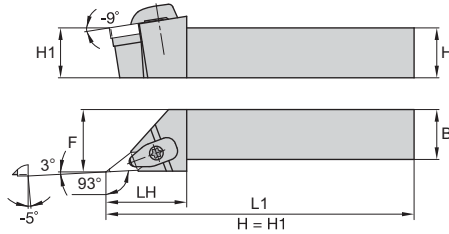
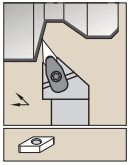
■ DTFN 90°

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	



■ DTGN 90°

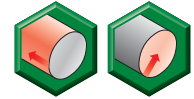
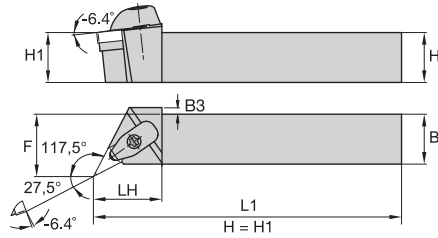
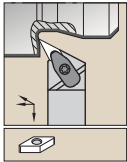
order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5696729	DTGNR2020K16KC04	20	20	25,0	125	25,0	6,5	TN..160408	ITSN323	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696730	DTGNR2525M16KC04	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



■ DVJN 93°

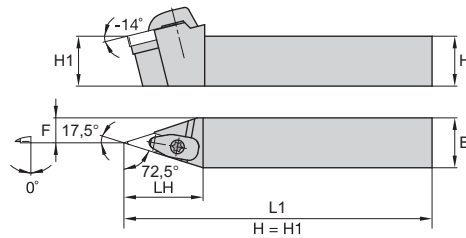
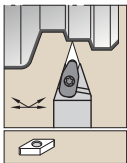
order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin	
right hand															
5696737	DVJNR2020K16KC04	20	20	25,0	125	46,0	VN..160408	IVSN322	KMSP315IP	15 IP	CM215R ASSY	15 IP	SSP025016M	KLM34L9IP	
5696738	DVJNR2525M16KC04	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	

Tools for External Turning and Internal Boring



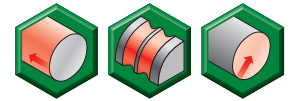
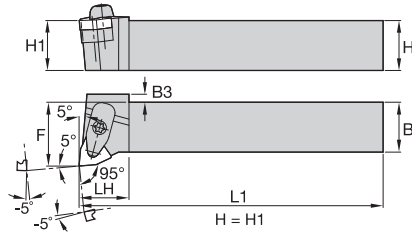
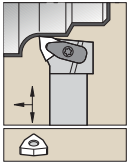
■ DVON 117,5°

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



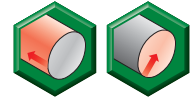
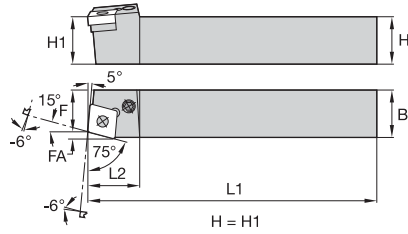
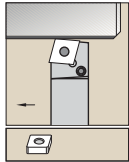
■ DVN 72,5°

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



■ 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	DWLN2020K06KC04	20	20	25,0	125	31,0	—	WN..060408	IWSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696758	DWLN2020K08KC04	20	20	25,0	125	33,0	—	WN..080408	IWSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5696759	DWLN2525M06KC04	25	25	32,0	150	25,0	—	WN..060408	IWSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696760	DWLN2525M08KC04	25	25	32,0	150	25,0	4,0	WN..080408	IWSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5696761	DWLN3225P08KC04	32	25	32,0	170	25,0	4,0	WN..080408	IWSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5696762	DWLN3232P08KC04	32	32	40,0	170	25,0	—	WN..080408	IWSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
left hand															
5696751	DWLN2020K06KC04	20	20	25,0	125	31,0	—	WN..060408	IWSN322	KMSP39IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696752	DWLN2020K08KC04	20	20	25,0	125	33,0	—	WN..080408	IWSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5696753	DWLN2525M06KC04	25	25	32,0	150	25,0	—	WN..060408	IWSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5696754	DWLN2525M08KC04	25	25	32,0	150	25,0	4,0	WN..080408	IWSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5696755	DWLN3225P08KC04	32	25	32,0	170	25,0	4,0	WN..080408	IWSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP
5696756	DWLN3232P08KC04	32	32	40,0	170	25,0	—	WN..080408	IWSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM4615IP

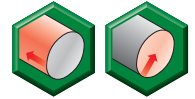
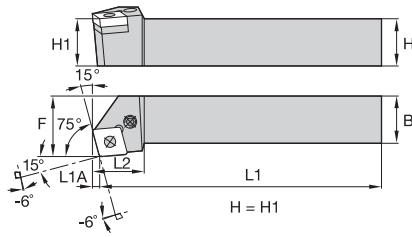
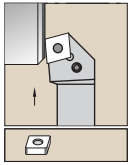


Tools for External Turning and Internal Boring

■ PCBN 75°

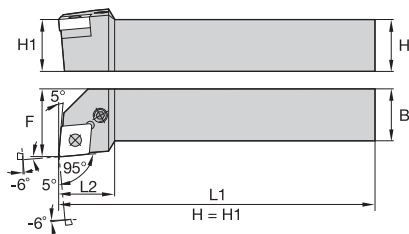
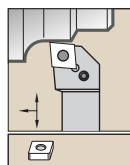
order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus	
right hand															
3878361	PCBNR2020K12	20	20	17,0	125	26,0	3,1	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP	
3878356	PCBNR2525M12	25	25	22,0	150	26,0	3,1	CN..120408	512.112	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	





■ PCKN 75°

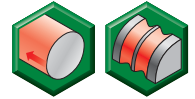
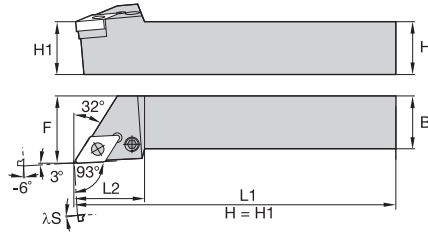
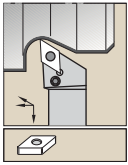
order number	catalogue number	H	B	F	L1	L2	L1A	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3878372	PCKNR2020K12	20	20	25,0	125	23,0	3,1	CN..120408	512.112	513.023	515.018	511.023	514.123	15 IP
3878370	PCKNR2525M12	25	25	32,0	150	23,0	3,1	CN..120408	512.112	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



Tools for External Turning and Internal Boring

■ PCLN 95°

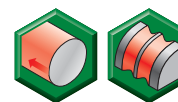
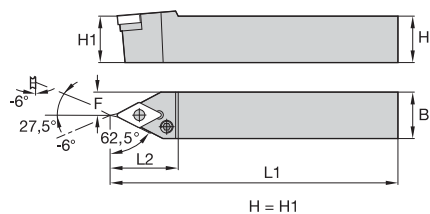
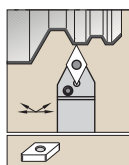
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	lever screw wrench size
right hand													
3900154	PCLNR1616H09	16	16	20,0	100	23,0	CN..090308	512.111	513.019	515.018	511.018	514.018	2.5 mm
3878400	PCLNR1616H12	16	16	20,0	100	26,0	CN..120408	512.112	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



■ 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

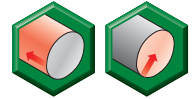
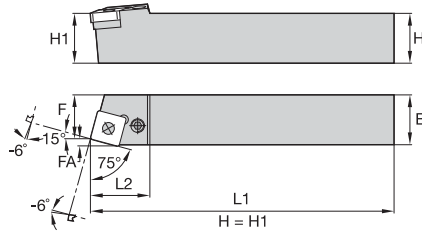
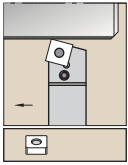
Tools for External Turning and Internal Boring



Tools for External Turning and Internal Boring

■ PDNN 62,5°

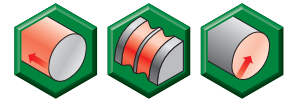
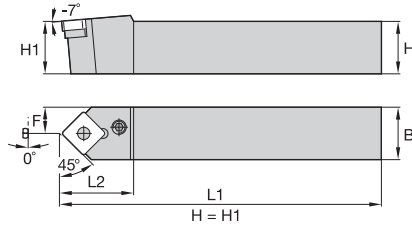
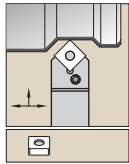
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879319	PDNNR2525M15	25	25	12,5	150	36,0	DN..150608	512.153	513.023	515.018	511.024	514.128	15 IP
3900156	PDNNR3225P15	32	25	12,5	170	36,0	DN..150608	512.153	513.023	515.018	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



■ PSBN 75°

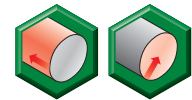
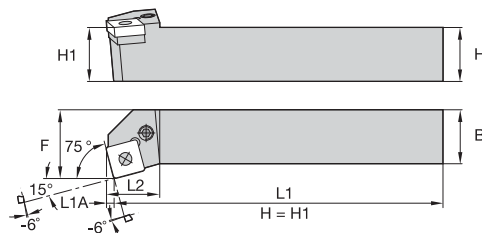
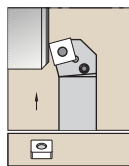
order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus	
right hand															
3879324	PSBNR2020K12	20	20	17,0	125	26,0	3,1	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP	
3900158	PSBNR2525M12	25	25	22,0	150	26,0	—	SN..120408	512.063	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	

Tools for External Turning and Internal Boring



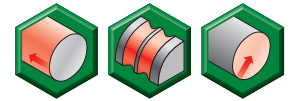
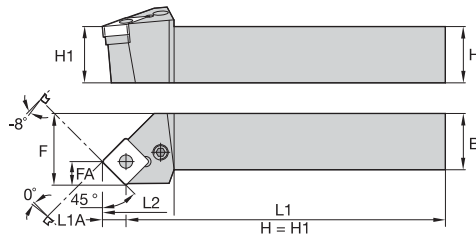
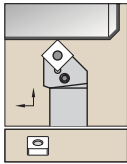
■ PSDN 45°

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



■ PSKN 75°

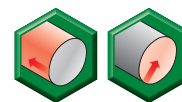
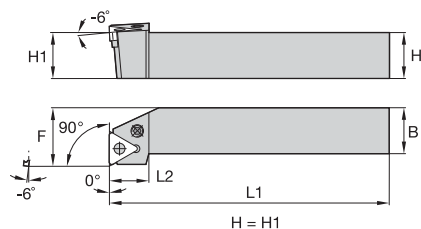
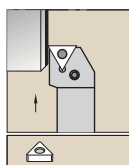
order number	catalogue number	H	B	F	L1	L2	L1A	gage insert						
									shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3879340	PSKNR2020K12	20	20	25,0	125	23,0	3,1	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879341	PSKNR2525M12	25	25	32,0	150	23,0	3,1	SN..120408	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



■ 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

Tools for External Turning and Internal Boring

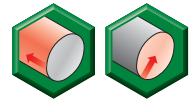
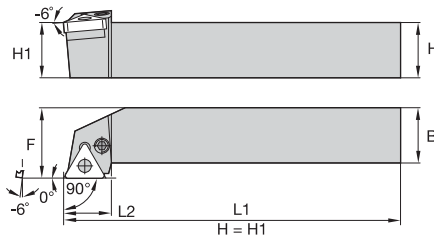
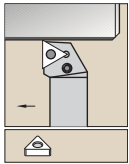


Tools for External Turning and Internal Boring

■ PTFN 90°

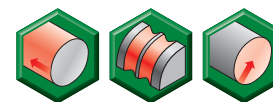
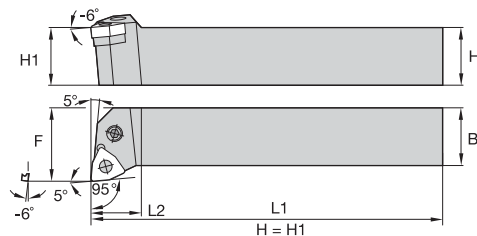
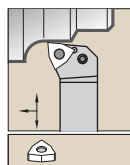


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879369	PTFNR1616H16	16	16	20,0	100	20,0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879367	PTFNR2020K16	20	20	25,0	125	20,0	TN..160408	512.013	513.018	515.018	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



■ PTGN 90°

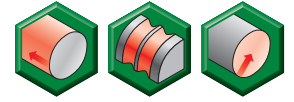
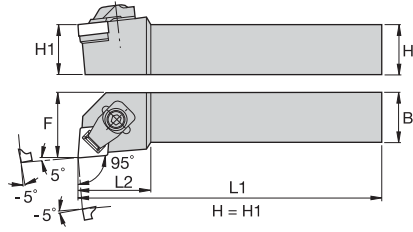
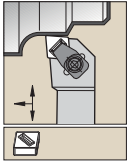
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879385	PTGNR1616H16	16	16	20,0	100	20,0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879389	PTGNR2020K16	20	20	25,0	125	20,0	TN..160408	512.013	513.018	515.018	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



Tools for External Turning and Internal Boring

■ PWLN 95°

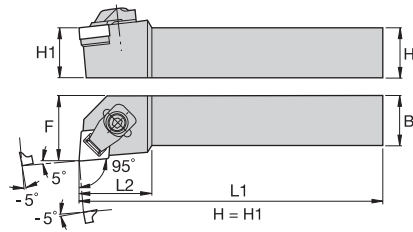
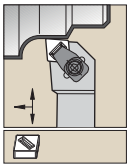
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879405	PWLN1616H06	16	16	20,0	100	14,0	WN..060408	512.134	513.018	515.018	511.018	514.118	10 IP
3879407	PWLN2020K06	20	20	25,0	125	14,0	WN..060408	512.134	513.018	515.018	511.018	514.118	10 IP
3879408	PWLN2020K08	20	20	25,0	125	20,0	WN..080408	512.135	513.023	515.018	511.023	514.123	15 IP
3900167	PWLN2525M06	25	25	32,0	150	20,0	WN..060408	512.134	513.018	515.018	511.018	514.118	10 IP
3879409	PWLN2525M08	25	25	32,0	150	26,0	WN..080408	512.135	513.023	515.018	511.023	514.123	15 IP
3900164	PWLN3232P08	32	32	40,0	170	26,0	WN..080408	512.135	513.023	515.018	511.023	514.123	15 IP
left hand													
3879410	PWLN1616H06	16	16	20,0	100	14,0	WN..060408	512.134	513.018	515.018	511.018	514.118	10 IP
3879406	PWLN2020K06	20	20	25,0	125	14,0	WN..060408	512.134	513.018	515.018	511.018	514.118	10 IP
3879403	PWLN2020K08	20	20	25,0	125	20,0	WN..080408	512.135	513.023	515.018	511.023	514.123	15 IP
3900166	PWLN2525M06	25	25	32,0	150	20,0	WN..060408	512.134	513.018	515.018	511.018	514.118	10 IP
3879404	PWLN2525M08	25	25	32,0	150	26,0	WN..080408	512.135	513.023	515.018	511.023	514.123	15 IP
3900165	PWLN3232P08	32	32	40,0	170	26,0	WN..080408	512.135	513.023	515.018	511.023	514.123	15 IP



■ 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

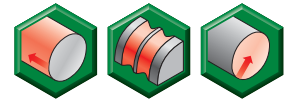
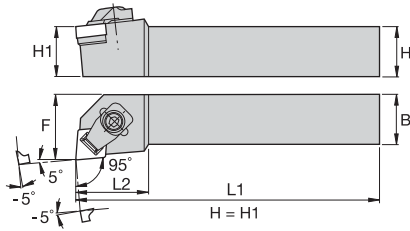
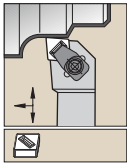
NOTE: MX — clamping version is shown.



■ 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

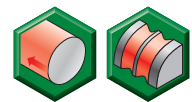
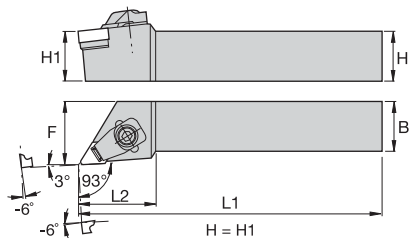
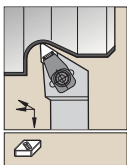
NOTE: MX — clamping version is shown.



■ 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

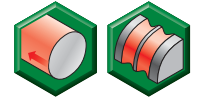
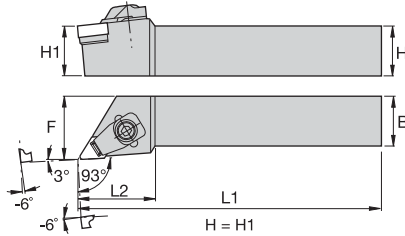
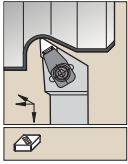
NOTE: MX — clamping version is shown.



■ 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

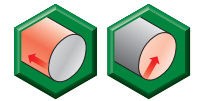
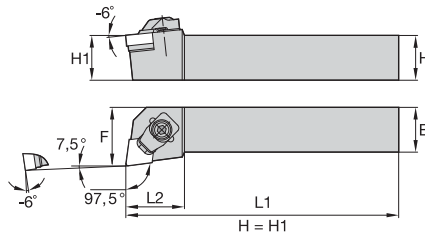
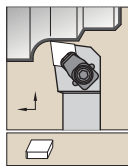
NOTE: MX — clamping version is shown.



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.

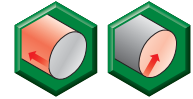
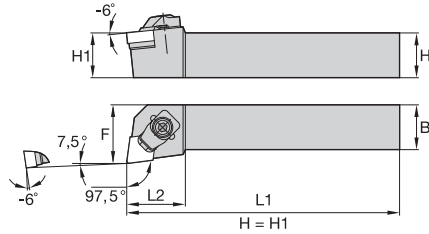
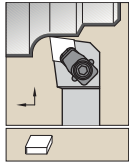


CELN-MF 97,5°

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.

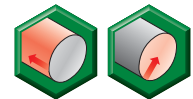
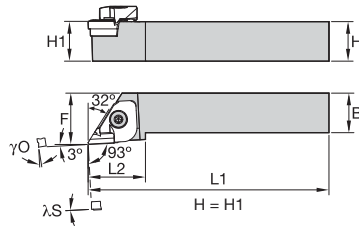
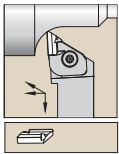
Tools for External Turning and Internal Boring



■ CELN-MN 97,5°

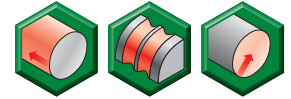
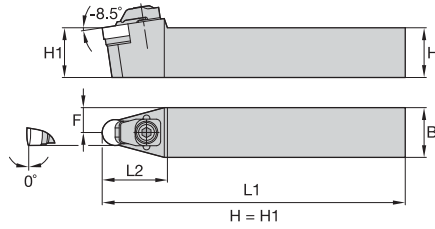
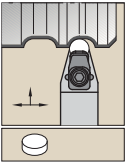
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand													
3879701	CELNR2525M13MN7	25	25	32,5	153	32,0	EN.N130708	552.240	554.252	2.5 mm	557.111	551.317	4 mm
left hand													
3879699	CELNL2525M13MN7	25	25	32,5	153	32,0	EN.N130708	552.240	554.252	2.5 mm	557.111	551.317	4 mm

NOTE: MN – clamping version is shown.



■ CKJN

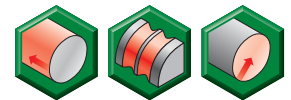
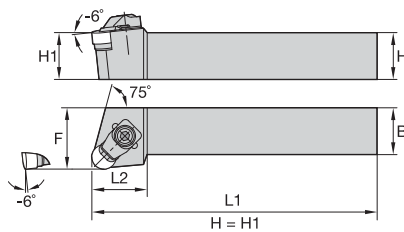
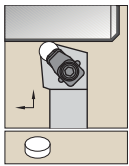
order number	catalogue number	H	B	F	L1	L2	λS°	γ0°	gage insert	shim	shim pin	clamp	clamp assembly	hex	hex wrench	pin
right hand																
3870064	CKJNR2525M16	25	25	32,0	150	36,0	0.0	-6.0	KN..160410R	512.100	513.020	551.129	—	4 mm	170.004	513.123
3870065	CKJNR3225P16	32	25	32,0	170	33,0	0.0	-6.0	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



■ 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

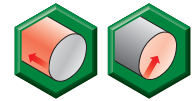
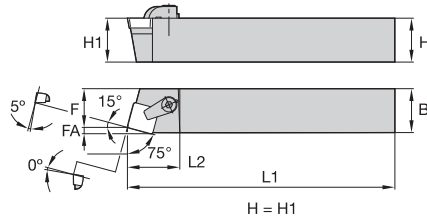
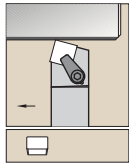
NOTE: MN — clamping version is shown.



■ CRSN-MN

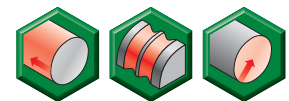
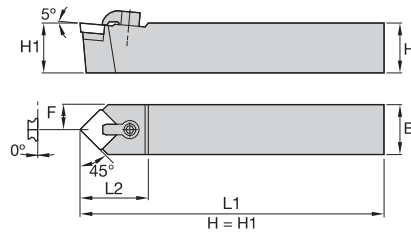
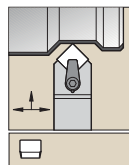
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand													
3032677	CRSNR2525M12MN7	25	25	32,0	150	26,0	RN.N120700	552.230	554.252	2.5 mm	557.111	551.333	4 mm
3032675	CRSNR3225P12MN4	32	25	32,0	170	26,0	RN.N120400	552.229	554.252	2.5 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.



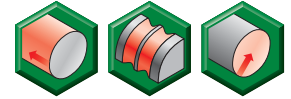
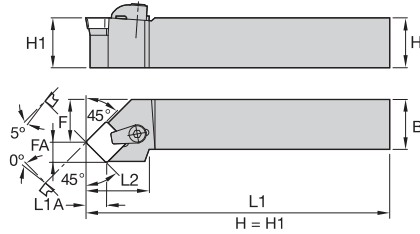
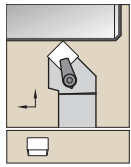
■ CSBP 75°

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	



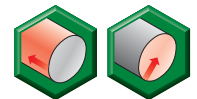
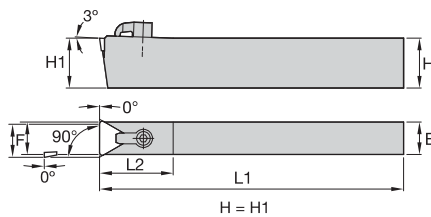
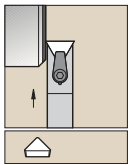
■ CSDP 45°

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



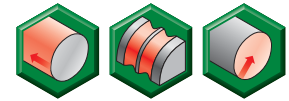
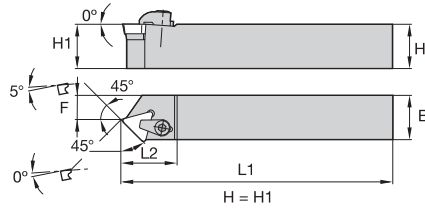
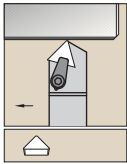
■ CSSP 45°

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



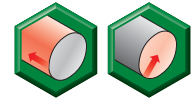
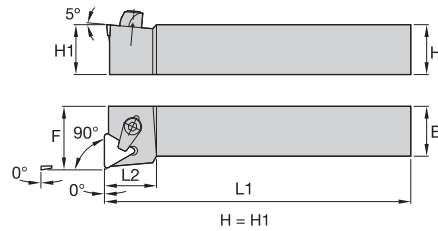
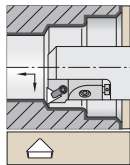
■ CTCN 90°

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



■ CTDP 45°

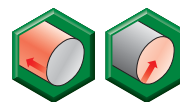
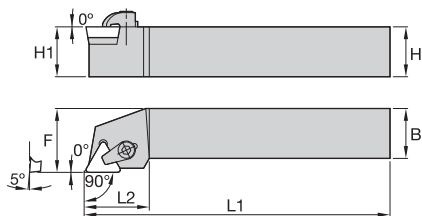
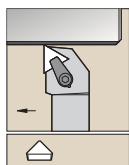
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	clamp	clamp screw	hex
right hand												
3870083	CTDPR1212F11	12	12	6,0	80	22,0	TP..110304	SM819	MS960	CKM19	STCM9	2.5 mm
left hand												
3870082	CTDPL1212F11	12	12	6,0	80	22,0	TP..110304	SM819	MS960	CKM19	STCM9	2.5 mm



■ 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

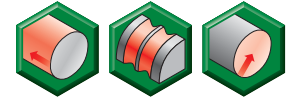
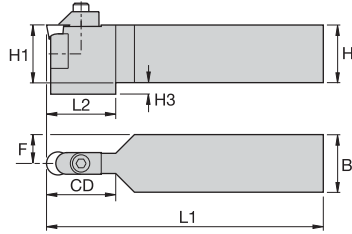
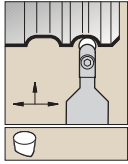




■ CTGP 90°

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



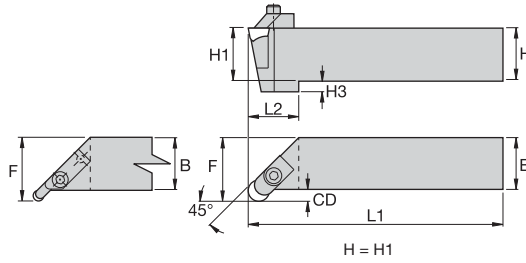
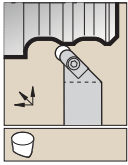


Tools for External Turning and Internal Boring

■ 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

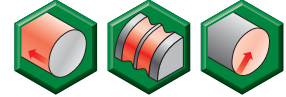
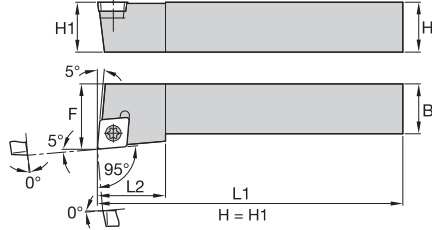
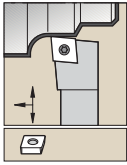
NOTE: CRDP toolholders are able to use RPGX and RCGX insert styles.



■ CRGP

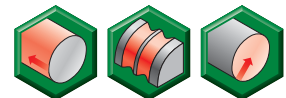
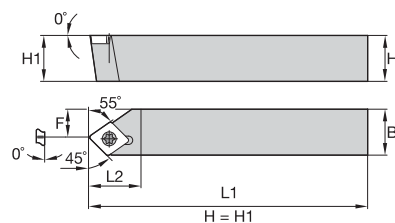
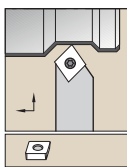
order number	catalogue number	H	B	F	L1	L2	H3	CD	gage insert	nest	clamp	clamp screw	hex
right hand													
3871515	CRGPR2525M06V	25	25	32,0	151	—	—	7,3	R..X060400E	NST1	CM214	MS1321	2.5 mm
3871519	CRGPR3232P09V	32	32	40,0	171	—	—	8,3	R..X090700E	NST2	CM219	CS412	9/64
3871517	CRGPR2525M09V	25	25	32,0	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.



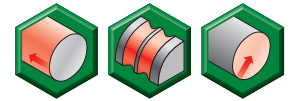
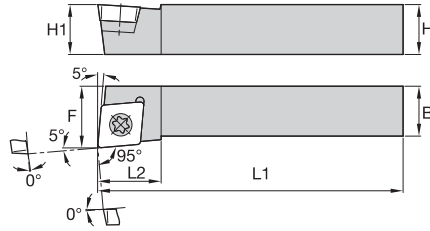
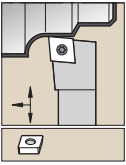
■ SCLC 95°

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



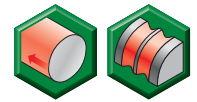
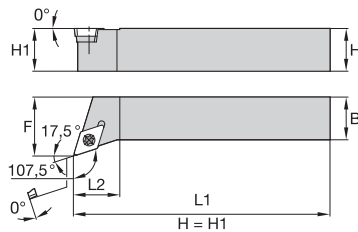
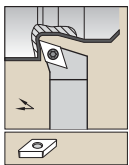
■ SCDP 45°

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



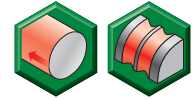
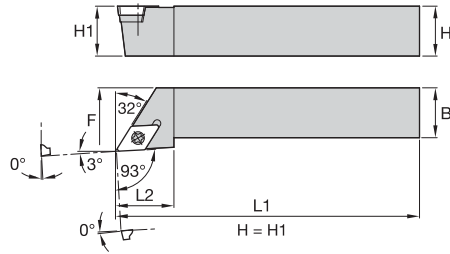
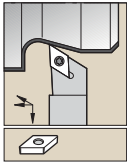
■ SCLP 95°

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



■ SDHC 107,5°

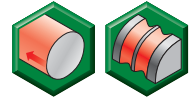
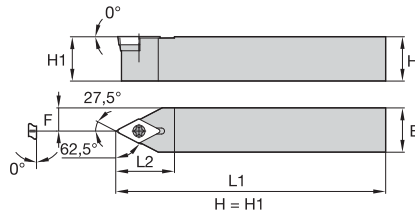
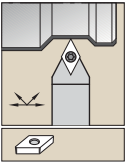
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3879435	SDHCR1616H11	16	16	20,0	100	20,0	DC..11T308	SKDP343	SRS3	3.5 mm	MS1156	T15
3879437	SDHCR2020K11	20	20	25,0	125	20,0	DC..11T308	SKDP343	SRS3	3.5 mm	MS1156	T15
3879440	SDHCR2525M11	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

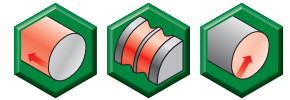
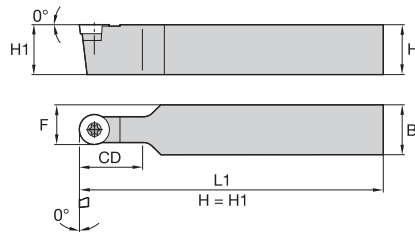
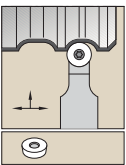
■ SDJC 93°

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



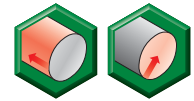
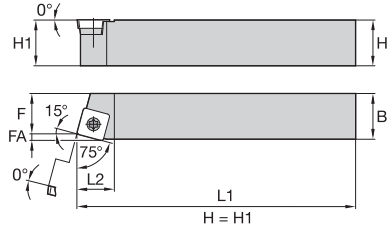
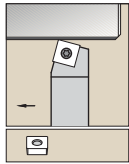
SDNC 62,5°

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



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

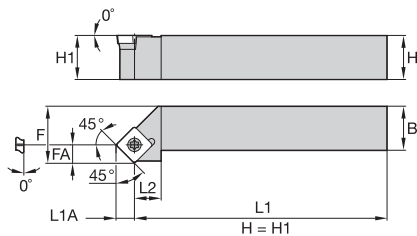
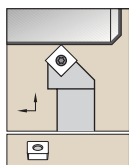


Tools for External Turning and Internal Boring

■ SSBC 75°



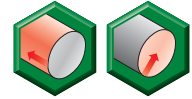
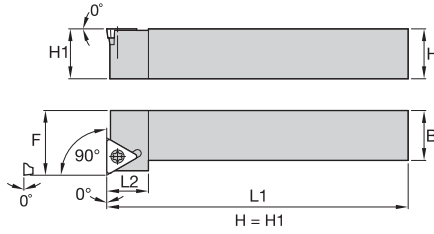
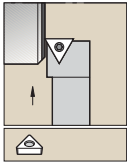
order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim screw	hex	insert screw	Torx
right hand													
3879850	SSBCR1616H09	16	16	13,0	100	16,0	2,2	SC..096308	SKSP343	SRS3	3.5 mm	MS1156	T15
3879741	SSBCR2020K12	20	20	17,0	125	21,0	3,1	SC..120408	SKSP453	SRS4	4 mm	MS1158	T15
3879740	SSBCR2525M12	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



SSSC 45°

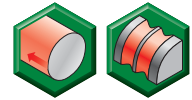
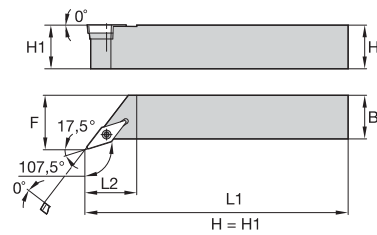
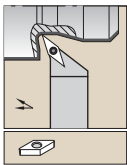
order number	catalogue number	H	B	F	L1	L2	FA	L1A	gage insert	shim	shim screw	hex	insert screw	Torx
right hand														
3879747	SSSCR1616H09	16	16	20,0	100	18,0	6,1	6,1	SC..09T308	SKSP343	SRS3	3.5 mm	MS1156	T15
3879746	SSSCR2020K12	20	20	25,0	125	25,0	8,3	8,3	SC..120408	SKSP453	SRS4	4 mm	MS1158	T15
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

Tools for External Turning and Internal Boring



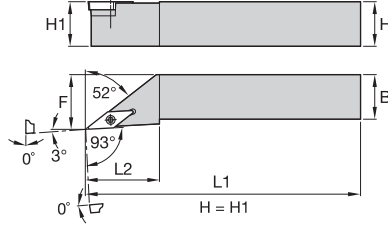
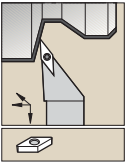
■ STFC 90°

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



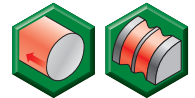
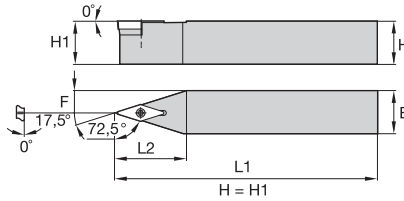
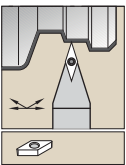
■ SVHB 107,5°

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



■ **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



■ **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.

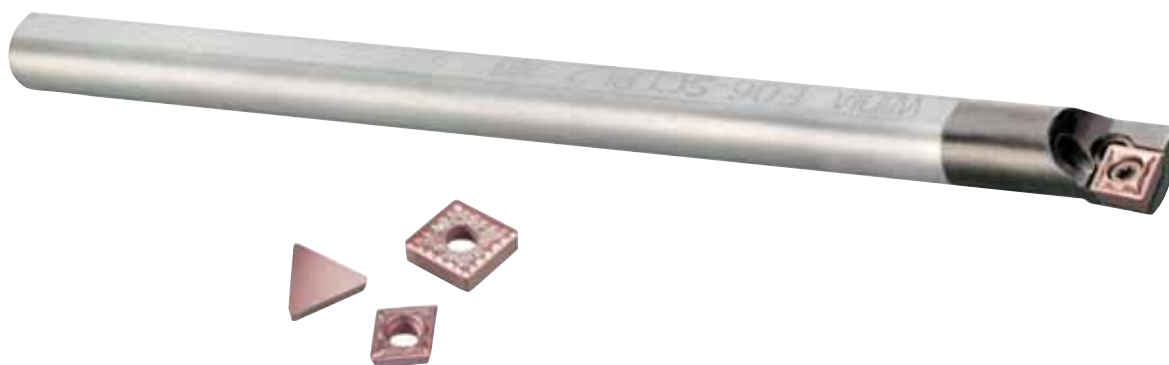
D-Style Clamping

- 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

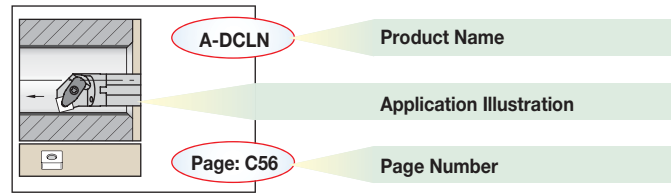
- Screw clamping system for positive indexable inserts.
- Compact design for high reliability and cost efficiency.
- Carbide shim for additional tool protection.

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.

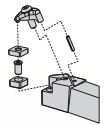


Each unique clamping system offers product options to fill your specific toolholder needs. Find the illustration that fits your application and navigate to the corresponding page to get the correct solution.

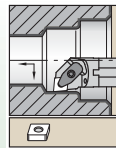


D-Style Clamping

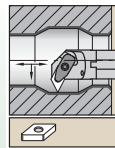
D



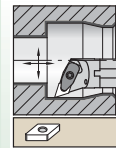
One-piece clamp assembly holder for use with negative style inserts. An extremely rigid clamping system. The tool is protected by a carbide shim.



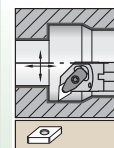
A-DCLN
95°
Page:
C56



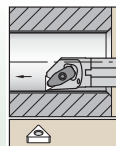
A-DDPN
117,5°
Page:
C56



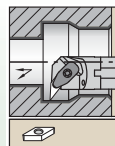
A-DDQN
107,5°
Page:
C57



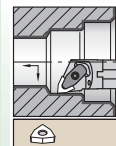
A-DDUN
93°
Page:
C57



A-DTFN
90°
Page:
C58



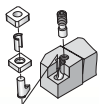
DVUN
93°
Page:
C58



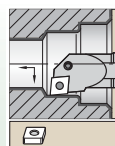
A-DWLN
95°
Page:
C59

P-Style Clamping

P



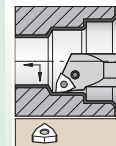
Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20mm in diameter. Inserts with one- and two-side chip control geometries have positive rakes from 6° to 18°. Advantages of this system are fast insert changes and no interference with chip flow.



A-PCLN
95°
Page:
C60

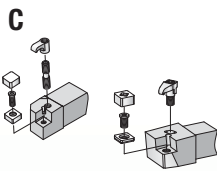


A-PTFN
90°
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C60

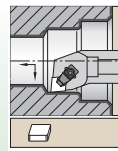


A-PWLN
95°
Page:
C61

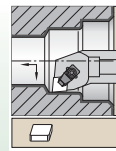
C-Style Clamping



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.



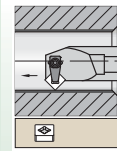
S-CCLN-MX
95°
Page: C62



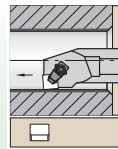
S-CCLN-MN
95°
Page: C62



S-CDQN-MX
Page: C63



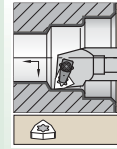
S-CSSN-MX
45°
Page: C63



S-CSYN-MN
85°
Page: C64

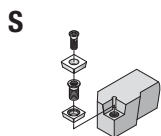


S-CWLN-MX
95°
Page: C64

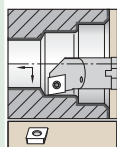


A-CTFP
90°
Page: C65

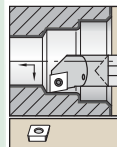
S-Style Clamping



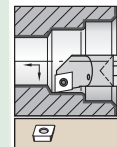
Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967. Compact design using a minimum of spare parts for high reliability and cost efficiency. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of .625" and insert iCs from .375" are secured by means of a threaded bushing.



A-SCFP
90°
Page: C66



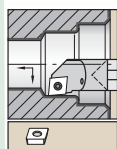
E-SCFC
90°
Page: C66



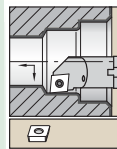
E-SCFP
90°
Page: C67



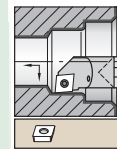
A-SCLC
95°
Page: C67



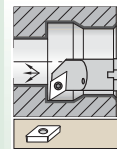
E-SCLC
95°
Page: C68



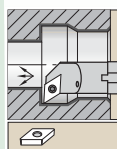
A-SCLP
95°
Page: C69



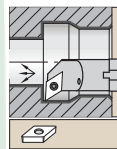
E-SCLP
95°
Page: C70



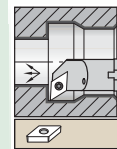
A-SDQC
107,5°
Page: C71



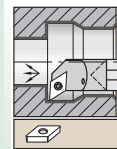
E-SDQC
107,5°
Page: C72



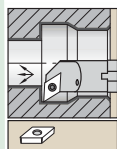
A-SDQP
Page: C72



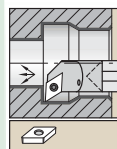
A-SDUC
93°
Page: C73



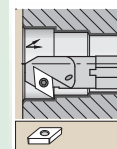
E-SDUC
93°
Page: C74



A-SDUP
93°
Page: C75



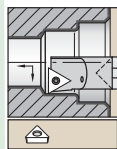
E-SDUP
93°
Page: C75



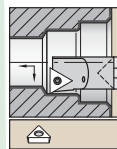
A-SDXP
95°
Page: C76



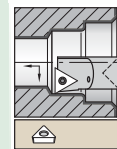
A-STFC
90°
Page: C76



E-STFC
90°
Page: C77



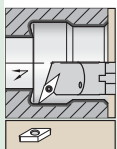
A-STFP
90°
Page: C78



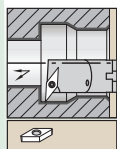
E-STFP
90°
Page: C79



A-STWP
60°
Page: C80



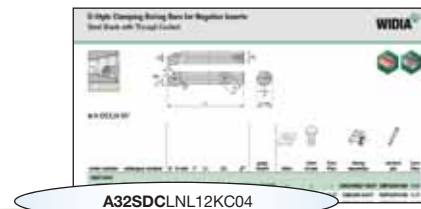
A-SVQB
107,5°
Page: C80


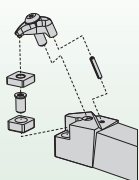


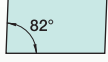









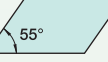







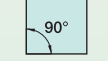





A-SVUB
93°
Page: C81

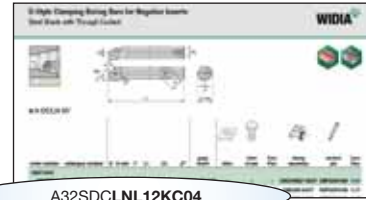
How Do Catalogue Numbers Work?

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.



A	32	S	D	C
Bar Type	Bar Diameter	Bar Length**	Insert Holding Method	Insert Shape
<p>A </p> <p>Steel bar with coolant</p>	<p>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</p>	<p>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</p> <p>**Used only when more than one length is available or a special length is required.</p>	<p>D </p>	<p>A </p>
<p>S </p> <p>Steel bar without coolant</p>			<p>B </p>	
<p>C </p> <p>Carbide bar</p>			<p>C </p>	
<p>D </p> <p>DeVibrator bar with coolant</p>			<p>D </p>	
<p>D </p> <p>Tunable bar with coolant</p>			<p>E </p>	
<p>E </p> <p>Carbide bar with coolant</p>			<p>H </p>	
<p>B </p> <p>DeVibrator</p>			<p>K </p>	
<p>H </p> <p>Interchangeable head</p>			<p>L </p>	
<p>L </p> <p>Heavy metal bar with coolant</p>			<p>M </p>	
			<p>O </p>	
	<p>P </p>			
	<p>R </p>			
	<p>S </p>			
	<p>T </p>			
	<p>V </p>			
	<p>W </p>			

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

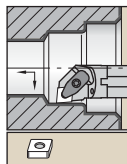


A32SDCLNL12KC04

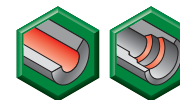
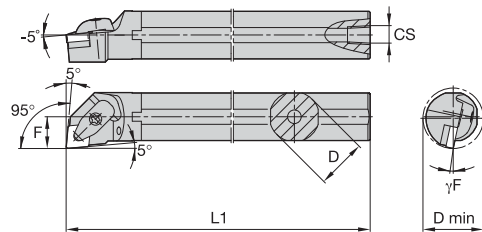
L	N	L	12	KC04
Bar Style or Lead Angle	Insert Clearance Angle	Hand of Tool	Insert Size Cutting Edge Length L10	Additional Information
<p>E </p> <p>F </p> <p>K </p> <p>L </p> <p>(E-style inserts)</p> <p>L </p> <p>P </p> <p>Q </p> <p>S </p> <p>U </p> <p>X </p>	<p>N 0° </p> <p>B 5° </p> <p>C 7° </p> <p>P 11° </p> <p>D 15° </p> <p>E 20° </p> <p>F 25° </p>	<p>R = Right-hand boring bar</p> <p>R </p> <p>L = Left-hand boring bar</p> <p>L </p>	<p>H </p> <p>O </p> <p>P </p> <p>S </p> <p>T </p> <p>CDE </p> <p>M </p> <p>V </p> <p>W </p> <p>L </p> <p>A </p> <p>B </p> <p>K </p> <p>R </p>	<p>M... = M.. MF, MN, MX, for ceramic and PcBN inserts</p> <p>KC = D-Style Clamping</p> <p>+ = Insert thickness</p>

D-Style Clamping Boring Bars for Negative Inserts

Steel Shank with Through Coolant

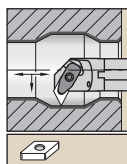


Steel shank with through coolant.

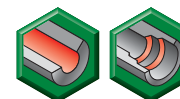
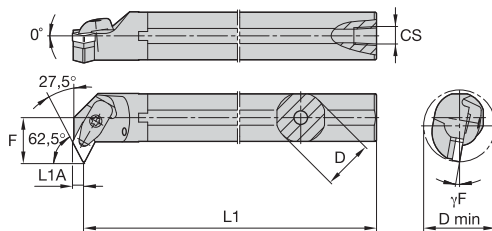


A-DCLN 95°

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



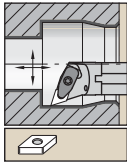
Steel shank with through coolant.



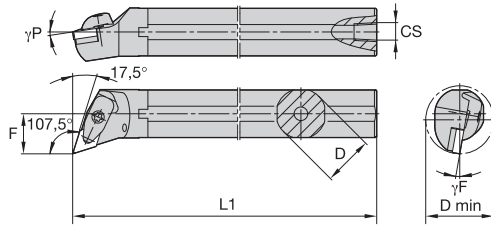
A-DDPN 117,5°

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



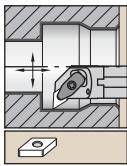


Steel shank with through coolant.

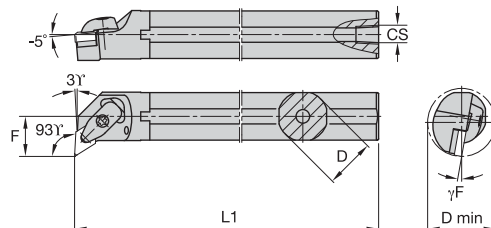


■ **A-DDQN 107,5°**

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.

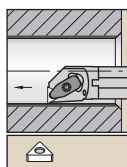


■ **A-DDUN 93°**

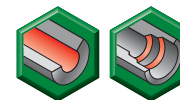
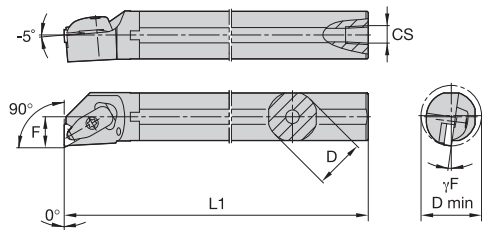
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus	
right hand															
5696089	A25RDDUNR11KC04	25	32,0	17,0	200	1/4-18 NPT	-12,0	DN..110408	—	—	—	CM234RLP ASSY	SSP025016M	15 IP	
5696211	A32SDDUNR11KC04	32	40,0	22,0	250	1/4-18 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	

D-Style Clamping Boring Bars for Negative Inserts

Steel Shank with Through Coolant

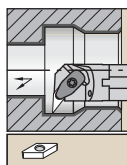


Steel shank with through coolant.

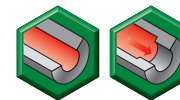
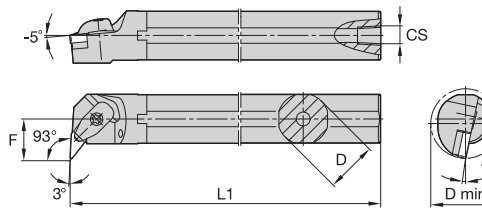


■ A-DTFN 90°

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



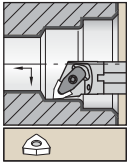
Steel shank with through coolant.



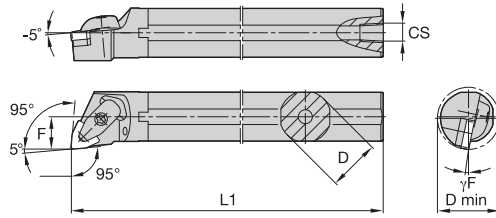
■ A-DVUN 93°

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.



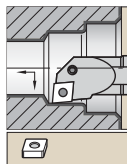
■ A-DWLN 95°

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	A25RDWLNRO6KC04	25	32,0	17,0	200	1/4-18 NPT	-14.0	WN..060408	—	—	—	CM234RLP ASSY	SSP025016M	15 IP
5696269	A25RDWLNRO8KC04	25	32,0	17,0	200	1/4-18 NPT	-12.0	WN..080408	—	—	—	CM234RLP ASSY	SSP025016M	15 IP
5696281	A32SDWLNRO8KC04	32	40,0	22,0	250	1/4-18 NPT	-14.0	WN..080408	IWSN433	KMSP415IP	15 IP	CM234RLP ASSY	SSP025016M	15 IP
5696283	A40TDWLNRO8KC04	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	A25RDWLNLO6KC04	25	32,0	17,0	200	1/4-18 NPT	-14.0	WN..060408	—	—	—	CM234RLP ASSY	SSP025016M	15 IP
5696280	A25RDWLNLO8KC04	25	32,0	17,0	200	1/4-18 NPT	-12.0	WN..080408	—	—	—	CM234RLP ASSY	SSP025016M	15 IP
5696282	A32SDWLNLO8KC04	32	40,0	22,0	250	1/4-18 NPT	-14.0	WN..080408	IWSN433	KMSP415IP	15 IP	CM234RLP ASSY	SSP025016M	15 IP
5696284	A40TDWLNLO8KC04	40	50,0	27,0	300	1/4-18 NPT	-14.0	WN..080408	IWSN433	KMSP415IP	15 IP	CM234R ASSY	SSP025016M	15 IP

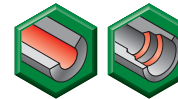
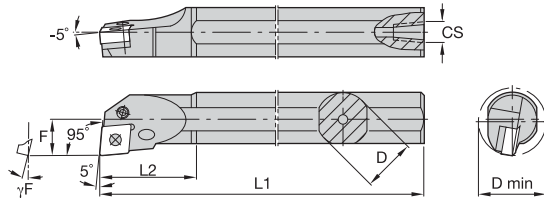


P-Style Clamping Boring Bars for Negative Inserts

Steel Shank with Through Coolant

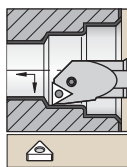


Steel shank with through coolant.

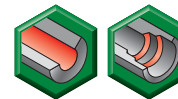
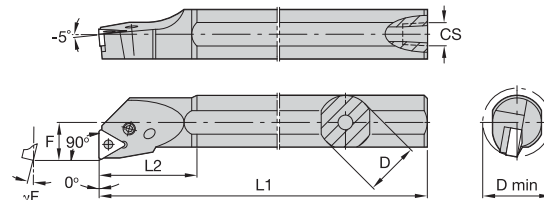


■ A-PCLN 95°

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



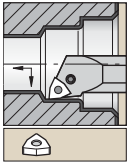
Steel shank with through coolant.



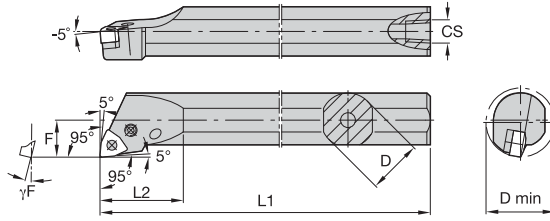
■ A-PTFN 90°

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

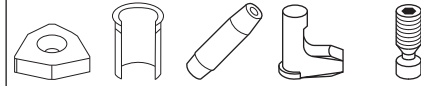




Steel shank with through coolant.



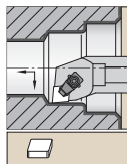
■ A-PWLN 95°



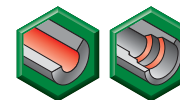
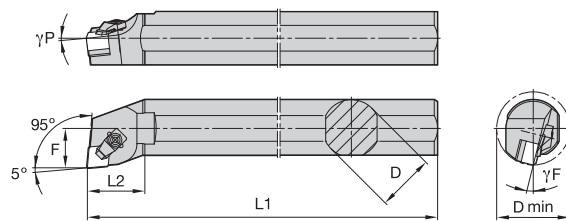
order number	catalogue number	D	D min	F	L1	L2	CS	γF°	gage insert	shim	shim pin	pin	toggle lever	lever screw	Torx Plus
right hand															
3883459	A16RPWLN06	16	27,0	11,0	200	32	1/8-27 NPT	-12,0	WN..060408	—	—	—	511.030	514.112	—
3883455	A20SPWLN06	20	25,0	13,0	250	—	1/8-27 NPT	-14,0	WN..060408	—	—	—	511.030	514.112	8 IP
3883458	A25RPWLN08	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	A32SPWLN08	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	A16RPWLN06	16	27,0	11,0	200	32	1/8-27 NPT	-12,0	WN..060408	—	—	—	511.030	514.112	—
3883457	A20SPWLN06	20	25,0	13,0	250	—	1/8-27 NPT	-14,0	WN..060408	—	—	—	511.030	514.112	8 IP
3883456	A32SPWLN08	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	—

C-Style Clamping Boring Bars for Negative Inserts

Steel Shank with Through Coolant



Steel shank with through coolant.

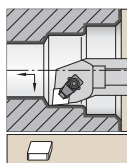


Tools for External Turning and Internal Boring

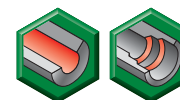
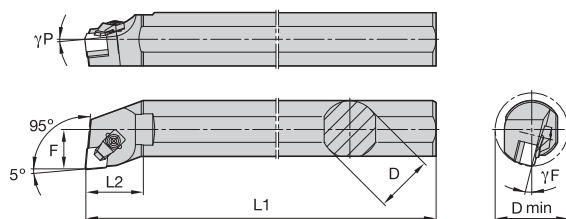
■ S-CCLN-MX 95°

order number	catalogue number	D	D min	F	L1	L2	γ_F°	γ_P°	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.



Steel shank with through coolant.



■ S-CCLN-MN 95°

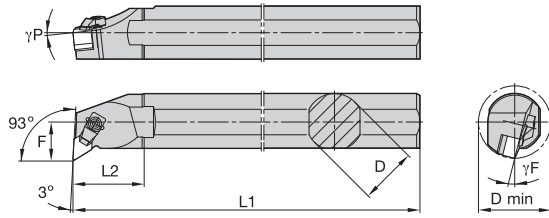
order number	catalogue number	D	D min	F	L1	L2	γ_F°	γ_P°	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand															
3029011	S40TCCLNR12MN4	40	55,0	27,0	300	40	-14,0	-6,0	CN.N120408	552.220	554.252	2.5 mm	557.111	551.317	4 mm
3029143	S40TCCLNR12MN7	40	55,0	27,0	300	40	-14,0	-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.





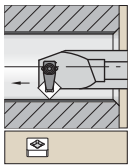
Steel shank with through coolant.



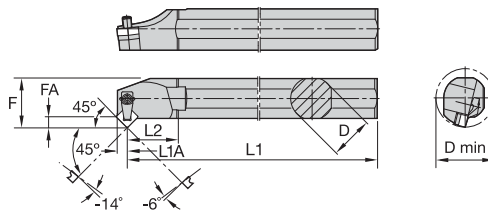
■ S-CDQN-MX

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.



Steel shank with through coolant.



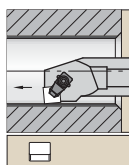
■ S-CSSN-MX 45°

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

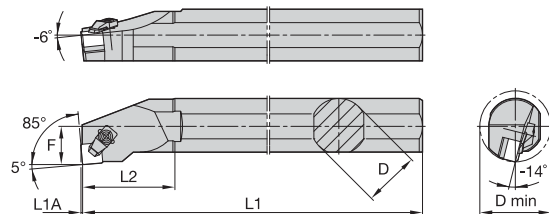
NOTE: MX – clamping version is shown.

C-Style Clamping Boring Bars for Negative Inserts

Steel Shank with Through Coolant



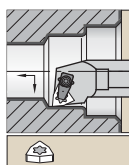
Steel shank with through coolant.



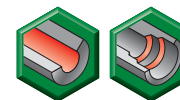
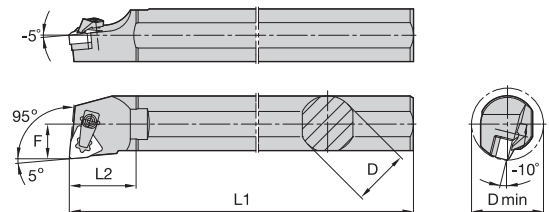
■ S-CSYN-MN 85°

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.



Steel shank with through coolant.

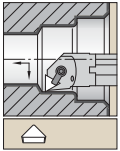


■ S-CWLN-MX 95°

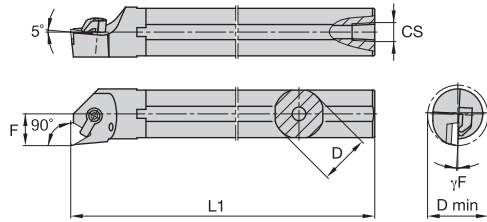
order number	catalogue number	D	D min	F	L1	L2	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand												
3029153	S40TCWLNRO8MX7	40	80,0	27,0	300	55,0	WN.X080708	552.210	554.252	2.5 mm	551.316	4 mm
left hand												
3029154	S40TCWLNLO8MX7	40	80,0	27,0	300	55,0	WN.X080708	552.210	554.252	2.5 mm	551.316	4 mm

NOTE: MX – clamping version is shown.

Tools for External Turning and Internal Boring



Steel shank with through coolant.

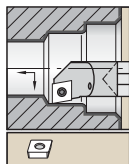


■ A-CTFP 90°

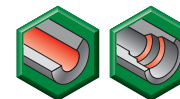
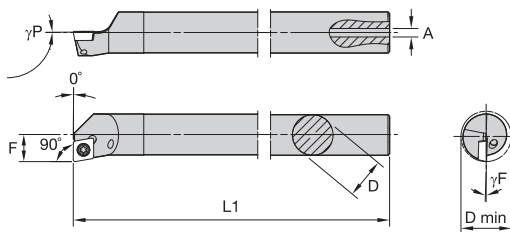
order number	catalogue number	D	D min	F	L1	CS	γ_F°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex	
right hand															
3883451	A16RCTFPR11	16	20,0	11,0	200	1/8-27 NPT	-4.0	TP..110304	—	—	—	CKM19	STCM9	2.5 mm	
3883450	A25RCTFPR16	25	32,0	17,0	200	1/4-18 NPT	-3.0	TP..160308	SM841	MS110	2 mm	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	

S-Style Clamping Boring Bars for Positive Inserts

Carbide Shank with Through Coolant



Carbide shank with through coolant.

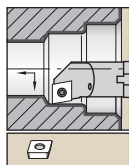


E-SCFC 90°

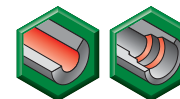
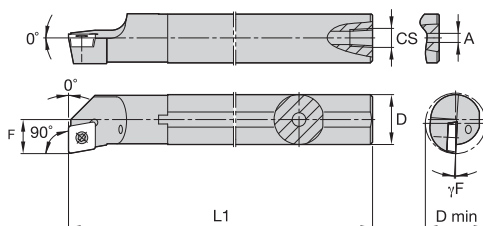


order number	catalogue number	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand											
2023600	E08KSCFCR06	8	11,0	6,0	125	3,0	-12,0	0,0	CC..060204	12148036300	T8
left hand											
2031019	E08KSCFCL06	8	11,0	6,0	125	3,0	-12,0	0,0	CC..060204	12148036300	T8

Steel Shank with Through Coolant



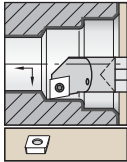
Steel shank with through coolant.



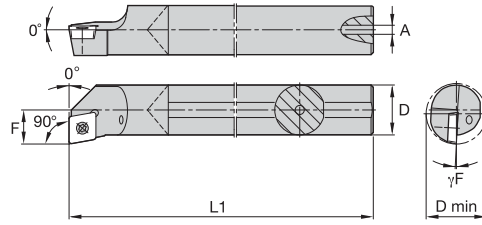
A-SCFP 90°



order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
5077442	A08JSCFP06	8	11,0	6,0	110	2,4	—	-8,0	CP..0602..	MS1153	T7
5077449	A10KSCFP06	10	13,0	7,0	125	3,2	—	-6,0	CP..0602..	MS1153	T7
5077497	A12MSCFP06	12	16,0	9,0	150	—	1/16 - 27 NPT	-4,0	CP..0602..	MS1153	T7
5077552	A16RSCFP06	16	20,0	11,0	200	—	1/8 - 27 NPT	-5,0	CC..0602..	MS1153	T7
5077553	A16RSCFP09	16	20,0	11,0	200	—	1/8 - 27 NPT	-4,0	CP..09T3..	MS1155	T15
5077614	A20SSCF06	20	25,0	13,0	250	—	1/8 - 27 NPT	-3,0	CC..0602..	MS1153	T7
5077615	A20SSCF09	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.

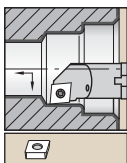


■ E-SCFP 90°

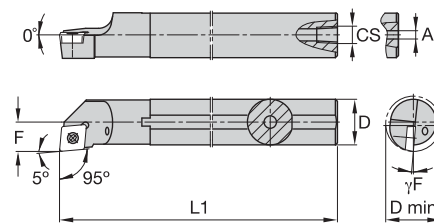


order number	catalogue number	D	D min	F	L1	A	A1	γF°	gage insert	insert screw	Torx
right hand											
2010047	E06JSCFPR04	6	8,0	4,5	110,0	2,0	1,4	-10.0	CP..04T104	12148005800	T6
5092759	E08KSCFPR06A	8	11,0	6,0	123,0	2,4	—	-8.0	CP..060204	MS1939	T7
5092921	E10MSCFPR06A	10	13,0	7,0	148,0	3,2	—	-4.0	CP..060204	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.



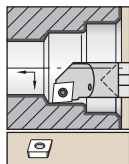
■ A-SCLC 95°



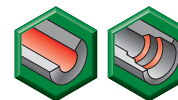
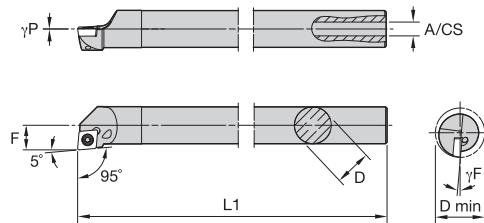
order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	shim	shim screw	hex	insert screw	Torx
right hand														
3883285	A08JSCLCR06	8	11,0	6,0	110	2,4	—	-8.0	CC..060204	—	—	—	MS1939	T7
3883283	A10KSCLCR06	10	13,0	7,0	125	3,2	—	-7.0	CC..060204	—	—	—	MS1153	T7
3883271	A16RSCLCR09	16	20,0	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

S-Style Clamping Boring Bars for Positive Inserts

Carbide Shank with Through Coolant



Carbide shank with through coolant.

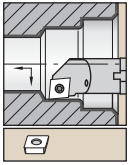


■ E-SCLC 95°

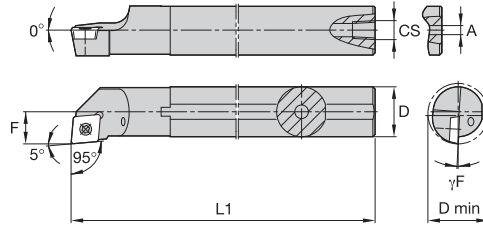


order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
right hand												
2010068	E08KSCLCR06	8	11,0	6,0	125	3,0	—	-12.0	0.0	CC..060204	12148036300	T8
2023603	E08KSCLCR065	8	10,0	5,0	125	3,0	—	-15.0	0.0	CC..060204	12148036300	T8
2031021	E10MSCLCR06	10	13,0	7,0	150	3,5	—	-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

Tools for External Turning and Internal Boring



Steel shank with through coolant.



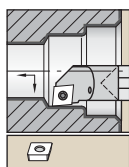
■ A-SCLP 95°



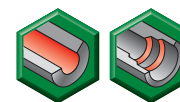
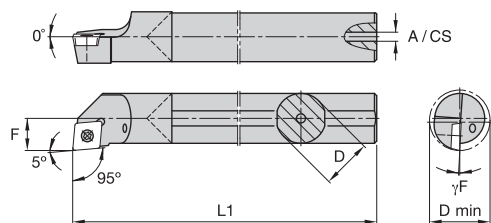
order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
5077640	A08JSCLPR06	8	11,0	6,0	110	2,4	—	-6.0	CP..0602..	MS1939	T7
5077645	A10KSCLPR06	10	13,0	7,0	125	3,2	—	-4.0	CP..0602..	MS1939	T7
5077681	A12MSCLPR06	12	16,0	9,0	150	4,0	—	-3.0	CP..0602..	MS1153	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

S-Style Clamping Boring Bars for Positive Inserts

Carbide Shank with Through Coolant



Carbide shank with through coolant.

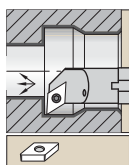


Tools for External Turning and Internal Boring

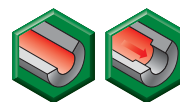
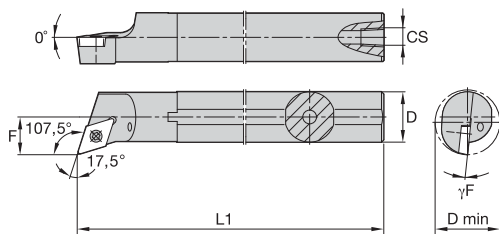
■ E-SCLP 95°



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.



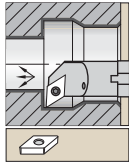
■ A-SDQC 107,5°

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

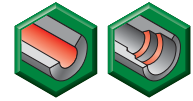
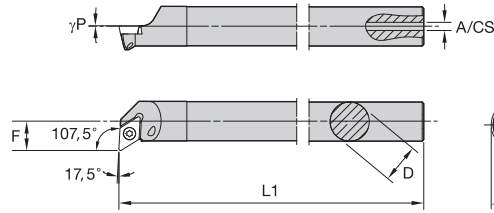


S-Style Clamping Boring Bars for Positive Inserts

Carbide Shank with Through Coolant



Carbide shank with through coolant.

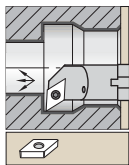


E-SDQC 107,5°

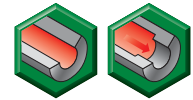
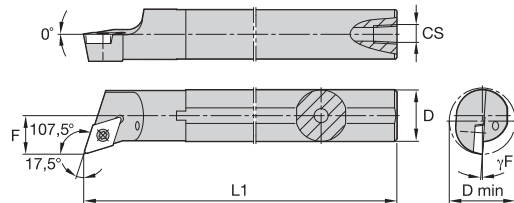


order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
right hand												
2010111	E12QSDQCR07	12	16,0	9,0	180	4,5	—	-7.0	0.0	DC..070204	12148080000	T8
2031025	E16RSDQCR07	16	20,0	11,0	200	5,5	—	-5.0	0.0	DC..070204	12148080000	T8
2023623	E20SSDQCR11	20	25,0	13,0	250	—	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



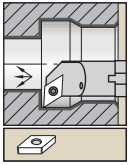
Steel shank with through coolant.



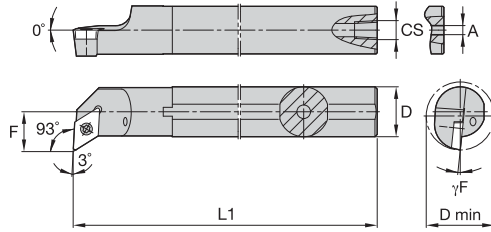
A-SDQP



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.



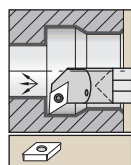
■ A-SDUC 93°

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

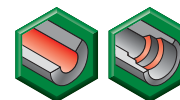
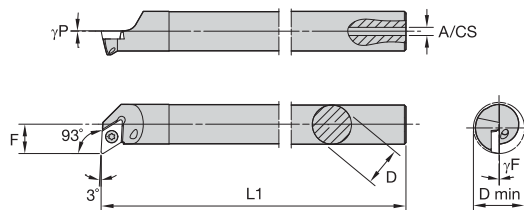


S-Style Clamping Boring Bars for Positive Inserts

Carbide Shank with Through Coolant



Carbide shank with through coolant.

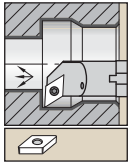


■ E-SDUC 93°

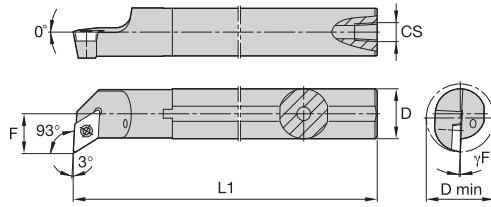


order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
right hand												
2023611	E12QSDUCR07	12	16,0	9,0	180	4,5	—	-7.0	0.0	DC..070204	12148068700	T8
2010157	E16RSDUCR07	16	20,0	11,0	200	4,5	—	-5.0	0.0	DC..070204	12148080000	T8
2023624	E20SSDUCR11	20	25,0	13,0	250	—	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

Tools for External Turning and Internal Boring



Steel shank with through coolant.

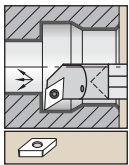


■ A-SDUP 93°

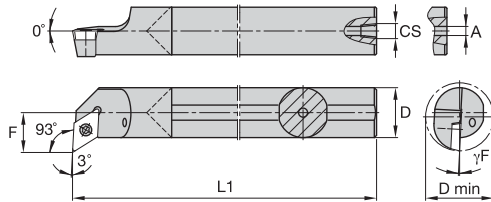
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	insert screw	Torx
right hand										
5078360	A12MSDUPR07	12	16,0	9,0	150	1/16-27 NPT	-2.0	DP..070204	MS1153	T7
5078364	A16RSDUPR07	16	20,0	11,0	200	1/8-27 NPT	0.0	DP..070204	MS1153	T7
5078368	A20SSDUPR11	20	25,0	13,0	250	1/8-27 NPT	-2.0	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.



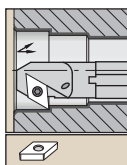
■ E-SDUP 93°

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

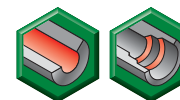
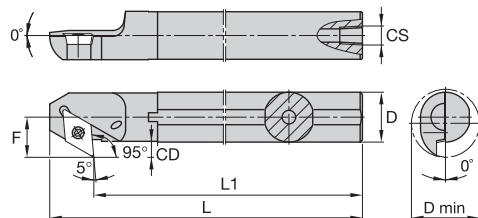


S-Style Clamping Boring Bars for Positive Inserts

Steel Shank with Through Coolant

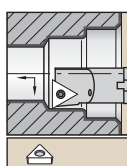


Steel shank with through coolant.

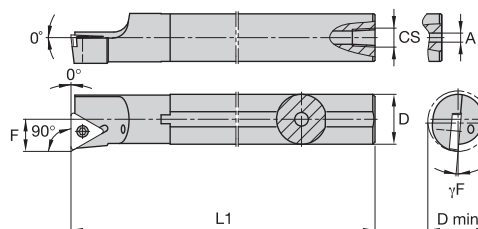


■ A-SDXP 95°

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



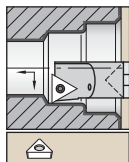
Steel shank with through coolant.



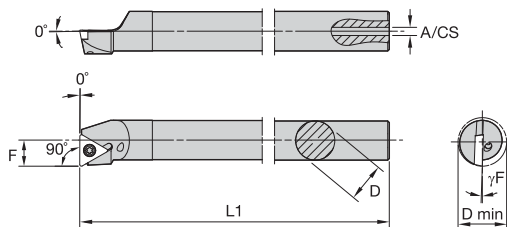
■ A-STFC 90°

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.



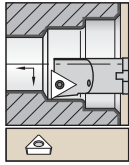
■ E-STFC 90°



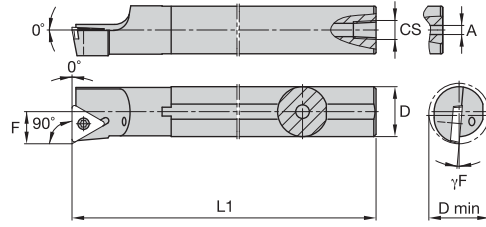
order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
2031888	E10MSTFCR11	10	13,0	7,0	150	3,5	—	-10,0	TC..110204	12148068700	T8
2031024	E12QSTFCR11	12	16,0	9,0	180	4,5	—	-8,0	TC..110204	12148068700	T8
2010174	E16RSTFCR16	16	20,0	11,0	200	4,5	—	-9,0	TC..16T308	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

S-Style Clamping Boring Bars for Positive Inserts

Steel Shank with Through Coolant



Steel shank with through coolant.

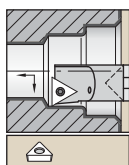


■ A-STFP 90°

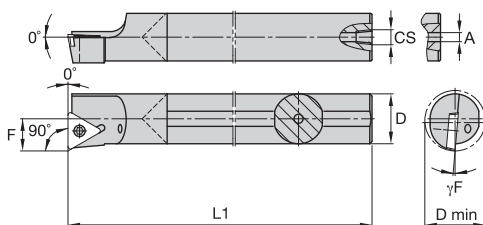


order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
5086726	A08JSTFPR09	8	11,0	6,0	110	—	—	-8.0	TP..090204	MS1933	T7
3883446	A10KSTFPR11	10	13,0	7,0	125	3,2	—	-4.0	TP..110204	MS1153	T7
5086802	A12MSTFPR11	12	16,0	9,0	150	4,0	—	-2.0	TP..110204	MS1153	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	A25STFPR16	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	A25STFPL16	25	32,0	17,0	300	6,4	1/4-18 NPT	0.0	TP..16T308	MS1155	T15

Tools for External Turning and Internal Boring



Carbide shank with through coolant.



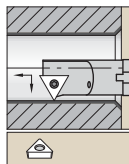
■ E-STFP 90°

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

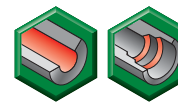
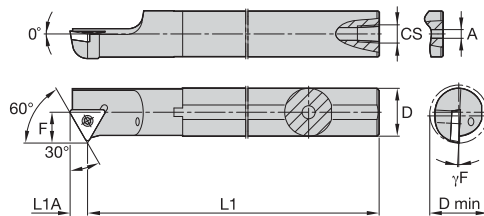


S-Style Clamping Boring Bars for Positive Inserts

Steel Shank with Through Coolant

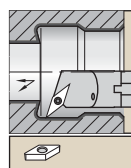


Steel shank with through coolant.

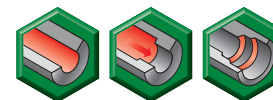
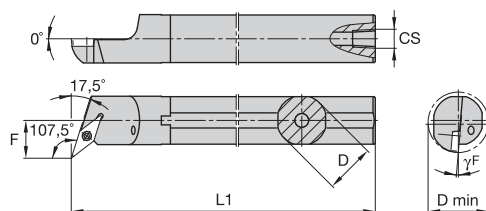


■ A-STWP 60°

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



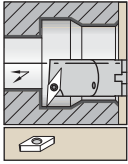
Steel shank with through coolant.



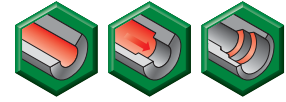
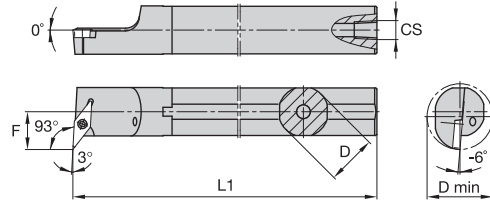
■ A-SVQB 107,5°

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.



■ **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

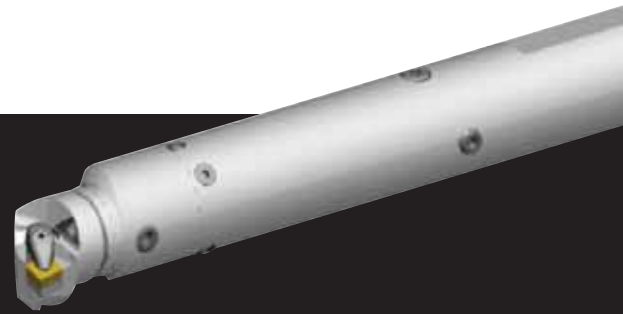


Tools for External Turning and Internal Boring

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:

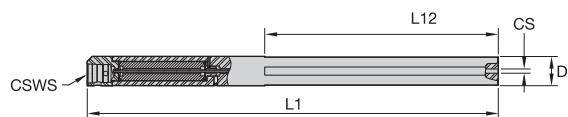
- Steel
— 40–100mm
- Carbide
— 50–100mm

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	<ul style="list-style-type: none"> • Eliminates chatter and vibration. • Higher metal removal rate. • Larger depths of cut. 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.



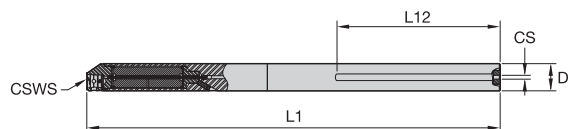
Tunable steel shank with through coolant and front end KM™ clamping unit.



■ 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).

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.

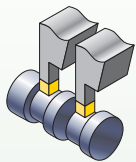
WIDIA 



Turning • Grooving and Cut-Off

Grooving and Cut-Off Platforms	D2-D3
WMT Grooving, Face Grooving, Cut-Off, and Profiling.....	D4-D39
TopGroove Shallow Grooving and Face Grooving	D40-D91
ProGroove Grooving and Cut-Off	D92-D106

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:
D4–D39



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.

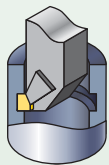
Pages:
D40–D91



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:
D92–D104



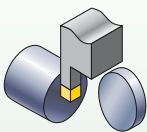
LG

- Insert cutting widths: 8–16mm.
- O.D. cutting depths: 20–32mm.
- Wedge-clamping integral shank tooling available.

Pages:
D105–D106



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:
D4–D39



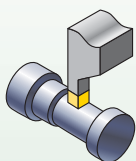
ProGroove

- 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:
D92–D104



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:
D4–D39



ProGroove

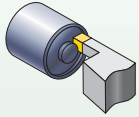
For Light-Cutting Inserts

- Cutting widths: 2–8mm.
- O.D. cutting depths: 10–40mm.
- Single-edge inserts for maximum depth capacity.
- Screw-clamping integral shank toolholders available.

Pages:
D92–D104



Face Grooving



WMT™

- Cutting widths: 3–6,35mm.
- Cutting depths: 13–25,4mm.
- Minimum face groove diameter: 38–205mm.

Pages:
D4–D39



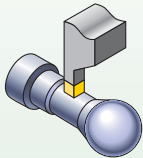
TopGroove™

- 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:
D40–D91



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:
D4–D39



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:
D40–D91



ProGroove™

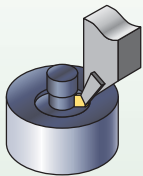
For Light Cutting

- Full-radius insert cutting widths: 3–6mm.
- O.D. cutting depths: 10–32mm.
- Screw-clamping integral shank/cartridge toolholders available.

Pages:
D92–D104



Undercutting



TopGroove

- Undercutting insert widths: 2,4–4mm.
- Economical double-ended inserts.

Pages:
D40–D91



WMT™ System •

One Platform for Grooving, Face Grooving,
Cut-Off, and Profiling

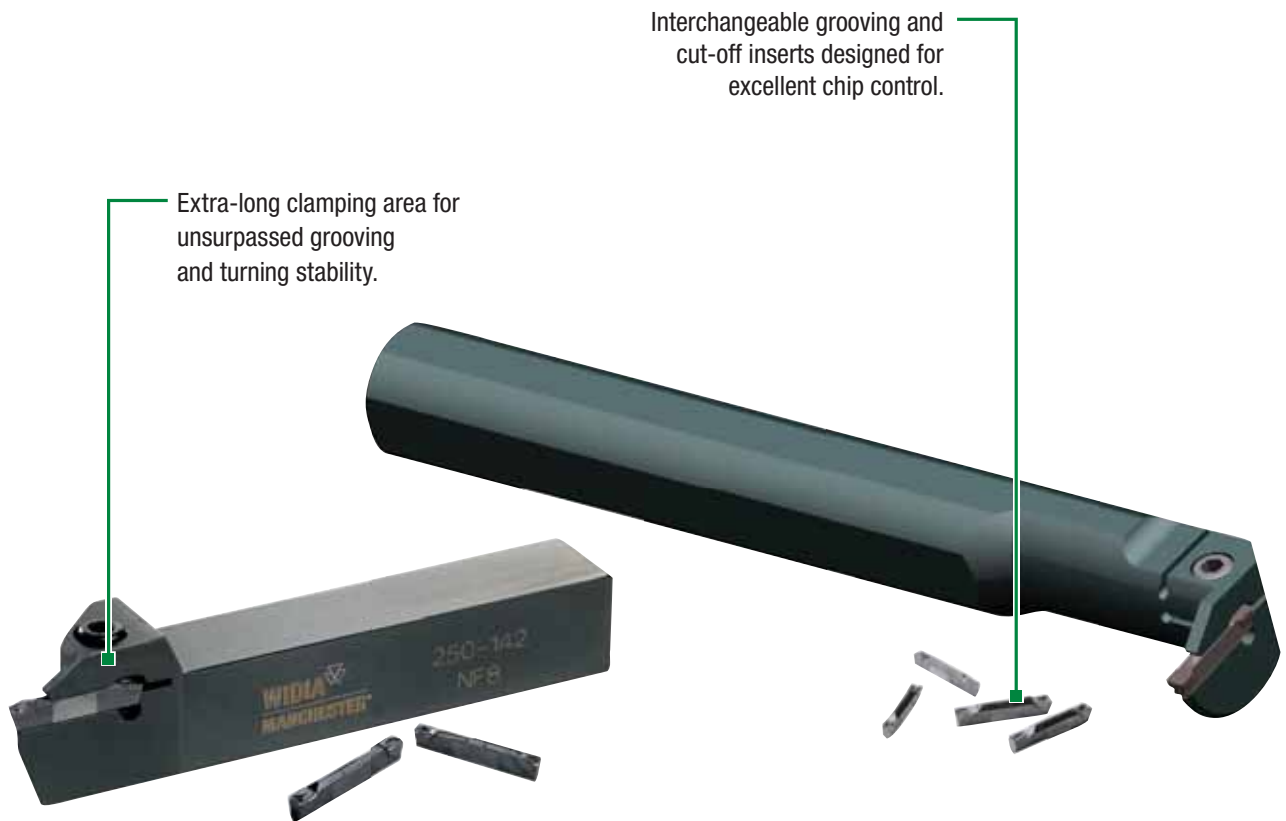


WMT

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!

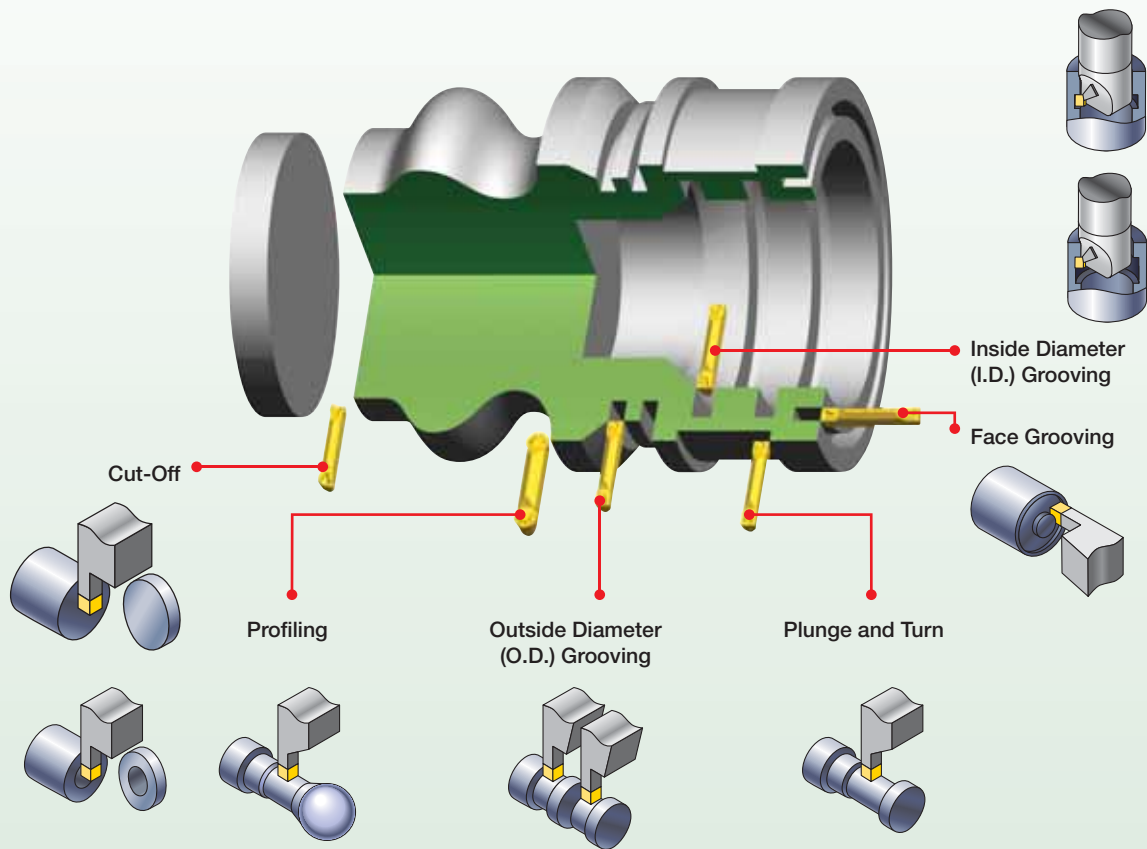
The WMT system, with its extra-long clamping area and precise insert positioning, ensures exceptionally fast and accurate machining, all-in-one tool, for your most demanding grooving, cut-off, turning, and profiling applications.

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.

WMT™ Turning, Grooving, and Cut-Off
Integral Toolholders

WIDIA

■ O.D. Cut-Off and Grooving

Order number	catalogue number	Insert size	H	A	B	CD	F	C	HS	L1	L2	clamp screw	clamp screw
right hand													
3000216	WMTSR2225M116	1	25.0	5.00	11	25.0	24.0	—	130	116	—	00K249	—
3000468	WMTSR1616K216	2	16.0	3.00	11	16.0	15.0	8	125	101	—	00K249	—
3000469	WMTSR2020K216	2	20.0	3.00	11	20.0	19.0	—	125	92	—	00K249	—
3000506	WMTSR2225M216	2	25.0	3.00	11	25.0	24.0	—	130	116	—	00K249	—
3000490	WMTSR1616K211	2	16.0	3.00	11	16.0	15.0	—	125	92	—	—	01K206
3000482	WMTSR1616K222	2	16.0	3.00	22	16.0	15.0	8	125	92	—	—	01K206
3000488	WMTSR2020K211	2	20.0	3.00	11	20.0	19.0	—	125	92	—	—	01K206
3000476	WMTSR2020K222	2	20.0	3.00	22	20.0	19.0	—	130	116	—	—	01K206
3000478	WMTSR2225M211	2	25.0	3.00	11	25.0	24.0	—	130	116	—	—	01K206
3000481	WMTSR2225M222	2	25.0	3.00	22	25.0	24.0	—	130	116	—	—	01K206
3000392	WMTSR1616K11	4	16.0	4.00	11	16.0	15.0	—	125	92	—	—	01K206
3000484	WMTSR1616K22	4	16.0	4.00	22	16.0	15.0	8	125	92	—	—	01K206
3003751	WMTSR2020K26	4	20.0	4.00	22	20.0	20.0	8	125	92	—	—	01K206
3000504	WMTSR2020K411	4	20.0	4.00	11	20.0	19.0	—	125	92	—	—	01K206
3003752	WMTSR2225M11	4	25.0	4.00	11	25.0	24.7	—	130	117	—	—	01K206
3000483	WMTSR2225M422	4	25.0	4.00	22	25.0	24.3	—	130	116	—	—	01K206
3000486	WMTSR1616K314	5	16.0	3.00	14	16.0	15.2	—	125	98	—	—	01K169
3000473	WMTSR2020K314	5	20.0	3.00	14	20.0	19.2	—	125	98	—	—	01K169
3000475	WMTSR2020K326	5	20.0	3.00	14	20.0	19.2	8	140	92	—	—	01K169

	application	conventional toolholders	modular blades
	O.D. Grooving and Cut-Off	pages D30–D32	page D38
	Face Grooving	pages D33–D34	page D39
	I.D. Grooving	page D35	—
	Plunge and Turn	pages D30–D32	page D38

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.

WMT™ Turning, Grooving, Cut-off, and Profiling
 Feed Values for Grooving Inserts

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 minimized cutting pressure on various materials.
- Ideal for 300 Series stainless steel, tool steel, titanium, INCOINEL®, and other nickel-based alloys at moderate speeds and feeds.

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 minimized cutting pressure on various materials.

PT Grooving 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 Plunging and Turning 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.

Width of cut (mm)	CM Feed Rate (mm/min)	CM-W Feed Rate (mm/min)
1.5 and 2.0	0.15	0.20
2.5	0.20	0.25
3.0	0.25	0.30
4.0	0.30	0.35

Insert Size	Turn/profile feed (mm/min)	Plunge groove feed (mm/min)
size 2	0.1	0.05
size 3	0.15	0.1
size 4	0.25	0.15
size 5	0.4	0.30

Insert Size	Turn/profile feed (mm/min)	Plunge groove feed (mm/min)
size 2	0.1	0.05
size 3	0.15	0.1
size 4	0.25	0.15
size 5	0.4	0.30

- A** Choose the appropriate insert width “W” for your specific application.
- B** Select the required corner radius value “RR”.

WMT™ Turning, Grooving, and Cut-Off
 Cut-Off Inserts

• first choice
 ◯ alternate choice

WMT-CM	catalogue number	insert size	A W	B RR	LJ	hand	WP190T	WP250T	WU190T	WU250T	WU15HT
	WMTC015A00CM06	1	1.50	0.08	16.30	N - Neutral	•	•	•	•	•
	WMTC020A00CM06	2	2.00	0.08	16.21	N - Neutral	•	•	•	•	•

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 D11 for Grades and Grade Descriptions.

6 Determine cutting data:

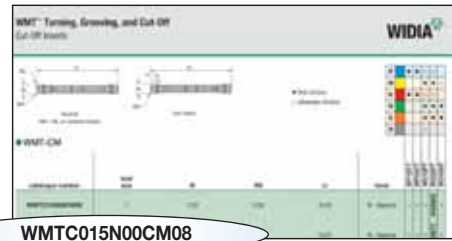
- A** Based on material group and grade, identify starting speed (vc).
- B** First choice starting speed is in **bold**.

NOTE: See page D13 for cutting data.

WIDIA		WMT™ Turning, Grooving, and Cut-Off Recommended Cutting Speeds • Metric														
		Cutting Speed — vc m/min														
Material Group		WU15HT			WU15PT			WU25PT			WP10CT			WP25CT		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	9/1	100	100	110	100	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	160	165	170	150	160	170	210	220	230	185	195	205
	4	70	70	75	165	170	175	135	140	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	65	70	75	-	-	-	-	-	-
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	160	110	120	130	-	-	-	-	-	-
	3	70	75	80	140	150	160	110	120	130	-	-	-	-	-	-
	4	70	75	80	140	150	160	110	120	130	-	-	-	-	-	-
	5	70	75	80	140	150	160	110	120	130	-	-	-	-	-	-
	6	70	75	80	140	150	160	110	120	130	-	-	-	-	-	-
	7	70	75	80	140	150	160	110	120	130	-	-	-	-	-	-
S	1	30	25	30	70	75	80	60	65	65	-	-	-	-	-	-
	2	30	25	30	65	65	70	50	50	50	-	-	-	-	-	-
	3	30	30	30	100	100	110	70	75	80	-	-	-	-	-	-
	4	-	-	-	70	75	80	50	50	50	-	-	-	-	-	-
1	-	-	-	15	30	60	15	30	60	-	-	-	-	-	-	-

WMT Identification System

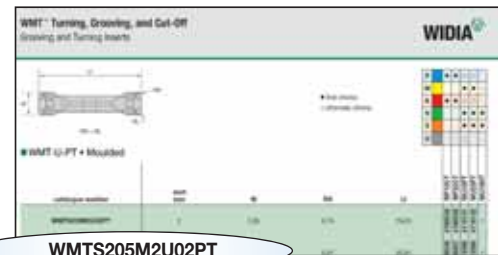
Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



WMTC015N00CM08

Cut-Off

WMT Tooling System	C Cut-Off	015 W in mm* 10	N Hand of Insert	00 Main Cutting Edge Lead Angle	CM Chipbreaker Geometry CM = Cut-Off Medium CM-W = Cut-Off Medium with Wiper	08 Corner Radius in mm* 10
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WMTS205M2U02PT

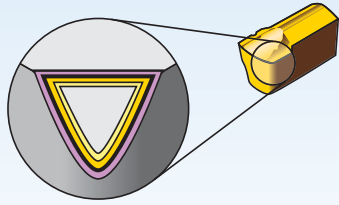
Groove, Plunge, Turn, and Contour Inserts

WMT Tooling System	S Square	205 mm* 10 inch* 1000	M Unit of Measurement for Width M = mm I = inch	2 Seat Size	U Insert Tolerance	02 Corner Radius in mm* 10	PT Chipbreaker Geometry PT = Groove, Plunge, and Turn PH = Groove, Plunge, and Turn PC = Plunge and Contour
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P = Precision ground grooving width tolerance:
± .001" (0,025mm)

U = Utility moulded grooving width tolerance:

3,05–4,05:	$\frac{+.006"}{-0}$	$\frac{(+0,15\text{mm})}{-0}$
5,05–10,05:	$\frac{+.010"}{-0}$	$\frac{(+0,25\text{mm})}{-0}$



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	Material																		
				05	10	15	20	25	30	35	40	45									
WU10PT		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																		
	HC-P15		M																		
			K																		
			N																		
			S																		
			H																		
WU25PT		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																		
	HC-P30		M																		
			K																		
			N																		
			S																		
			H																		
WU10HT		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																		
	HC-K15		K																		
			N																		
			S																		
			H																		
WP10CT		A specially engineered, proprietary, cobalt-enriched carbide grade with thick K-MTCVD-TiCN coating layer, an Al ₂ O 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																		
	HC-P10		M																		
			K																		
			N																		
			S																		
			H																		
WP25CT		A tough cobalt-enriched carbide grade with a newly designed multilayer K-MTCVD TiCN-Al ₂ O ₃ -TiCN/TiN 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																		
	HC-P25		M																		
			K																		
			N																		
			S																		
			H																		

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.



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.



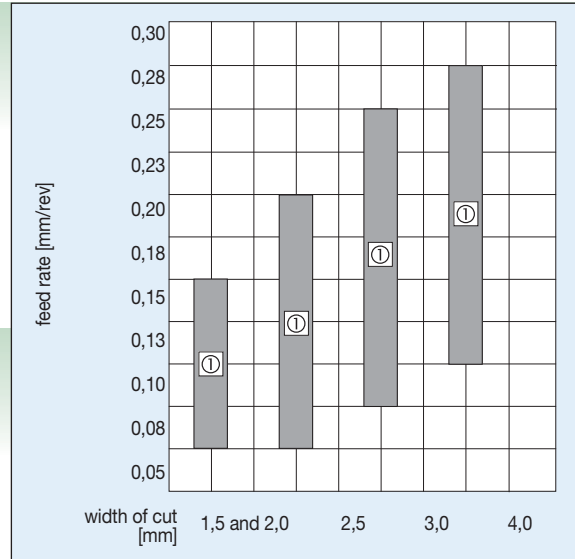
PC Grooving and Profiling Inserts

- Superior chip control.
- Full nose radius geometry for plunge and contour operations.
- Effective cutting edge geometry exceeds 180° for increased versatility.

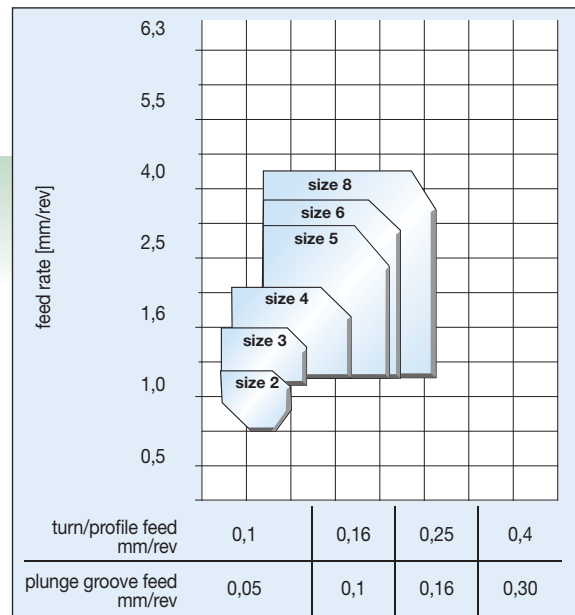
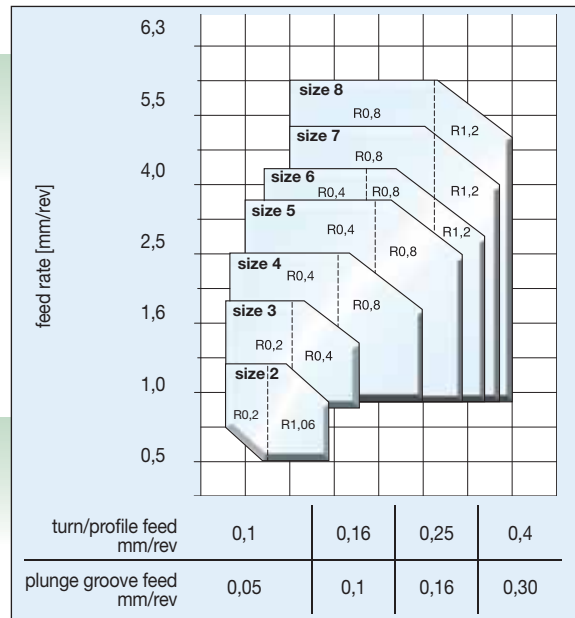


PH Plunge, Groove, and Turn Inserts

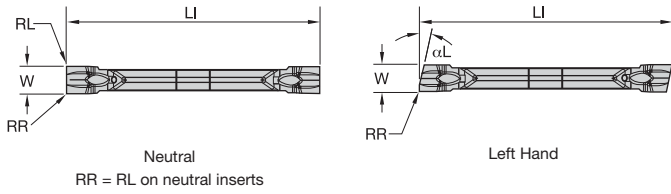
- Excellent performance in greater than 35 HRC.
- Deep grooving tool for plunge and turn O.D. and face grooving operations.
- Delivers chip control over full range of DOC when turning.
- Delivers superior chip control in interrupted cuts.



① Recommended Starting Feed



Material Group		Cutting Speed – vc m/min														
		WU10HT			WU10PT			WU25PT			WP10CT			WP25CT		
		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	-	-	-	-	-	-



● first choice
○ alternate choice

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

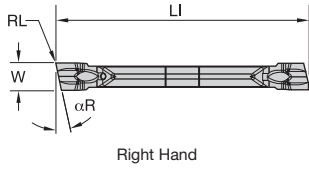
■ WMT-CM

Grooving and Cut-Off

catalogue number	seat size	W	RR	LI	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC015N00CM08	1	1,50	0,08	19,30	N - Neutral	●	●	○	○	○
WMTC020N00CM08	2	2,00	0,08	19,21	N - Neutral	●	●	○	○	○
WMTC094N00CM13	2B	2,39	0,13	22,32	N - Neutral	●	●	○	○	○
WMTC030N00CM17	3	3,00	0,17	25,40	N - Neutral	●	●	○	○	○
WMTC125N00CM17	3	3,17	0,17	25,41	N - Neutral	●	●	○	○	○
WMTC040N00CM17	4	4,00	0,17	25,40	N - Neutral	●	●	○	○	○
WMTC015L05CM08	1	1,50	0,08	19,31	L - Left	●	●	○	○	○
WMTC020L05CM08	2	1,99	0,08	19,21	L - Left	●	●	○	○	○
WMTC020L12CM08	2	2,00	0,08	19,25	L - Left	●	●	○	○	○
WMTC030L12CM17	3	3,00	0,17	25,40	L - Left	●	●	○	○	○
WMTC030L05CM17	3	3,00	0,17	25,40	L - Left	●	●	○	○	○
WMTC040L12CM17	4	4,00	0,17	25,40	L - Left	●	●	○	○	○
WMTC040L05CM17	4	4,00	0,17	25,40	L - Left	●	●	○	○	○

(continued)

(WMT-CM – continued)

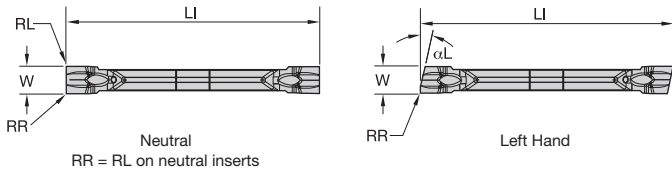


● first choice
○ alternate choice

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	●	●	○	○	○
WMTC015R05CM08	1	1,50	0,08	19,31	5	R - Right	●	●	○	○	○
WMTC020R05CM08	2	2,00	0,08	19,26	5	R - Right	●	●	○	○	○
WMTC020R12CM08	2	2,00	0,08	19,26	12	R - Right	●	●	○	○	○
WMTC094R12CM13	2B	2,39	0,13	22,28	12	R - Right	●	●	○	○	○
WMTC094R05CM13	2B	2,39	0,13	22,32	5	R - Right	●	●	○	○	○
WMTC030R05CM17	3	3,00	0,17	25,40	5	R - Right	●	●	○	○	○
WMTC030R12CM17	3	3,00	0,17	25,40	12	R - Right	●	●	○	○	○
WMTC125R05CM17	3	3,17	0,17	25,40	5	R - Right	●	●	○	○	○
WMTC125R12CM17	3	3,18	0,17	25,40	12	R - Right	●	●	○	○	○
WMTC040R12CM17	4	4,00	0,17	25,40	12	R - Right	●	●	○	○	○
WMTC040R05CM17	4	4,00	0,17	25,40	5	R - Right	●	●	○	○	○

Grooving and Cut-Off



● first choice
○ alternate choice

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

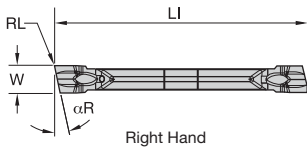
WMT-CM-W

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	■
WMTC020L12CMW08	2	2,00	0,08	19,27	L - Left	■	■	■	4169681	■
WMTC030L12CMW17	3	3,00	0,17	25,40	L - Left	■	■	■	4169691	■
WMTC030L05CMW17	3	3,00	0,17	25,40	L - Left	■	■	■	4169687	■

(continued)

Grooving and Cut-Off

(WMT-CM-W – continued)



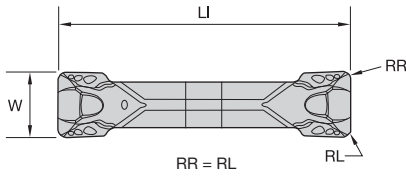
● first choice
○ alternate choice

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	●	●	○	○	○
WMTC020R12CMW08	2	2,00	0,08	19,27	12	R - Right	●	●	○	○	○
WMTC094R12CMW13	2B	2,39	0,13	22,29	12	R - Right	●	●	○	○	○
WMTC094R05CMW13	2B	2,39	0,13	22,32	5	R - Right	●	●	○	○	○
WMTC030R05CMW17	3	3,00	0,17	25,40	5	R - Right	●	●	○	○	○
WMTC030R12CMW17	3	3,00	0,17	25,40	12	R - Right	●	●	○	○	○
WMTC125R05CMW17	3	3,17	0,17	25,41	5	R - Right	●	●	○	○	○
WMTC125R12CMW17	3	3,17	0,17	25,41	12	R - Right	●	●	○	○	○



Grooving and Cut-Off



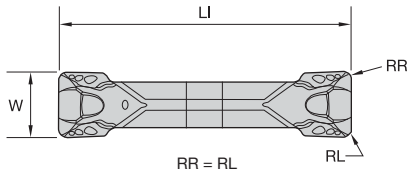
● first choice
○ alternate choice

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

WMT-U-PT • Moulded

Grooving and Cut-Off

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

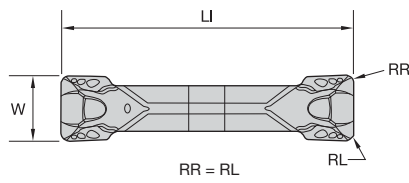
P	●	●	○	○	
M	●	●	○	○	
K	●	●	○	○	
N	●	●	○	○	
S	●	●	○	○	
H	○	○	○	○	

■ **WMT-P-PT • Precision**

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS200M2P02PT	2	2,00	0,15	19,10	•	•	○	○	
WMTS094I2BP02PT	2B	2,38	0,15	22,15	•	•	○	○	
WMTS094I2BP04PT	2B	2,38	0,38	22,14	•	•	○	○	
WMTS300M3P03PH	3	3,00	0,30	25,65	•	•	○	○	
WMTS300M3P03PT	3	3,00	0,31	25,65	•	•	○	○	
WMTS300M3P06PH	3	3,00	0,60	25,65	•	•	○	○	
WMTS300M3P06PT	3	3,00	0,61	25,65	•	•	○	○	
WMTS125I3P03PT	3	3,17	0,23	25,40	•	•	○	○	
WMTS125I3P08PT	3	3,17	0,76	25,40	•	•	○	○	
WMTS125I3P03PH	3	3,18	0,25	25,40	•	•	○	○	
WMTS125I3P08PH	3	3,18	0,75	25,40	•	•	○	○	
WMTS156I4P03PH	4	3,95	0,30	25,40	•	•	○	○	
WMTS156I4P08PH	4	3,96	0,75	25,40	•	•	○	○	
WMTS400M4P03PH	4	4,00	0,30	25,40	•	•	○	○	
WMTS400M4P03PT	4	4,00	0,31	25,40	•	•	○	○	
WMTS400M4P06PH	4	4,00	0,60	25,40	•	•	○	○	



(WMT-P-PT • Precision — continued)



● first choice
○ alternate choice

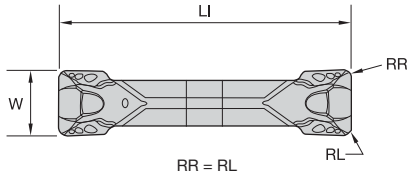
P	●	●	○	○
M	●	●	○	○
K	●	●	○	○
N	●	●	○	○
S	●	●	○	○
H	○	○	○	○

Grooving and Cut-Off

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS400M4P06PT	4	4,00	0,60	25,40	●	●	○	○	○
WMTS188I5P03PT	5	4,76	0,26	28,63	●	●	○	○	○
WMTS188I5P03PH	5	4,77	0,25	28,63	●	●	○	○	○
WMTS188I5P08PH	5	4,77	0,75	28,63	●	●	○	○	○
WMTS188I5P08PT	5	4,77	0,76	28,63	●	●	○	○	○
WMTS500M5P03PH	5	5,00	0,30	28,63	●	●	○	○	○
WMTS500M5P03PT	5	5,00	0,30	28,63	●	●	○	○	○
WMTS500M5P06PH	5	5,00	0,60	28,63	●	●	○	○	○
WMTS500M5P06PT	5	5,00	0,61	28,63	●	●	○	○	○
WMTS600M6P03PH	6	6,00	0,30	28,63	●	●	○	○	○
WMTS600M6P03PT	6	6,00	0,30	28,63	●	●	○	○	○
WMTS600M6P06PT	6	6,00	0,58	28,63	●	●	○	○	○
WMTS600M6P06PH	6	6,00	0,60	28,63	●	●	○	○	○
WMTS250I6P08PH	6	6,32	0,75	28,63	●	●	○	○	○

(continued)

(WMT-P-PT • Precision — continued)



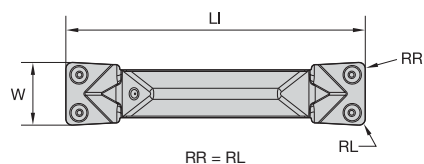
● first choice
○ alternate choice

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	●	●	○	○	○
WMTS250I6P03PH	6	6,35	0,25	28,63	●	●	○	○	○
WMTS250I6P03PT	6	6,35	0,25	28,63	●	●	○	○	○
WMTS312I8P03PH	8	7,92	0,25	28,57	●	●	○	○	○
WMTS312I8P08PH	8	7,92	0,75	28,57	●	●	○	○	○
WMTS800M8P03PH	8	8,00	0,30	28,57	●	●	○	○	○
WMTS800M8P06PH	8	8,00	0,60	28,57	●	●	○	○	○
WMTS800M8P06PT	8	8,00	0,61	28,57	●	●	○	○	○
WMTS800M8P15PT	8	8,00	1,50	28,57	●	●	○	○	○



Grooving and Cut-Off



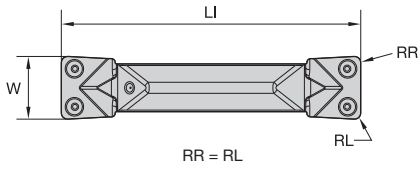
● first choice
○ alternate choice

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

■ **WMT-U-PH • Moulded**

Grooving and Cut-Off

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS305M3U03PH	3	3,05	0,30	25,81	●	●	○	○	○
WMTS305M3U06PH	3	3,05	0,60	25,81	●	●	○	○	○
WMTS405M4U03PH	4	4,05	0,30	25,53	●	●	○	○	○
WMTS405M4U06PH	4	4,05	0,60	25,53	●	●	○	○	○
WMTS505M5U03PH	5	5,05	0,30	28,76	●	●	○	○	○
WMTS505M5U06PH	5	5,05	0,60	28,76	●	●	○	○	○
WMTS605M6U03PH	6	6,05	0,30	28,76	●	●	○	○	○
WMTS605M6U06PH	6	6,05	0,60	28,76	●	●	○	○	○
WMTS805M8U03PH	8	8,05	0,30	28,70	●	●	○	○	○
WMTS805M8U06PH	8	8,05	0,60	28,70	●	●	○	○	○



● first choice
○ alternate choice

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

■ WMT-P-PH • Precision

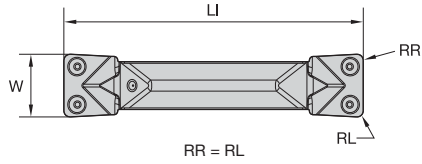
catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS300M3P03PH	3	3,00	0,30	25,65	●	●	○	○	○
WMTS300M3P06PH	3	3,00	0,60	25,65	●	●	○	○	○
WMTS125I3P03PH	3	3,18	0,25	25,40	●	●	○	○	○
WMTS125I3P08PH	3	3,18	0,75	25,40	●	●	○	○	○
WMTS156I4P03PH	4	3,95	0,30	25,40	●	●	○	○	○
WMTS156I4P08PH	4	3,96	0,75	25,40	●	●	○	○	○
WMTS400M4P03PH	4	4,00	0,30	25,40	●	●	○	○	○
WMTS400M4P06PH	4	4,00	0,60	25,40	●	●	○	○	○
WMTS188I5P03PH	5	4,77	0,25	28,63	●	●	○	○	○
WMTS188I5P08PH	5	4,77	0,75	28,63	●	●	○	○	○

(continued)



Grooving and Cut-Off

(WMT-P-PH • Precision — continued)

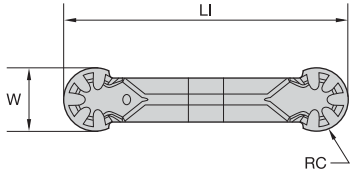


● first choice
○ alternate choice

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

Grooving and Cut-Off

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS500M5P03PH	5	5,00	0,30	28,63	●	●	○	○	○
WMTS500M5P06PH	5	5,00	0,60	28,63	●	●	○	○	○
WMTS600M6P03PH	6	6,00	0,30	28,63	●	●	○	○	○
WMTS600M6P06PH	6	6,00	0,60	28,63	●	●	○	○	○
WMTS250I6P08PH	6	6,32	0,75	28,63	●	●	○	○	○
WMTS250I6P03PH	6	6,35	0,25	28,63	●	●	○	○	○
WMTS312I8P03PH	8	7,92	0,25	28,57	●	●	○	○	○
WMTS312I8P08PH	8	7,92	0,75	28,57	●	●	○	○	○
WMTS800M8P03PH	8	8,00	0,30	28,57	●	●	○	○	○
WMTS800M8P06PH	8	8,00	0,60	28,57	●	●	○	○	○



● first choice
○ alternate choice

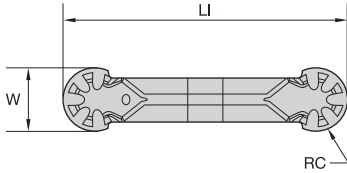
P	●	●	○	○
M	●	●	○	○
K	●	●	○	○
N	●	●	●	●
S	●	●	●	●
H	○	○	○	○

■ **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	4170174	4170172	4170173	4170173
WMTR405M4UPC	4	4,05	2,03	25,58	4170179	4170179	4170177	4170178	4170178
WMTR505M5UPC	5	5,05	2,53	29,01	4170184	4170184	4170182	4170183	4170183
WMTR605M6UPC	6	6,05	3,03	28,77	4170189	4170189	4170187	4170188	4170188
WMTR805M8UPC	8	8,05	4,03	29,22	4170194	4170194	4170192	4170193	4170193



Grooving and Cut-Off



● first choice
○ alternate choice

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

■ WMT-P-PC • Precision

Grooving and Cut-Off

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

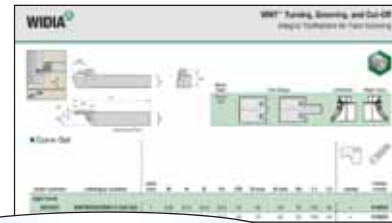
A method of selecting cutting tools from a tree structure via a hierarchy or parametric search:

- 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

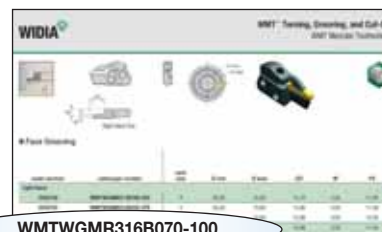
Our WMT toolholders now have a smart new naming system. Here are some examples of the improved nomenclature for our WMT Toolholders.



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	



WMTWGM316B070-100

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	



WGMSR2525

Modular Toolholders

WGM

Tooling System

MDG = Modular Deep Grooving

WGM = Modular Serrated Locking System

S

Tool Style

S = Straight

E = End mount

R

Hand

R = Right hand

L = Left hand

2525

Shank Size

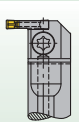


A25RWMTER0316M

Integral Boring Bars

A

Steel Bar with Coolant



25

Bar Diameter



metric bars:
Bar diameter in millimetres



metric bars:	inch bars:
R = 200mm	R = 8"
S = 250mm	S = 10"
T = 300mm	T = 12"

inch bars:
A two-digit number which indicates the bar diameter in 1/16" increments.

WMT

WMT™ Groove and Turn System



E = End mounted (90°)

E

Tool Style

R

Hand

R = Right hand

L = Left hand

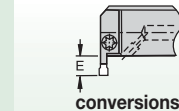
03

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:

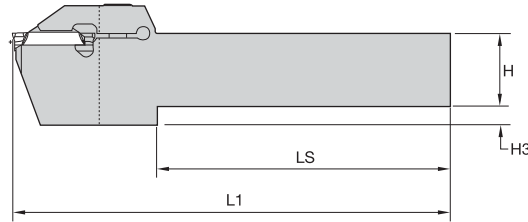
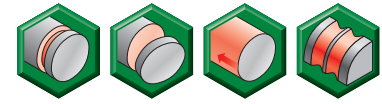
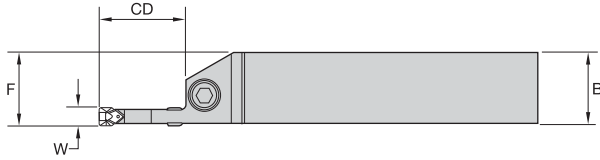
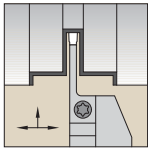
mm	inch
7mm	.28"
10mm	.39"
12mm	.47"
16mm	.63"

M

Tool Units

N = Inch

M = Metric

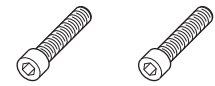


Right Hand Tool

Grooving and Cut-Off

■ O.D. Grooving and Cut-Off

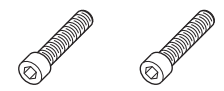
order number	catalogue number	seat size	W	H	B	CD	F	H3	L1	LS	clamp screw	clamp screw
right hand												
3650516	WMTSR2525M116	1	1,50	25,0	25,0	17	25,0	—	150	116	606249	—
3650456	WMTSR1616K216	2	2,00	16,0	16,0	17	16,0	6	125	101	606249	—
3650458	WMTSR2020K216	2	2,00	20,0	20,0	17	20,0	—	125	92	606249	—
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



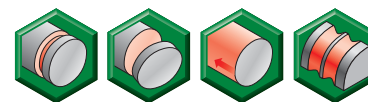
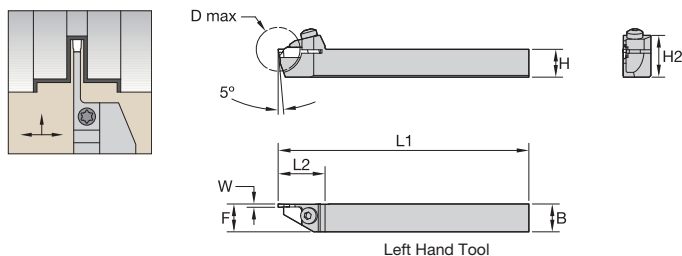
(continued)

(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



Grooving and Cut-Off



■ **Swiss Grooving and Cut-Off • Metric**

Grooving and Cut-Off

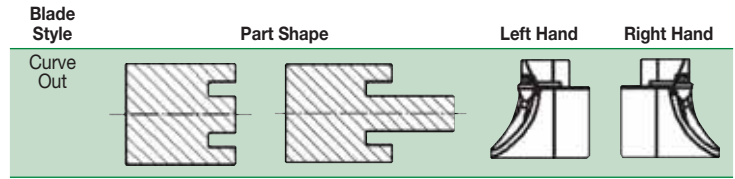
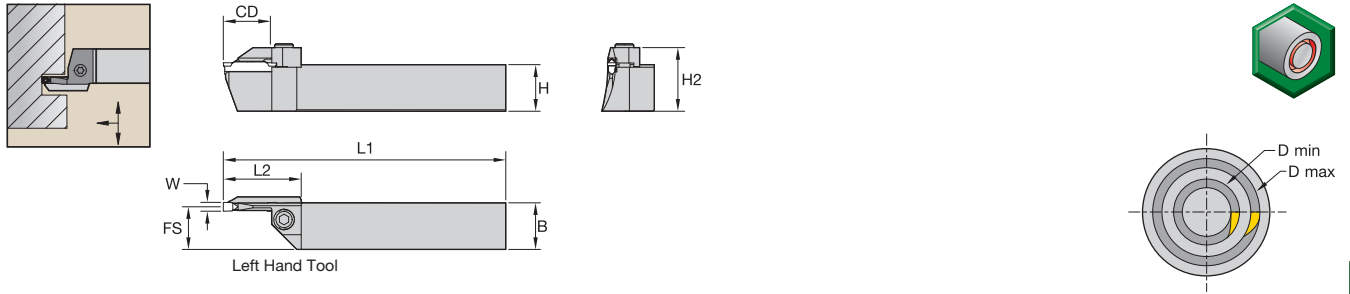
order number	catalogue number	seat size	W	H	B	F	D max	H2	L1	L2	clamp screw
right hand											
3650508	WMTCR1010H110	1	1,50	10,0	10,0	10,0	20	16	100	21	606249
3650510	WMTCR1212H110	1	1,50	12,0	12,0	12,0	20	18	100	21	606249
3650512	WMTCR1616K113	1	1,50	16,0	15,9	16,0	26	24	125	24	606266
3650514	WMTCR2020K113	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.

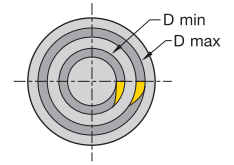
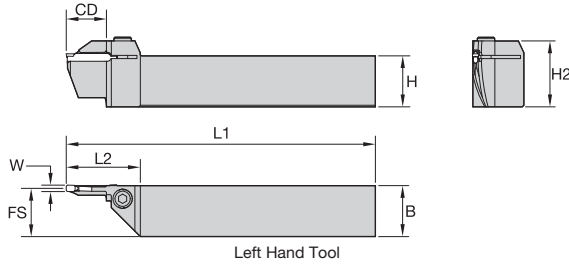
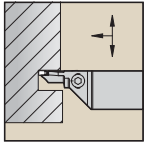
Insert Width	Lead Angle	Old Manchester Catalogue Number	Old Manchester Grade	WMT Cut-Off Insert	WMT Insert Grade	WIDIA™ Order Number
1,5mm	Neutral	583-165	M443B	WMTC015N00CM08	WU25PT	4169668
1,5mm	Right - 5°	583-166	M443B	WMTC015R05CM08	WU25PT	4169670
1,5mm	Right - 12°	583-168	M443B	WMTC015R12CM08	WU25PT	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	WMTC200M2P02PT	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



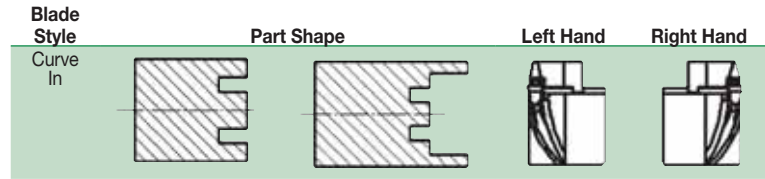
■ **Curve Out**

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.

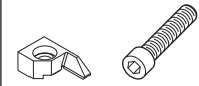


Grooving and Cut-Off

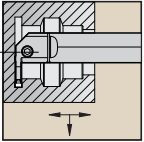


■ Curve In

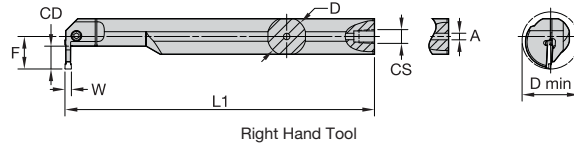
order number	catalogue number	seat size	W	H	B	FS	CD	D max	D min	H2	L1	L2	clamp	clamp screw
right hand														
3634282	WMTAR2525M316-070-100	3	3,00	24,8	24,8	23,5	16	100	70	32	150	34	—	MS326
3634284	WMTAR2525M319-100-205	3	3,00	24,8	24,8	23,5	19	205	100	32	150	37	—	MS326
3634290	WMTAR2525M619-070-100	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.



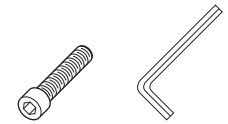
Steel shank with through coolant.

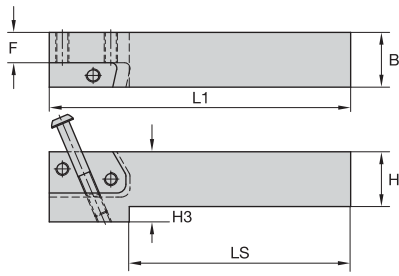
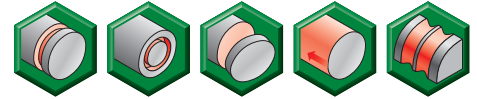
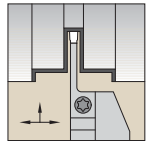


Grooving and Cut-Off

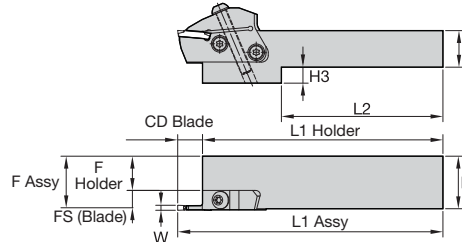
■ I.D. Boring Bars

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



$$F \text{ Assy} = F (\text{Holder}) + FS (\text{Blade}) + W/2$$

$$L1 \text{ Assy} = L1 (\text{Holder}) + CD (\text{Blade})$$



Grooving and Cut-Off

■ 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.

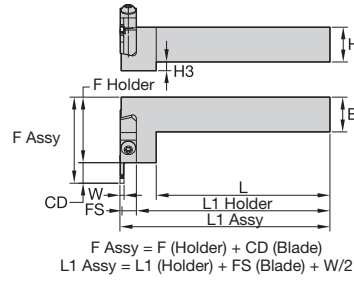
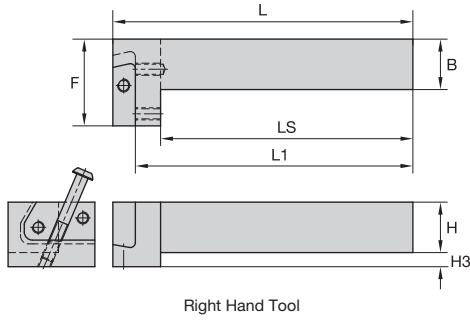
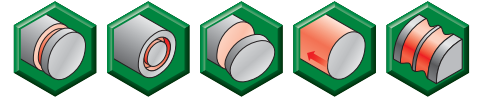
Toolholder Style	Hand of Holder	Hand of Blade
WGMS – Straight Mount	Right	Right
	Left	Left
WGME – End Mount	Right	Left
	Left	Right



Grooving and Cut-Off Blades found on page D38.



Face Grooving Blades found on page D39.



Grooving and Cut-Off

■ End Mount • Grooving, Cut-Off, and Face Grooving

order number	catalogue number	H	B	L	L1	LS	F	H3
right hand								
5514979	WGMR2525	25	25	150,3	139,3	125,25	42,75	9
5515021	WGMR3232	32	32	170,3	159,3	145,25	42,75	—
left hand								
5514978	WGME2525	25	25	150,3	139,3	125,25	42,75	9
5515020	WGME3232	32	32	170,3	159,3	145,25	42,75	—

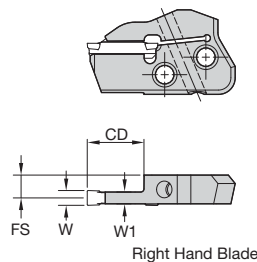
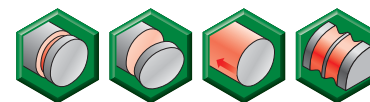
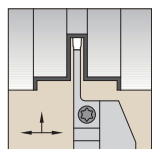
Toolholder Style	Hand of Holder	Hand of Blade
WGMS – Straight Mount	Right	Right
	Left	Left
WGME – End Mount	Right	Left
	Left	Right



Grooving and Cut-Off Blades found on page D38.



Face Grooving Blades found on page D39.



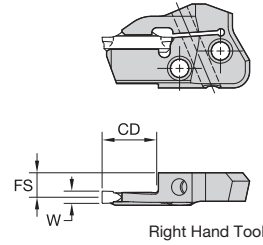
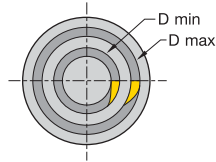
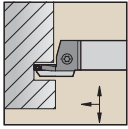
Grooving and Cut-Off

■ 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

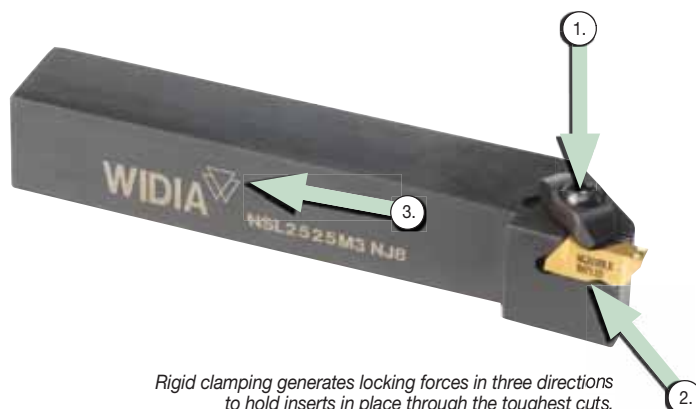


WIDIA has set the industry standard for threading and grooving productivity with the TopGroove clamping design. The TopGroove design provides consistent tool performance, accurate indexing, and superior clamping to provide excellent surface finish and outstanding tool life.

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.

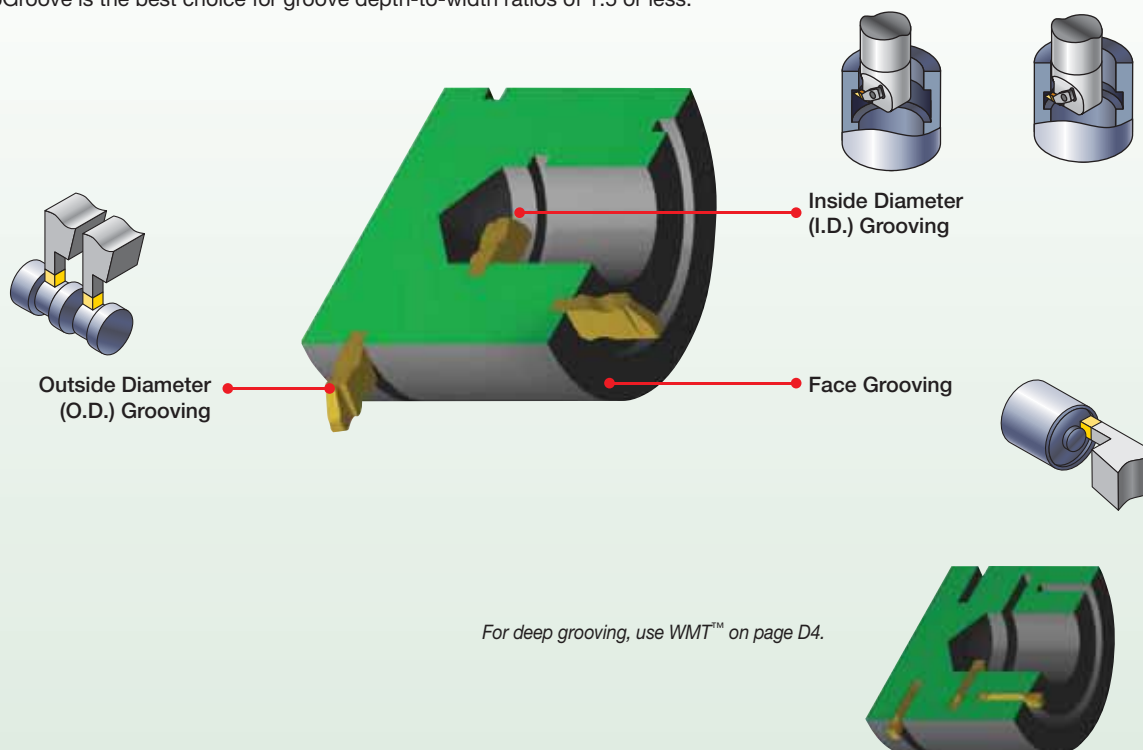
What you need to know:

- 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.



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

order number	catalogue number	C		F	L1	L2	B4	CD	A	gage insert	clamp	clamp screw	clamp screw	hex/Torx Plus
		H	B											
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 D74–D76	—
		I.D. Grooving	pages D78–D79	—

4 Select chipbreaker style for the application:


See application guide on page D48 for a complete list of insert styles.


NOTE: Chart shows recommended starting feed rates.

See page D49.

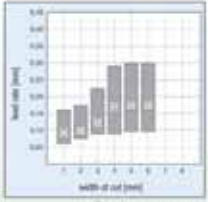
WIDIA
TopGroove™
Feed Values for Grooving Inserts

TopGroove • NG -K, NG-1L, and NG


NG-K



NG


- 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.



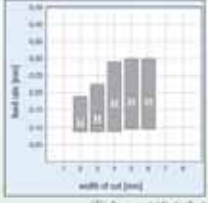
Recommended Starting Feed

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.



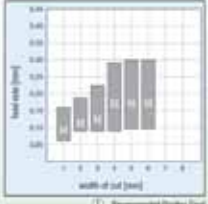
Recommended Starting Feed

TopGroove • NR and NR-K


NR


NR-K

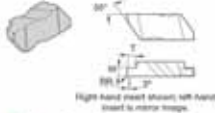
- For full radius grooving and turning profiling applications.
- Chip geometry for excellent chip control.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.



Recommended Starting Feed

- 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 with feed
insert to rotate image.

■ NG • Grooving Inserts

catalogue number	insert size	A		T	
		W	RR		
NG201R	2	0.79	0.08	1.27	3607123 3607123 3607123 3607123 3607123
NG204R	2	1.04	0.08	1.27	3607124 3607124 3607124 3607124 3607124
NG3047R	3	1.19	0.19	1.91	3607021 3607021 3607021 3607021 3607021
NG206R	2	1.47	0.19	1.27	3607022 3607022 3607022 3607022 3607022
NG3062R	3	1.68	0.19	2.26	3607023 3607023 3607023 3607023 3607023
NG2062R	2	1.55	0.19	2.79	3607024 3607024 3607024 3607024 3607024
NG3094R	3	2.29	0.19	3.81	3607025 3607025 3607025 3607025 3607025

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 D47 for Grades and Grade Descriptions.

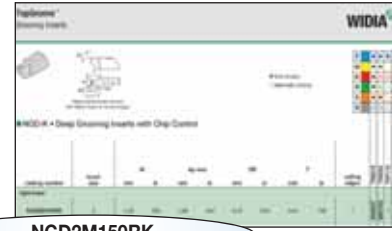
6 Determine cutting data:

- A Based on material group and grade, identify starting speed (vc).
- B First choice starting speed is in bold.

See page D50 for cutting data.

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	148	150	200	215	230	90	85	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	100	140	170	100	125	145	105	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	--	--	--	90	75	90
	2	55	70	90	40	50	55	--	--	--	50	60	75
	3	60	80	95	40	60	80	--	--	--	40	60	55
K	1	120	150	180	60	80	90	175	220	275	70	90	100
	2	120	150	180	60	75	85	185	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	560	700	850	560	700	850	--	--	--	150	200	250
S	1	35	40	50	25	35	40	--	--	--	25	35	45
	2	20	30	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														
<p>N – TopGroove</p>	<p>B – Blank (for special forms)</p> <p>F – Face grooving</p> <p>G – Grooving</p> <p>P – Back turning</p> <p>R – Full radius</p> <p>U – Undercutting (or relieving)</p> <p>V – Poly-Vee</p>	<p>D – Deep grooving</p> <p>P – Positive</p> <p>C – Groove and chamfer</p>	<p>2 – Insert Size</p> <table border="1"> <thead> <tr> <th>insert number</th> <th>W1 mm</th> </tr> </thead> <tbody> <tr><td>1</td><td>2,54</td></tr> <tr><td>2</td><td>3,81</td></tr> <tr><td>3</td><td>4,95</td></tr> <tr><td>4</td><td>6,98</td></tr> <tr><td>5</td><td>9,65</td></tr> <tr><td>6</td><td>9,73</td></tr> </tbody> </table>	insert number	W1 mm	1	2,54	2	3,81	3	4,95	4	6,98	5	9,65	6	9,73	<p>M – Metric insert groove width</p> <p>C – Circlip groove insert width is nominal circlip size</p> <p>Blank – Indicates inch width insert</p>	<p>150 – Groove Size**</p>	<p>L – Left hand</p> <p>R – Right hand</p>	<p>Shown for groove and chamfer inserts in 0,01mm increments.</p>	<p>K – Standard chip control</p> <p>E – Hone only</p>	<p>Groove size</p> <p>J or L – Poly-Vee inserts</p> <p>I – Internal face grooving</p>
insert number	W1 mm																						
1	2,54																						
2	3,81																						
3	4,95																						
4	6,98																						
5	9,65																						
6	9,73																						

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.

**Omit position for TopGroove NB-style blanks.

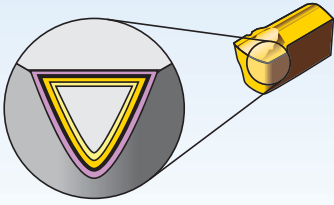
TopGroove/TopThread Threading and Grooving Insert Dimensions

insert size	S		W1	
	mm	inch	mm	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

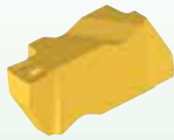
Grade	Coating	Grade Description		wear resistance																			
				05	10	15	20	25	30	35	40	45											
TN6010	HC-S10	An advanced PVD TiAlN coating over a very deformation-resistant unalloyed carbide substrate. TN6010 is ideal for finishing to general machining of most workpiece materials at higher 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 ₂ O ₃ -TiN. Very wear resistant. Light and medium machining. For steels and nodular cast iron.	P																				
			M																				
			K																				
			N																				
			S																				
			H																				
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																				



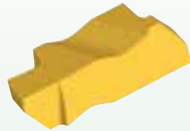
insert style	application	rake angle	page(s)	insert style	application	rake angle	page(s)
NG 	<ul style="list-style-type: none"> • General-purpose grooving. • O-ring grooving. • Circlip grooving. 	neutral	D51–D52	NFD-KI* 	<ul style="list-style-type: none"> • Internal deep face grooving with chip control. • For use in boring bars for internal face grooves. 	10° positive	–
NG-K 	<ul style="list-style-type: none"> • Chip control geometry. • General-purpose grooving. • O-ring grooving. • Circlip grooving. • Light turning. 	10° positive	D53–D59	NP-K 	<ul style="list-style-type: none"> • Turning. • Back turning positive. • Profiling with chip control. 	10° positive	D66
NGC-K* 	<ul style="list-style-type: none"> • Combined groove and chamfered edge break in one positive plunge with chip control. • Designed for DIN 471/472 standard circlip grooves. 	10° positive	–	NR 	<ul style="list-style-type: none"> • Full radius grooving. • Turning and profiling. 	neutral	D67–D69
NGD* 	<ul style="list-style-type: none"> • Deep grooving. 	neutral	–	NR-K 	<ul style="list-style-type: none"> • Chip control geometry. • Full radius grooving, turning, and profiling. 	10° positive	D70
NGD-K 	<ul style="list-style-type: none"> • Chip control geometry. • Deep grooving. • Light turning. 	10° positive	D60–D62	NRD 	<ul style="list-style-type: none"> • Deep grooving. • Full radius end-form. 	neutral	D71
NGP 	<ul style="list-style-type: none"> • General-purpose grooving. • O-ring grooving. • Circlip grooving. 	5° positive	D63–D64	NRP* 	<ul style="list-style-type: none"> • Full radius grooving. • Light-turning profiling. 	5° positive	–
NF* 	<ul style="list-style-type: none"> • Face grooving. • Additional side clearance. 	neutral	–	NU* 	<ul style="list-style-type: none"> • Undercutting. 	neutral	–
NF-K 	<ul style="list-style-type: none"> • Face grooving with chip control. • Additional side clearance. 	10° positive	D65	NV* 	<ul style="list-style-type: none"> • Poly-Vee grooving. 	neutral	–
NFD-K 	<ul style="list-style-type: none"> • Deep face grooving with chip control. • Additional side clearance. 	10° positive	D66	NB/NBD 	<ul style="list-style-type: none"> • Blanks. • Blanks for deep grooving. • Available in uncoated grades only. 	–	D72

*Inserts are available as custom solutions.

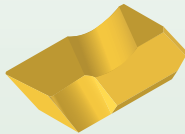
TopGroove • NG -K, NG-1L, and NG



NG-K

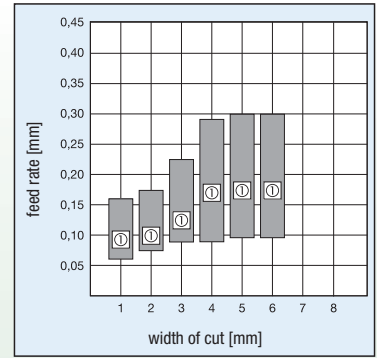


NG



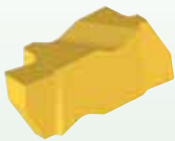
NG-1L

- 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.

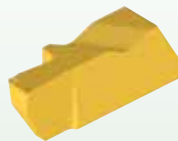


① Recommended Starting Feed

TopGroove • NGP and NGD-K

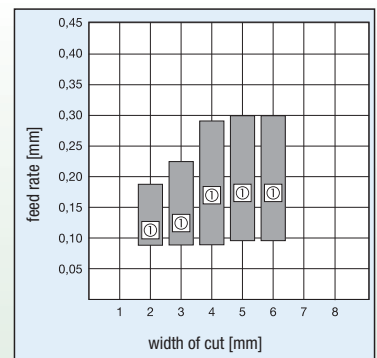


NGP



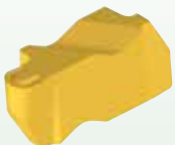
NGD-K

- 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.

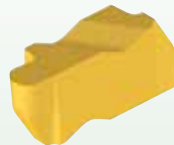


① Recommended Starting Feed

TopGroove • NR and NR-K

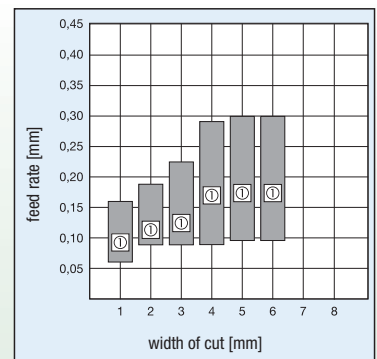


NR



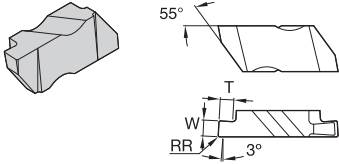
NR-K

- 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

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

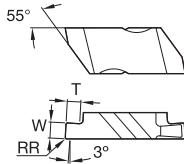
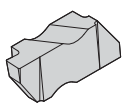
■ **NG • Grooving Inserts**

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	■	■
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)



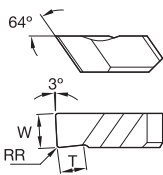
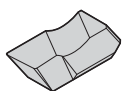
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

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

Grooving and Cut-Off

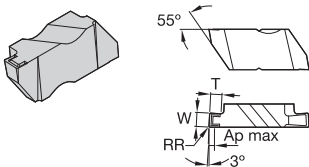
catalogue number	insert size	W	RR	T	TN6010	TN6025	TN7110	THM
NG3094L	3	2,39	0,19	3,81	3607160	3607323	—	—
NG3125L	3	3,18	0,19	3,81	3607152	3607445	—	3607022
NG5M500L	5	5,00	0,32	9,52	—	3636572	—	—
NG4250L	4	6,35	0,57	6,35	3607175	3607513	—	—



■ 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

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

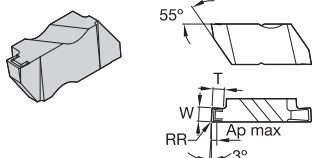
■ **NG-K • Grooving Inserts with Chip Control**

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	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	3607234	●	●
NG3M150RK	3	1,50	1,02	0,19	2,39	3607221	3607221	●	●
NG2062RK	2	1,58	1,09	0,19	2,79	3607089	3607215	●	●
NG3062RK	3	1,58	1,02	0,19	2,39	3607055	3607070	●	●
NG2M170RK	2	1,70	1,09	0,19	2,79	3606673	3607242	●	●

(continued)



(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

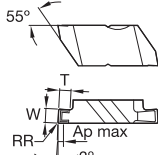
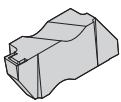
P		●	●	●	●
M		●	●	○	○
K		●	○	○	○
N		●	○	○	●
S		●	●	○	●
H		○	○	○	○

Grooving and Cut-Off

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG2M175RK	2	1,75	1,09	0,19	2,79	●	●	●	●
NG3M175RK	3	1,75	1,02	0,19	2,39	●	●	○	○
NG3072RK	3	1,83	1,02	0,19	2,39	●	●	○	○
NG2M195RK	2	1,95	1,09	0,19	2,79	●	●	○	○
NG3078RK	3	1,98	1,02	0,19	2,39	●	●	○	○
NG2M200RK	2	2,00	1,09	0,19	2,79	●	●	○	○
NG3M200RK	3	2,00	1,02	0,19	2,39	●	●	○	○
NG2M220RK	2	2,20	1,09	0,19	2,79	●	●	○	○
NG3M220RK	3	2,20	1,02	0,19	2,39	●	●	○	○
NG3M225RK	3	2,24	1,02	0,19	2,39	●	●	○	○
NG2M225RK	2	2,25	1,09	0,19	2,79	●	●	○	○
NG2094RK	2	2,39	1,09	0,19	2,79	●	●	○	○
NG3094RK	3	2,39	1,02	0,19	3,81	●	●	○	○
NG2M250RK	2	2,50	1,09	0,19	2,79	●	●	○	○
NG3M250RK	3	2,50	1,02	0,19	3,81	●	●	○	○
NG2M275RK	2	2,75	1,09	0,19	2,79	●	●	○	○

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

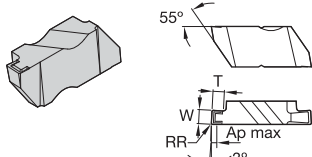
● first choice
○ alternate choice

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	○	○
NG4M300RK	4	3,00	1,02	0,19	3,81	3607388	3607655	○	○
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	3607365	○	○
NG2M325RK	2	3,25	1,09	0,19	2,79	3607533	3607533	○	○
NG3M325RK	3	3,25	1,02	0,19	3,81	3607515	3607515	○	○
NG3M350RK	3	3,50	2,92	0,32	3,81	3607302	3607302	○	○
NG4M350RK	4	3,50	2,92	0,57	6,35	3607370	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	3607517	3607517	○	○



(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

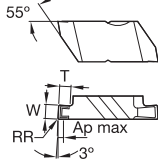
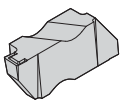
P	●	●	●	●	●
M	●	●	●	○	○
K	●	○	○	○	○
N	●	○	○	○	○
S	●	●	○	○	○
H	○	○	○	○	○

Grooving and Cut-Off

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG3M450RK	3	4,50	2,92	0,32	3,81	●	●	●	●
NG4M450RK	4	4,50	2,92	0,57	6,35	●	●	●	●
NG3189RK	3	4,80	2,92	0,57	3,81	●	●	●	●
NG4189RK	4	4,80	2,92	0,57	6,35	●	●	●	●
NG4M500RK	4	5,00	2,92	0,32	6,35	●	●	●	●
NG4M550RK	4	5,50	3,81	0,57	6,35	●	●	●	●
NG4M600RK	4	6,00	3,81	0,57	6,35	●	●	●	●
NG4250RK	4	6,35	3,81	0,57	6,35	●	●	●	●
left hand									
NG2M050LK	2	0,50	0,64	0,09	0,64	●	●	●	●
NG2031LK	2	0,79	0,76	0,09	1,27	●	●	●	●
NG2M080LK	2	0,80	0,76	0,09	1,27	●	●	●	●
NG2M100LK	2	1,00	0,76	0,09	1,27	●	●	●	●
NG3M100LK	3	1,00	0,76	0,19	1,91	●	●	●	●
NG2047LK	2	1,19	0,76	0,09	1,27	●	●	●	●
NG3047LK	3	1,19	0,76	0,19	1,91	●	●	●	●

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

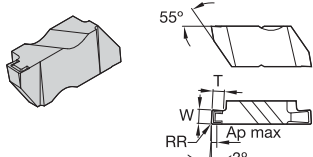
● first choice
○ alternate choice

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	●	●	○	○
NG3M120LK	3	1,20	0,76	0,19	1,91	●	○	○	○
NG2M140LK	2	1,40	0,76	0,09	1,27	●	○	○	○
NG2M150LK	2	1,50	1,09	0,19	2,79	○	○	○	○
NG3M150LK	3	1,50	1,02	0,19	2,39	○	○	○	○
NG2062LK	2	1,58	1,09	0,19	2,79	●	○	○	○
NG3062LK	3	1,58	1,02	0,19	2,39	●	○	○	○
NG2M170LK	2	1,70	1,09	0,19	2,79	●	○	○	○
NG2M175LK	2	1,75	1,09	0,19	2,79	○	○	○	○
NG3M175LK	3	1,75	1,02	0,19	2,39	○	○	○	○
NG3072LK	3	1,83	1,02	0,19	2,39	●	○	○	○
NG2M195LK	2	1,95	1,09	0,19	2,79	●	○	○	○
NG3078LK	3	1,98	1,02	0,19	2,39	●	○	○	○
NG2M200LK	2	2,00	1,09	0,19	2,79	●	○	○	○
NG3M200LK	3	2,00	1,02	0,19	2,39	○	○	○	○
NG2M220LK	2	2,20	1,09	0,19	2,79	○	○	○	○



(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

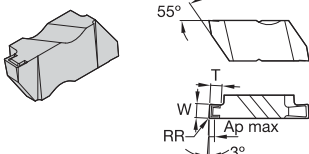
P		●	●	●	○
M		●	●	○	○
K		●	○	○	○
N		●	○	○	●
S		●	●	○	●
H		○	○	○	○

Grooving and Cut-Off

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG3M220LK	3	2,20	1,02	0,19	2,39	●	●	○	○
NG3M225LK	3	2,24	1,02	0,19	2,39	●	●	○	○
NG2M225LK	2	2,25	1,09	0,19	2,79	●	●	○	○
NG2094LK	2	2,39	1,09	0,19	2,79	●	●	○	○
NG3094LK	3	2,39	1,02	0,19	3,81	●	●	○	○
NG2M250LK	2	2,50	1,09	0,19	2,79	●	●	○	○
NG3M250LK	3	2,50	1,02	0,19	3,81	●	●	○	○
NG2M275LK	2	2,75	1,09	0,19	2,79	●	●	○	○
NG3M275LK	3	2,75	1,02	0,19	3,81	●	●	○	○
NG2M300LK	2	3,00	1,09	0,19	2,79	●	●	○	○
NG3M300LK	3	3,00	1,02	0,19	3,81	●	●	○	○
NG4M300LK	4	3,00	1,02	0,19	3,81	●	●	○	○
NG2125LK	2	3,18	1,09	0,19	2,79	●	●	○	○
NG3125LK	3	3,18	1,02	0,19	3,81	●	●	○	○
NG4125LK	4	3,18	1,06	0,19	3,81	●	●	○	○
NG3M320LK	3	3,20	1,02	0,19	3,81	●	●	○	○

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

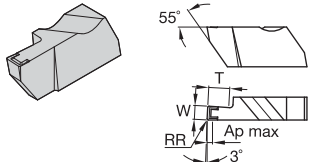
● first choice
○ alternate choice

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	●	●	○	○
NG3M325LK	3	3,25	1,02	0,19	3,81	●	●	○	○
NG3M350LK	3	3,50	2,92	0,32	3,81	●	●	○	○
NG4M350LK	4	3,50	2,92	0,57	6,35	●	●	○	○
NG3156LK	3	3,96	2,92	0,19	3,81	●	●	○	○
NG3M400LK	3	3,99	2,92	0,32	3,81	●	●	○	○
NG4M400LK	4	4,00	2,92	0,57	6,35	●	●	○	○
NG3M425LK	3	4,24	2,92	0,32	3,81	●	●	○	○
NG3M450LK	3	4,50	2,92	0,32	3,81	●	●	○	○
NG4M450LK	4	4,50	2,92	0,57	6,35	●	●	○	○
NG3189LK	3	4,80	2,92	0,57	3,81	●	●	○	○
NG4189LK	4	4,80	2,92	0,57	6,35	●	●	○	○
NG4M500LK	4	5,00	2,92	0,32	6,34	●	●	○	○
NG4M550LK	4	5,50	3,81	0,57	6,35	●	●	○	○
NG4M600LK	4	6,00	3,81	0,57	6,35	●	●	○	○
NG4250LK	4	6,35	3,81	0,57	6,35	●	●	○	○



Grooving and Cut-Off



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

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

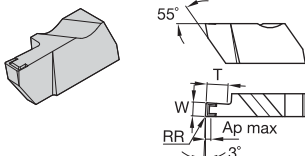
■ NGD-K • Deep Grooving Inserts with Chip Control

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	3607427	●	●
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	3607508	●	●
NGD3189RK	3	4,80	2,92	0,57	6,35	1	3607170	3607373	●	●

(continued)

Grooving and Cut-Off

(NGD-K • Deep Grooving Inserts with Chip Control – continued)



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

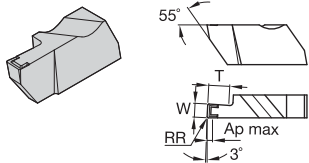
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M	●	●	●	○	○
K	●	○	○	○	○
N	●	○	○	●	●
S	●	●	●	●	●
H	○	○	○	○	○

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)



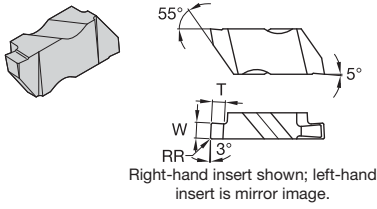
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice







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

Grooving and Cut-Off

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	○	○



● first choice
○ alternate choice

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

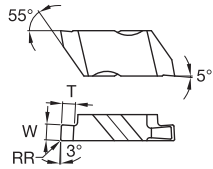
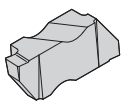
■ **NGP • Grooving Positive Rake Inserts**

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)



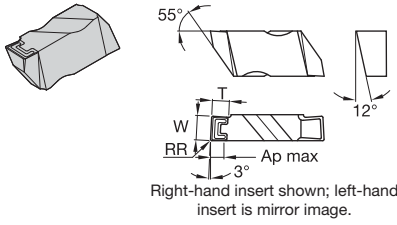
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

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

Grooving and Cut-Off

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



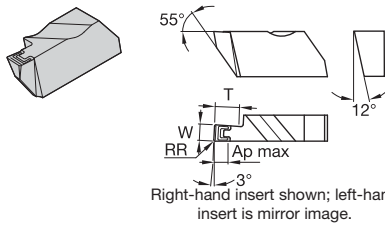
● first choice
○ alternate choice

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	●	●	○	○
NF3M300RK	3	3,00	1,02	0,19	3,81	●	●	○	○
NF3125RK	3	3,18	1,02	0,19	3,81	●	●	○	○
left hand									
NF3M200LK	3	2,00	1,02	0,19	1,78	○	○	●	●
NF3M300LK	3	3,00	1,02	0,19	3,81	○	○	●	●
NF3125LK	3	3,18	1,02	0,19	3,81	○	○	●	●
NF3156LK	3	3,96	2,92	0,19	3,81	○	○	●	●





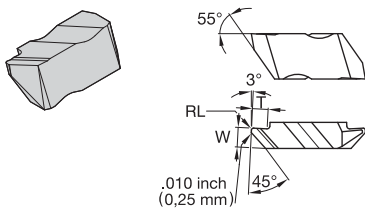
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

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	●	●	○	○
NFD3125RK	3	3,18	1,02	0,19	6,35	1	●	●	○	○
NFD4189RK	4	4,80	2,92	0,57	9,53	1	●	●	○	○
NFD4250RK	4	6,35	3,81	0,57	12,70	1	●	●	○	○
left hand										
NFD3M300LK	3	3,00	1,02	0,19	6,35	1	○	○	●	●
NFD3125LK	3	3,18	1,02	0,19	6,35	1	○	○	●	●
NFD4189LK	4	4,80	2,92	0,57	9,53	1	○	○	●	●

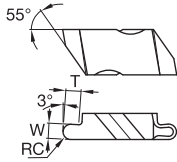
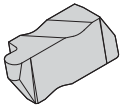


Right-hand insert shown; left-hand insert is mirror image.

■ 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	●	●	○	○
NP3002RK	3	4,83	0,25	5,08	●	●	○	○
NP3012RK	3	4,83	0,25	5,08	○	○	●	●

NOTE: Width tolerance is +/- 0,13mm.



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

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

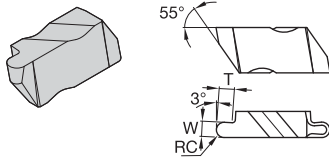
■ NR • Full Radius Inserts

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	3607489	|	|
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	3606956	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

(NR • Full Radius Inserts – continued)



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

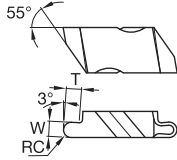
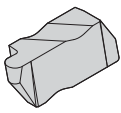
P	●	●	●	●
M	●	●	○	○
K	●	○	○	○
N	●	○	○	●
S	●	●	○	●
H	○	○	○	○

Grooving and Cut-Off

catalogue number	insert size	W	RC	T	TN6010	TN6025	TN7110	THM
NR3M200R	3	4,00	2,00	3,81	●	●	○	○
NR4M200R	4	4,00	2,00	6,35	●	●	○	○
NR3M225R	3	4,50	2,25	3,81	●	●	○	○
NR4M225R	4	4,50	2,25	6,35	●	●	○	○
NR3094R	3	4,78	2,39	3,81	●	●	○	○
NR4M250R	4	5,00	2,50	6,35	●	●	○	○
NR4125R	4	6,35	3,18	6,35	●	●	○	○
left hand								
NR2M050L	2	1,00	0,50	1,27	●	●	○	○
NR2M075L	2	1,50	0,75	2,79	●	●	○	○
NR2031L	2	1,58	0,79	2,79	●	●	○	○
NR3031L	3	1,58	0,79	2,39	●	●	○	○
NR2M100L	2	2,00	1,00	2,79	●	●	○	○
NR3M100L	3	2,00	1,00	2,39	●	●	○	○
NR2047L	2	2,39	1,19	2,79	●	●	○	○
NR3047L	3	2,39	1,19	3,81	●	●	○	○

(continued)

(NR • Full Radius Inserts – continued)



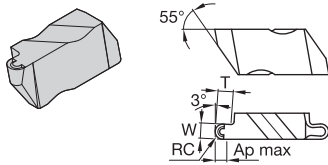
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

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	|	|

Grooving and Cut-Off



Right-hand insert shown; left-hand insert is mirror image.

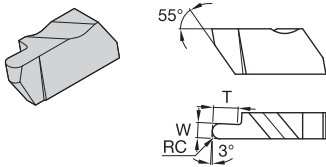
● first choice
○ alternate choice

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	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	○	○

Grooving and Cut-Off



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

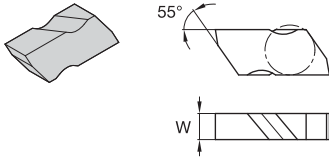
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S	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
H	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

■ **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

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

■ NB • Blanks

Grooving and Cut-Off

catalogue number	insert size	W	TN6010	TN6025	TN7110	THM
right hand						
NB2R	2	3,81	●	●	○	3607064
NB3R	3	4,95	●	●	○	3607019
left hand						
NB2L	2	3,81	●	●	○	3607016
NB3L	3	4,95	●	●	○	3607017

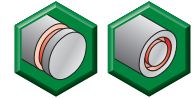
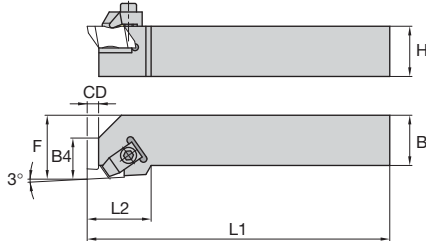
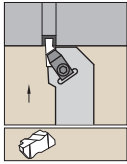
NOTE: NB blanks are designed to allow modification of the W dimension and end form.
W dimension is provided to indicate maximum possible width.
Available in uncoated grades only.

TopGroove™
Holder Identification System






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 Surface and Length																																																																
<p>N – TopGroove*</p> <p>*Proprietary standard only.</p>	<p>End mount</p> <p>Side mount Offset</p> <p>Side mount No offset for swiss machining</p> <p>NRR undercut</p>	<p>End mount</p> <p>Side mount</p>	<p>Drop Head</p> <p>DH = Drop Head</p>	<p>Shank height and width in mm and holder length according to ISO standard.</p>	<table border="1"> <thead> <tr> <th>L1</th> <th>ISO</th> </tr> </thead> <tbody> <tr><td>32</td><td>A</td></tr> <tr><td>40</td><td>B</td></tr> <tr><td>50</td><td>C</td></tr> <tr><td>60</td><td>D</td></tr> <tr><td>70</td><td>E</td></tr> <tr><td>80</td><td>F</td></tr> <tr><td>90</td><td>G</td></tr> <tr><td>100</td><td>H</td></tr> <tr><td>110</td><td>I</td></tr> <tr><td>125</td><td>J</td></tr> <tr><td>140</td><td>K</td></tr> <tr><td>150</td><td>L</td></tr> <tr><td>160</td><td>M</td></tr> <tr><td>170</td><td>N</td></tr> <tr><td>180</td><td>P</td></tr> <tr><td>200</td><td>Q</td></tr> <tr><td>250</td><td>R</td></tr> <tr><td>300</td><td>S</td></tr> <tr><td>350</td><td>T</td></tr> <tr><td>400</td><td>U</td></tr> <tr><td>450</td><td>V</td></tr> <tr><td>500</td><td>W</td></tr> <tr><td>Special Length</td><td>Y</td></tr> <tr><td></td><td>X</td></tr> </tbody> </table>	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	Special Length	Y		X	<table border="1"> <thead> <tr> <th>insert size</th> <th>W1</th> </tr> </thead> <tbody> <tr><td>2</td><td>3,81mm</td></tr> <tr><td>3</td><td>4,95mm</td></tr> <tr><td>4</td><td>6,98mm</td></tr> <tr><td>5</td><td>9,65mm</td></tr> <tr><td>6</td><td>9,73mm</td></tr> <tr><td>8</td><td>11,13mm</td></tr> </tbody> </table>	insert size	W1	2	3,81mm	3	4,95mm	4	6,98mm	5	9,65mm	6	9,73mm	8	11,13mm	<p>Q – qualified metric holder</p> <p>NOTE: Holders are designed to locate insert inclined to 3° to provide back clearance down open side.</p>
L1	ISO																																																																						
32	A																																																																						
40	B																																																																						
50	C																																																																						
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400	U																																																																						
450	V																																																																						
500	W																																																																						
Special Length	Y																																																																						
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insert size	W1																																																																						
2	3,81mm																																																																						
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5	9,65mm																																																																						
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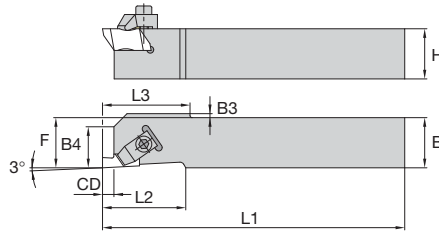
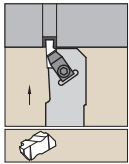
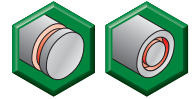


Grooving and Cut-Off




■ 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.

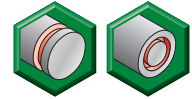
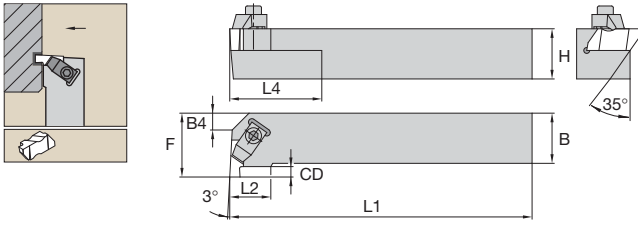


■ **NAS**




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.

Grooving and Cut-Off

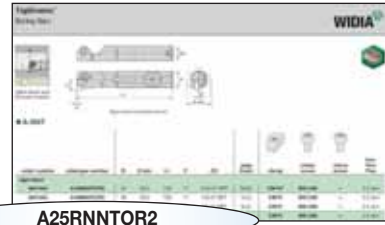


■ NE

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

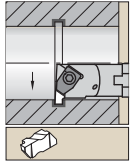
NOTE: F dimension measured over sharp point of insert.

TopGroove
Boring Bar Identification System

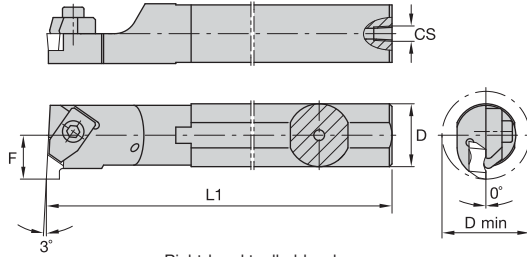


A25RRNNTOR2

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																
<p>Steel with coolant</p>	<p>Bar diameter</p>		<p>N – TopGroove</p>		<p>End mount</p> <p>Side mount</p>		<p>Right hand</p> <p>Left hand</p>																	
								<table border="1"> <thead> <tr> <th>insert size</th> <th>W1</th> </tr> </thead> <tbody> <tr><td>1</td><td>3,54mm</td></tr> <tr><td>2</td><td>3,81mm</td></tr> <tr><td>3</td><td>5,35mm</td></tr> <tr><td>4</td><td>6,40mm</td></tr> <tr><td>5</td><td>9,65mm</td></tr> <tr><td>6</td><td>9,73mm</td></tr> <tr><td>8</td><td>11,13mm</td></tr> </tbody> </table>	insert size	W1	1	3,54mm	2	3,81mm	3	5,35mm	4	6,40mm	5	9,65mm	6	9,73mm	8	11,13mm
insert size	W1																							
1	3,54mm																							
2	3,81mm																							
3	5,35mm																							
4	6,40mm																							
5	9,65mm																							
6	9,73mm																							
8	11,13mm																							
			<table border="1"> <thead> <tr> <th colspan="2">Metric Bars</th> </tr> </thead> <tbody> <tr><td>M</td><td>150mm</td></tr> <tr><td>Q</td><td>180mm</td></tr> <tr><td>R</td><td>200mm</td></tr> <tr><td>S</td><td>250mm</td></tr> <tr><td>T</td><td>300mm</td></tr> <tr><td>U</td><td>350mm</td></tr> </tbody> </table>	Metric Bars		M	150mm	Q	180mm	R	200mm	S	250mm	T	300mm	U	350mm							
Metric Bars																								
M	150mm																							
Q	180mm																							
R	200mm																							
S	250mm																							
T	300mm																							
U	350mm																							



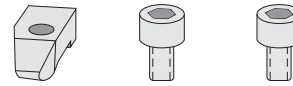
Steel shank with through coolant.



Right-hand toolholder shown.

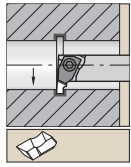


■ **A-NNT**

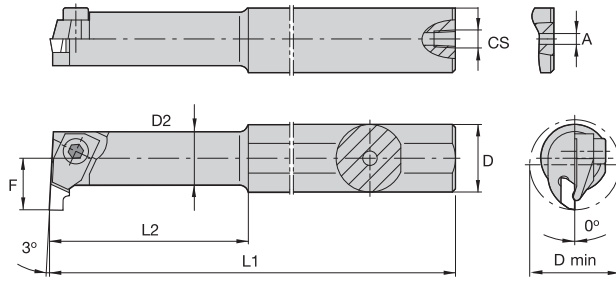


order number	catalogue number	D	D min	L1	F	CS	gage insert	clamp	clamp screw	clamp screw	hex/Torx Plus
right hand											
3641644	A12MNNTOR2	12	18,5	150	11	1/16-27 NPT	NG2L	CM147	MS1200	—	2.5 mm
3641643	A16MNNTOR2	16	22,0	150	11	1/8-27 NPT	N.2L	CM75	MS1200	—	2.5 mm
3641645	A20QNNTOR2	20	26,0	180	13	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 D86–D87 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 D86–D87 for details.
F dimension measured over sharp point of insert.

Grooving and Cut-Off

TopGroove™ Inserts: The Best Platform for Customisation

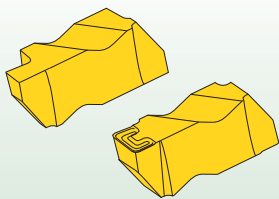
All TopGroove custom order inserts benefit from the superior rigidity of our TopGroove toolholder and clamping system. For added productivity, most custom orders can be incorporated into the double-ended inserts.

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.

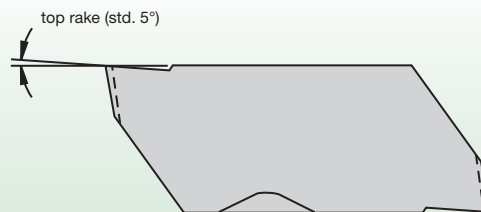
State-of-the-art CAD enables rapid development of your custom insert design. For convenience, a concept drawing is always available to facilitate engineering development of an insert.

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.

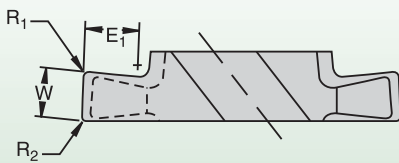
Whatever your special grooving requirements may be, WIDIA can provide an effective solution. We have the technical expertise, resources, and commitment to help you develop insert designs that satisfy your metalcutting application demands.



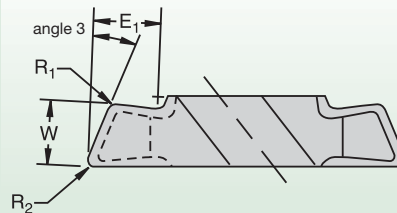
top rake



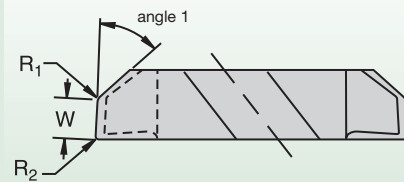
style A



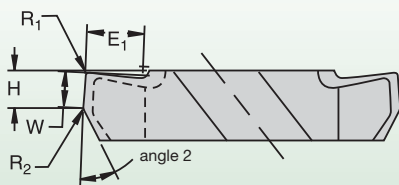
style B1



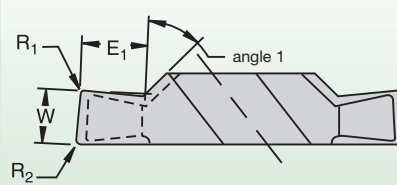
style B2



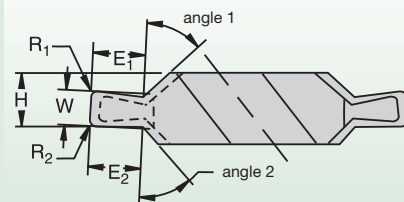
style B3



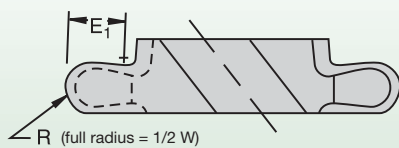
style B4



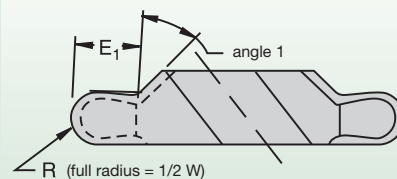
style C1



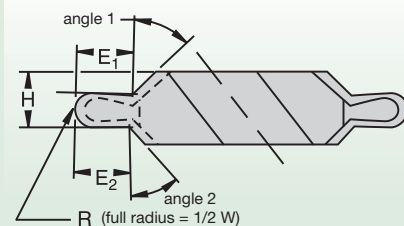
style D



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 (R₁)

Angle 2

Corner Radius 2 (R₂)

Offset (H)

Cutting Depth (E₁)

Other (please specify)

Special Instructions

(please make any necessary notes or sketches in the box at right)

Closest Catalogue Standard

Customer

Distributor

Shipping Requirements

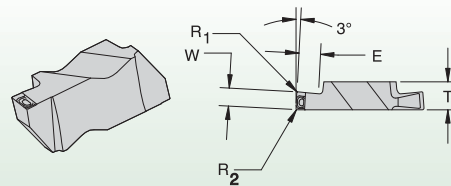
Attention Distributors: Use this worksheet to collect information for your customer.

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	NG2-L-SK	0,66–1,42	0,00–0,18	1,27	3,810	Carbide grades quoted upon request. See page D47.
or NF2-R-SK	or NF2-L-SK	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		
NG4-R-SK or NF4-R-SK	NG4-L-SK or NF4-L-SK	3,43–3,96	0,13–0,76	3,81	6,480	
		3,99–4,42	0,20–0,46	3,81		
		4,67–4,98	0,46–0,71	3,81		
		2,54–2,79	0,13–0,51	3,81		
		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,
R₁ = .010, R₂ = .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 (R₁ and R₂) will be applied.

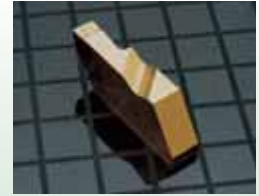
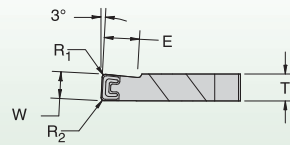
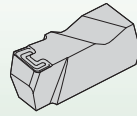
If deeper cutting depth (E) is required, please specify. Refer to the application drawing and charts for maximum face groove depths and minimum face groove diameters.

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 D47.
or	or	2,26–2,57*	.008–.033	6,35		
NFD3-R-SK	NFD3-L-SK	3,05–3,35*	.008–.033	6,35		
		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, R₁ = .010, R₂ = .010, grade TN6010™.

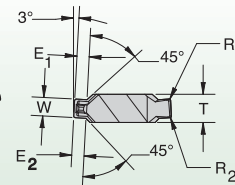
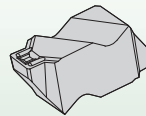
Unless otherwise specified, a standard tolerance of ±0,03mm on width (W) will be applied, and a standard tolerance of ±0,06mm on radii (R₁ and R₂) will be applied.

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

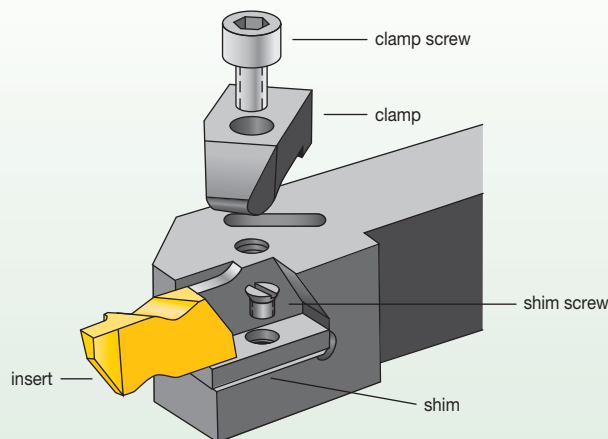
- Groove and chamfer













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.
NB3-R-K	NB3-L-K	2,39–4,32	0,13–0,64	3,81	4,95	See page D47.

NOTE: The above insert style is for simultaneous groove and chamfer operations with chip control.

TopGroove Toolholders and Boring Bars



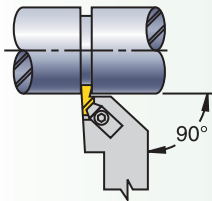
insert size and style	 clamp	 clamp screw	 shim	 shim screw
NG-1L 	CM-109	S-304	—	—
NG-2R	CM-182	S-310	—	—
NG-2L	CM-183	S-310	—	—
NG-2R 	CM-74	S-310	—	—
NG-2L	CM-75	S-310	—	—
NG-3R	CM-184	S-412	—	—
NG-3L	CM-185	S-412	—	—
NG-3R	CM-72	S-412	—	—
NG-3L 	CM-73	S-412	—	—
NG-3R*	CM-78	S-412	—	—
NG-3L*	CM-70	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.

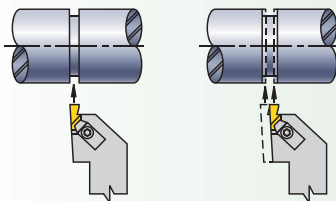
Grooving Tool Failure and Solution Guide

Practical Solutions to Common Grooving Problems

Holder Position for Grooving Operation

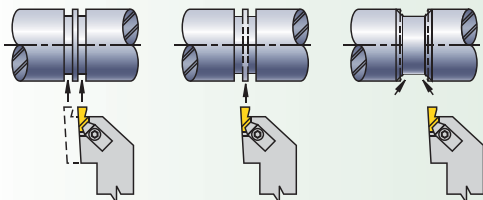


How to Cut a Groove Slightly Wider than the Groove Tool



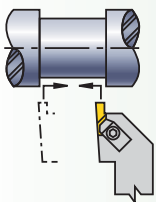
1. Plunge the centre of the groove.
2. Plunge each side of the groove to get the specified width. Use a slower feed rate when cutting groove sides.

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



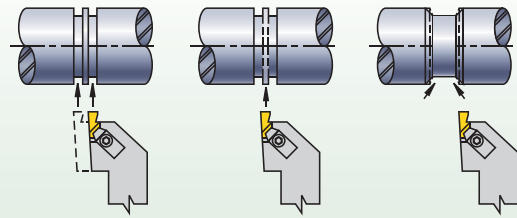
1. Follow recommendations explained above.
2. To avoid insert chipping and to achieve groove wall perpendicularity, follow the tool path outlined here.
3. Use the lightest depth of cut that still enables good chip surface finishing.

problem	solution
bur	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Reduce tool and workpiece overhang. 2. Adjust speed and feed (usually increase first). 3. Ensure centre height.
insert chipping	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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.

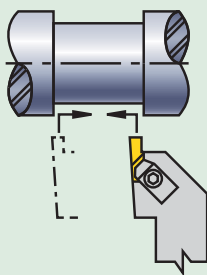


Machining Guidelines for Chip Control • Turning/Profiling

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.

Finish Turning the Groove

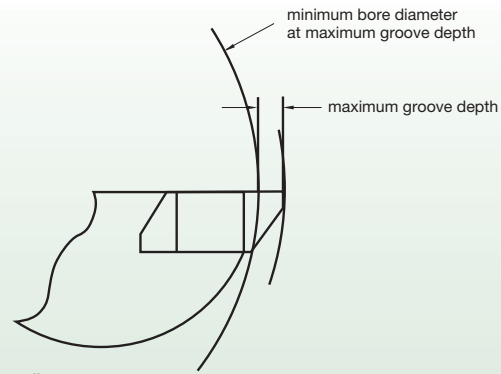


1. Plunge both sides of groove width.
2. Plunge centre area to remove web of material remaining.
3. To avoid insert chipping and to achieve groove wall perpendicularity, follow the tool path outlined.
4. Use the lightest depth of cut that still allows good chipbreaking, tool life, and surface finish.

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.

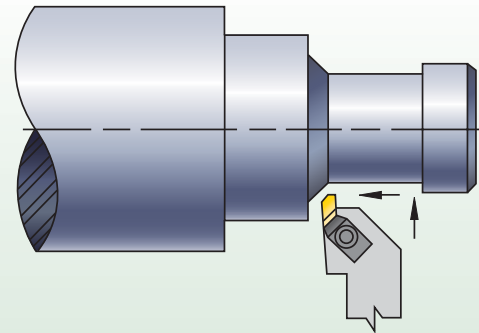
Internal Groove Depth versus Bar Interference



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.



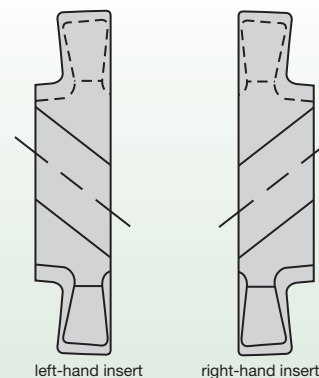
Machining Guidelines for Using TopGroove Deep Grooving Inserts (NGD)

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

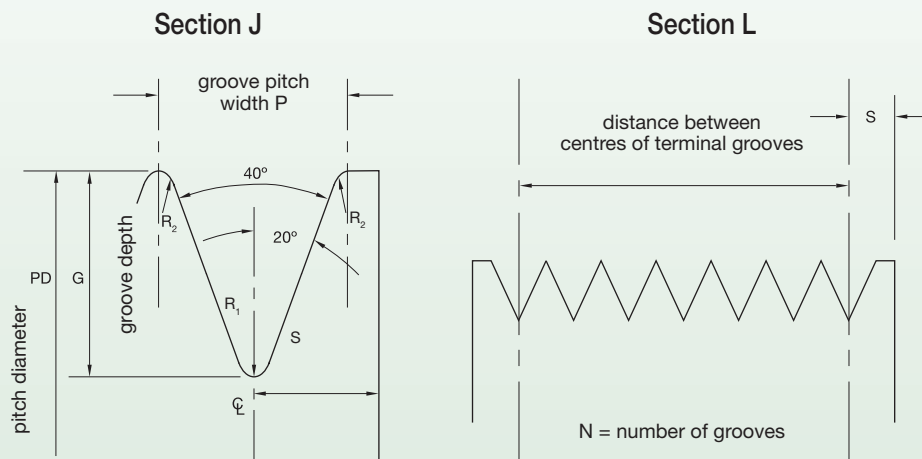
TopGroove Insert Selection Guide

- 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.



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.

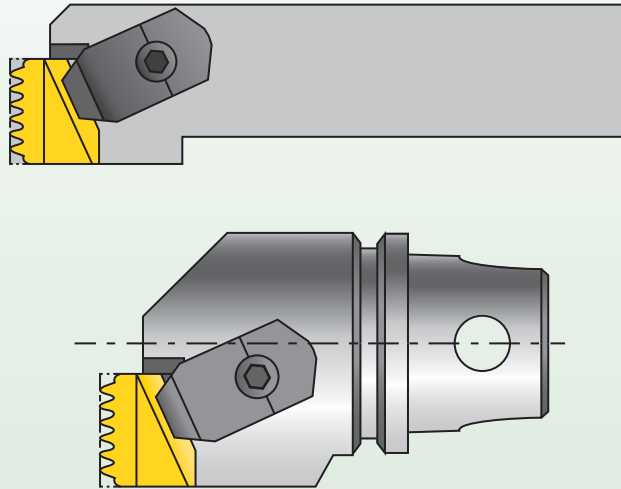


Groove Dimensions and Tolerances for Sheaves

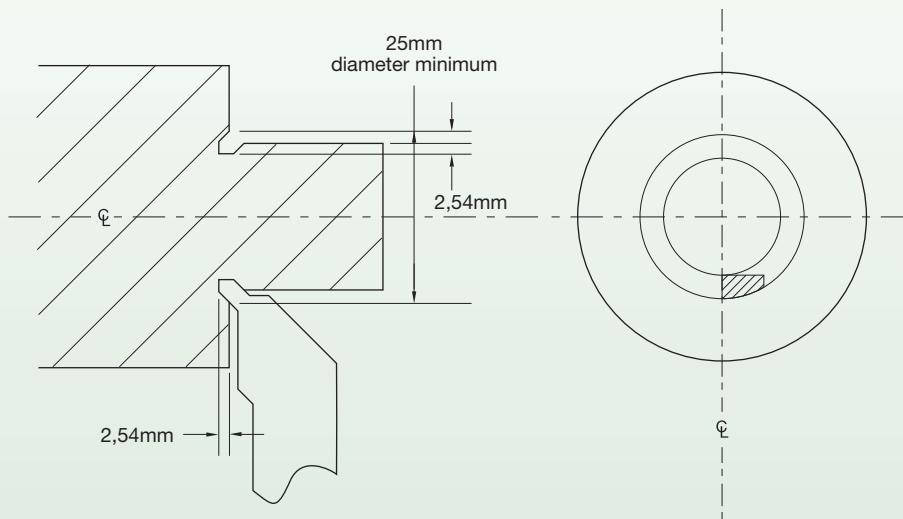
groove cross section	pitch width (P)	groove depth (G)	minimum radius (R2)	radius (R1)	terminal distance	distance between centres of terminal grooves and maximum accumulated tolerance
J	2,34 ±0,03	2,21 ±0,13	0,20	0,32 ±0,06	3,18	(N-1)4,88 ±0,25
L	4,70 ±0,05	5,11 ±0,13	0,38	0,32 ±0,06	3,18	(N-1)4,70 ±0,25

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.

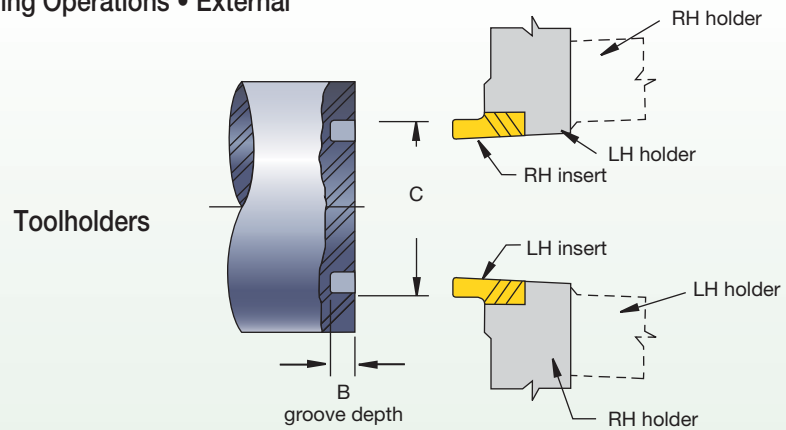


Machining Guidelines for Undercutting Operations Performed with Custom Solution and TopGroove NU Inserts (NU3094, NU3125, and NU3156)



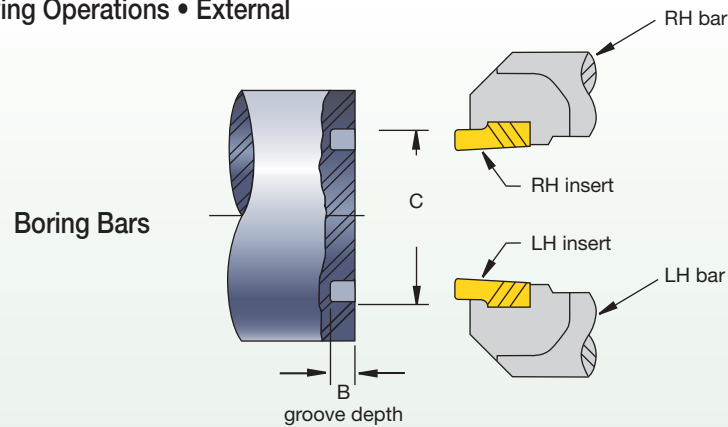
NOTE: Items shown are non-standard items.

Machining Guidelines for Face Grooving Operations • External



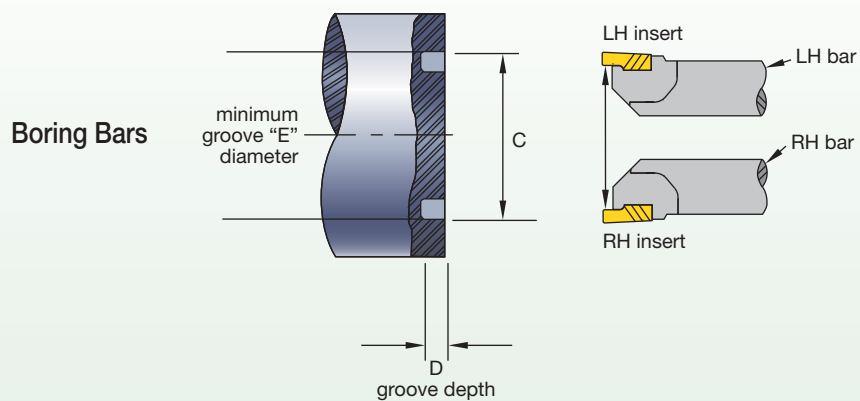
Standard NF/NDF Inserts		
insert family	maximum groove depth B mm	minimum groove diameter C mm
NF-3	1,52	23,9
NF-3	2,39	30,5
NF-3	3,18	36,1
NF-3	3,81	41,3
NFD-3	6,35	47,6
NFD-4	9,53	57,2
NFD-4	12,70	57,2

Machining Guidelines for Face Grooving Operations • External



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



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 D78.

ProGroove™ •
Grooving and Cut-Off

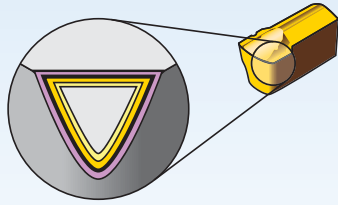
ProGroove



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.

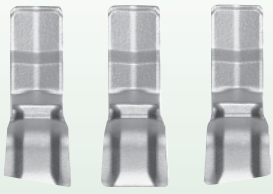
- Reduce cycle times — high speed and feed capability.
- Longer tool life — new multilayer coating provides better wear resistance.

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

wear resistance ← → toughness

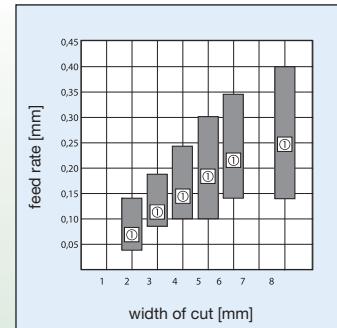
Grade	Coating	Grade Description	Material Group																		
			P	M	K	N	S	H	05	10	15	20	25	30	35	40	45				
TN6030		PVD-TiAlN Nanolayer coated carbide. Medium and heavy machining for steels and nodular cast irons. Recommended at medium cutting speeds when good toughness properties are required.	P																		
	HC-P30		M																		
TN7525		MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN coated carbide. Light and medium machining for steels and nodular cast irons.	P																		
	HC-P25		K																		
TN7535		MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ coated carbide. Medium and heavy machining for steels and nodular cast iron.	P																		
	HC-P35		K																		
TN8025		MT-CVD/CVD-TiN-TiCN-Al ₂ O ₃ -ZrCN coated carbide. Light and medium machining for all stainless steels. Can be used both with or without coolant.	M																		
	HC-M25																				
THM		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																		
	HW-K15		N																		
TTM		Uncoated carbide with good toughness and wear properties. Medium machining for steels.	S																		
	HW-P25		H																		
			P																		
			M																		

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.

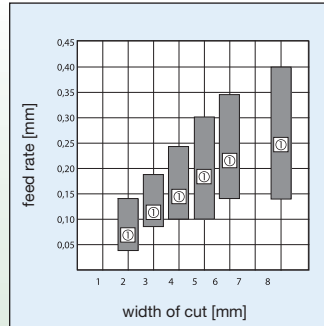


① Recommended Starting Feed

PGM



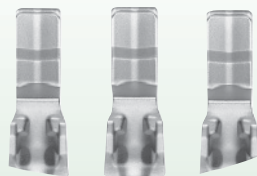
neutral



① Recommended Starting Feed

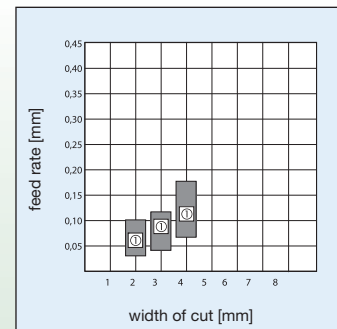
For grooving and parting, also capable of copy and straight turning as well as chamfering. With additional chip forming element for good chip control with varying depths of cut.

PGS



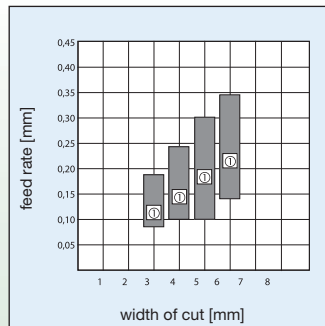
left-hand neutral right-hand

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

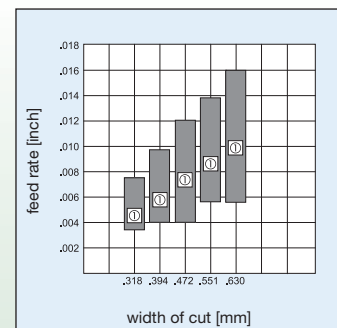


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...0
Inserts with wide range of applications in grooving and deep grooving. With additional chip control element for good chip control, even with varying widths of cut.

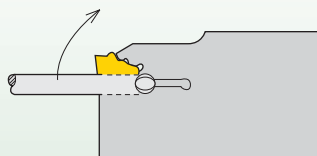
...1
Inserts with wide range of uses in grooving and deep grooving of short chipping materials.



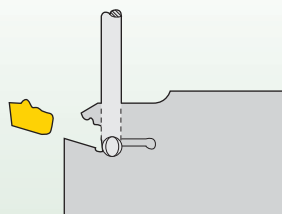
① Recommended Starting Feed

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	-	-	-

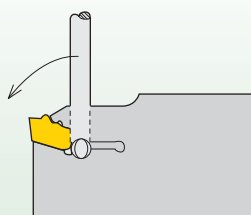
ProGroove System



To change the cutting insert, place the wrench into the blade recess.
The blade mouth is opened by turning through 90°.

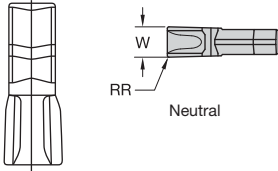


In this position, the wrench is self-locking, leaving both hands free
for changing the cutting insert.



The cutting insert is pressed against the rear seat in the blade mouth,
releasing the wrench. The insert is accurately positioned and securely clamped.





P	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
M	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
K	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
S	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
H	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

● first choice
○ alternate choice

■ PGU

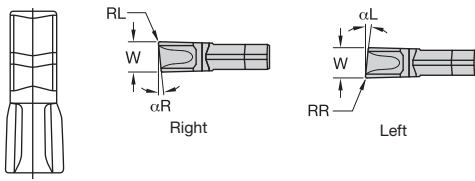
catalogue number	insert size	W	RR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567320	2	2,10	0,20	N - Neutral	2953289	2498725	2498713	2021804	2008876	-
123567330	3	3,10	0,30	N - Neutral	2953284	-	2498714	2017822	2008931	-
123567340	4	4,10	0,30	N - Neutral	2953286	2498727	2498715	-	2009080	-
123567350	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

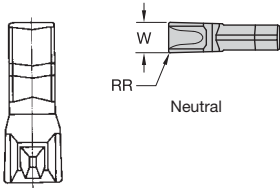
P	●	●	●	○	●
M	●	○	○	●	●
K	●	●	●	●	●
N	○	○	○	●	○
S	○	○	○	●	○
H	○	○	○	●	○

Grooving and Cut-Off

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

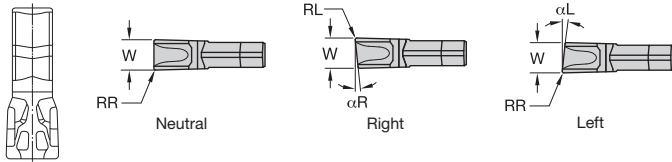
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M	●	○	○	○	●	●	●	●	●
K	●	●	●	●	●	●	●	●	●
N	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○
	TN6030	TN7525	TN7535	TN8025	THM	TTM			
	2953679	2953678	2953677	2953675	2953671	2953677	2953675	2953677	2953675
	2498733	2498734	2498735	2498736	2498736	2498735	2498736	2498735	2498736
	2498721	2498722	2498723	2498724	2498724	2498723	2498724	2498723	2498724

■ PGM

catalogue number	insert size	W	RR	hand
123567420	2	2,10	0,20	N - Neutral
123567430	3	3,10	0,30	N - Neutral
123567440	4	4,10	0,30	N - Neutral
123567450	5	5,10	0,30	N - Neutral
123567460	6	6,10	0,40	N - Neutral
123567480	8	8,15	0,60	N - Neutral

NOTE: W tolerance on all = ±0,05mm.





● first choice
○ alternate choice

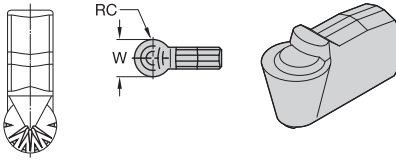
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M	●	○	○	●	●
K	●	●	●	●	●
N	○	○	○	○	○
S	○	○	○	○	○
H	○	○	○	○	○

PGS

catalogue number	insert size	W	RR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM	
123567702	2	2,25	0,20	N - Neutral	●	●	●	○	○	○	
123567703	3	3,25	0,20	N - Neutral	●	●	●	○	○	○	
123567704	4	4,25	0,20	N - Neutral	●	●	●	○	○	○	
catalogue number	insert size	W	RR	αL	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567721	2	2,25	0,20	6	L - Left	●	●	●	○	○	○
123567731	3	3,25	0,20	6	L - Left	●	●	●	○	○	○
catalogue number	insert size	W	RL	αR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567720	2	2,25	0,20	6	R - Right	●	●	●	○	○	○
123567730	3	3,25	0,20	6	R - Right	●	●	●	○	○	○
123567740	4	4,25	0,20	6	R - Right	●	●	●	○	○	○

NOTE: W tolerance on all = ±0,05mm.

Grooving and Cut-Off



● first choice
○ alternate choice

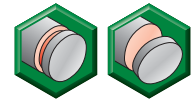
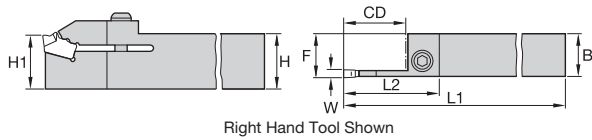
P	●	●	●	○	●	●
M	●	○	○	●	●	●
K	●	●	●	○	●	●
N	○	○	○	○	○	○
S	○	○	○	○	○	○
H	○	○	○	○	○	○
	TN6030	TN7525	TN7535	TN8025	THM	TTM
	-	2952337	2952338	-	-	-
	2952339	-	-	-	-	-
	2952340	-	-	-	-	-

■ PGR

catalogue number	insert size	W	RC	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567803	3	3,00	1,50	-	-	-	-	-	-
123567804	4	4,00	2,00	-	2952338	-	-	-	-
123567805	5	5,00	2,50	-	2952339	-	-	-	-
123567806	6	6,00	3,00	-	2952340	-	-	-	-

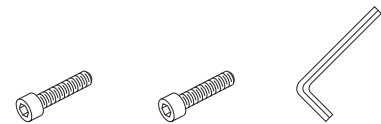
NOTE: W tolerance on all = ±0,07mm.



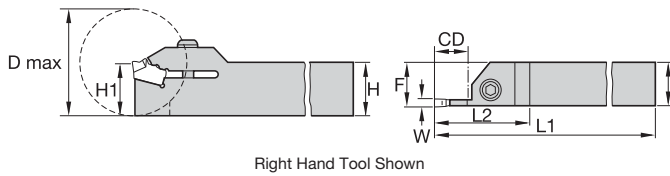
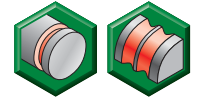


Grooving and Cut-Off

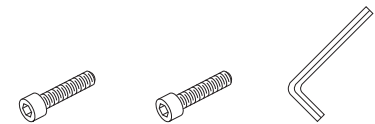
■ Grooving and Cut-Off



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

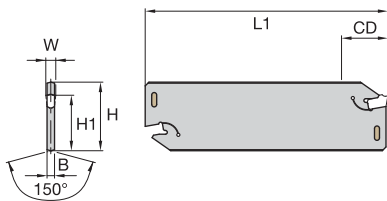


■ Grooving and Profiling



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

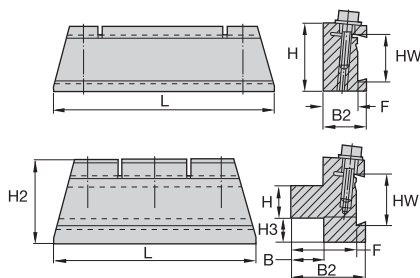
Grooving and Cut-Off



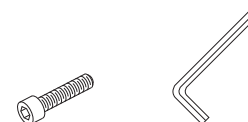
order number	catalogue number	seat size	W	H	H1	L1	B	CD	wrench
2021629	12251332000	2	2,1	19,0	15,7	90	1,7	20	12146003800
2021639	12251342000	2	2,1	26,0	21,4	110	1,7	25	12146003800
2008113	12251352000	2	2,1	32,0	25,0	150	1,7	25	12146003800
2021640	12251343000	3	3,1	26,0	21,4	110	2,4	40	12146003800
2008116	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.

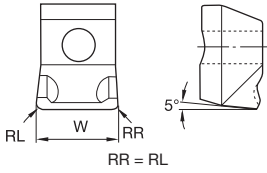
Blade Holders



■ 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



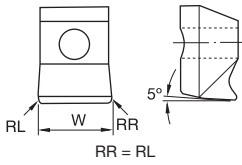
● first choice
○ alternate choice

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

■ **LGNO**

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.



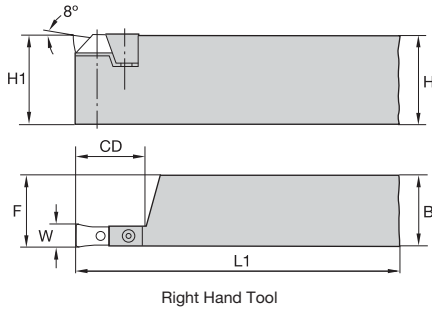
■ **LGN1**

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.



Grooving and Cut-Off



Grooving and Cut-Off

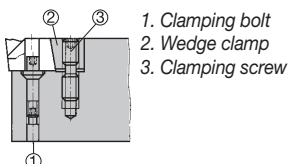
■ Grooving

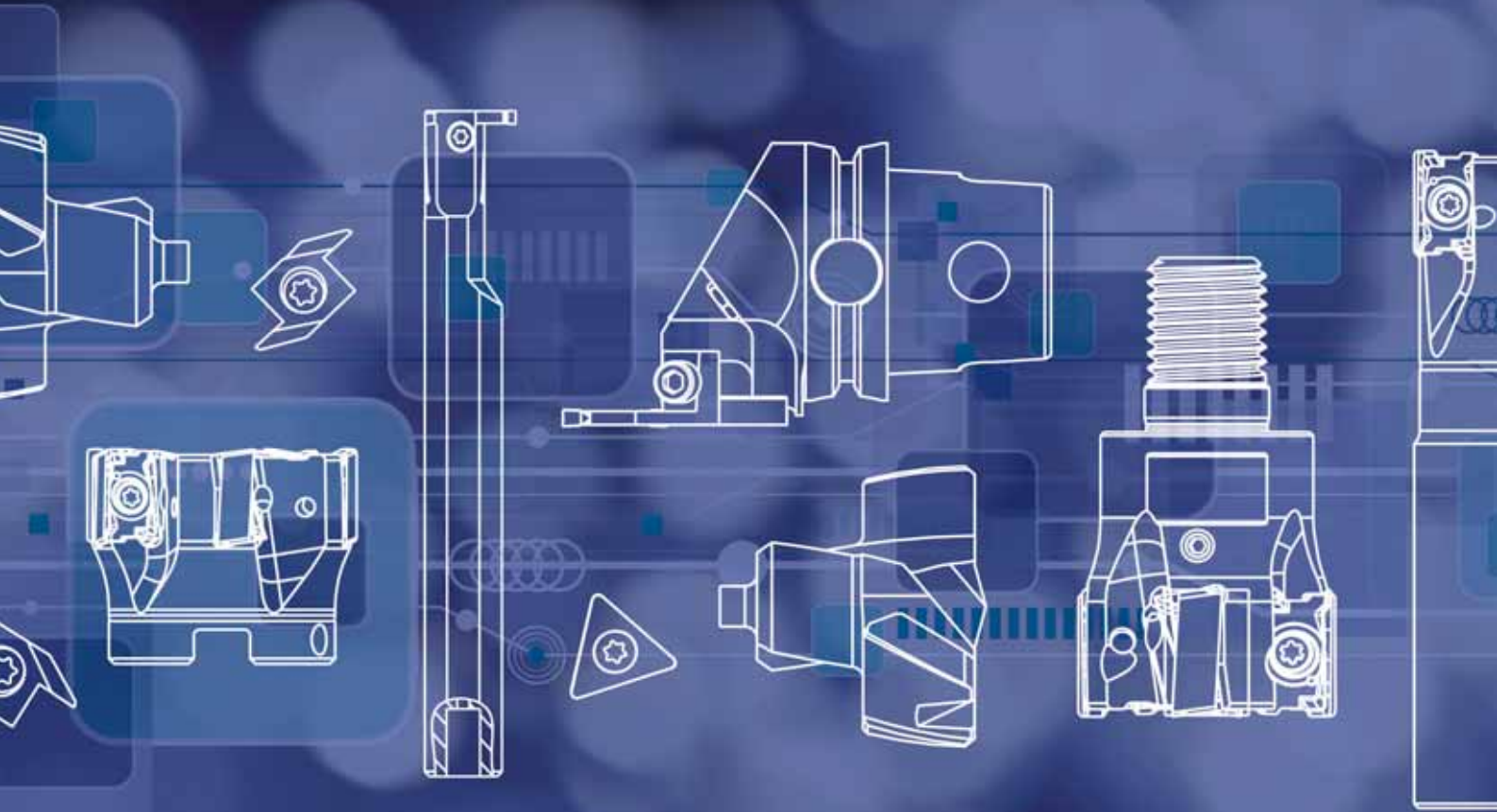
order number	catalogue number	seat size	W	CD	H	B	F	L1	H1
right hand									
2022446	12250110100	1	8,00	20,0	32	25,0	25,5	170	32
2008147	12250110300	1	10,00	20,0	32	25,0	25,5	170	32
2021719	12250110500	1	12,00	25,0	40	32,0	33,0	200	40
2021721	12250110700	1	14,00	28,0	40	32,0	33,0	200	40
2008521	12250110900	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	—





NOVO KNOWS ART TO PART TO PROFIT

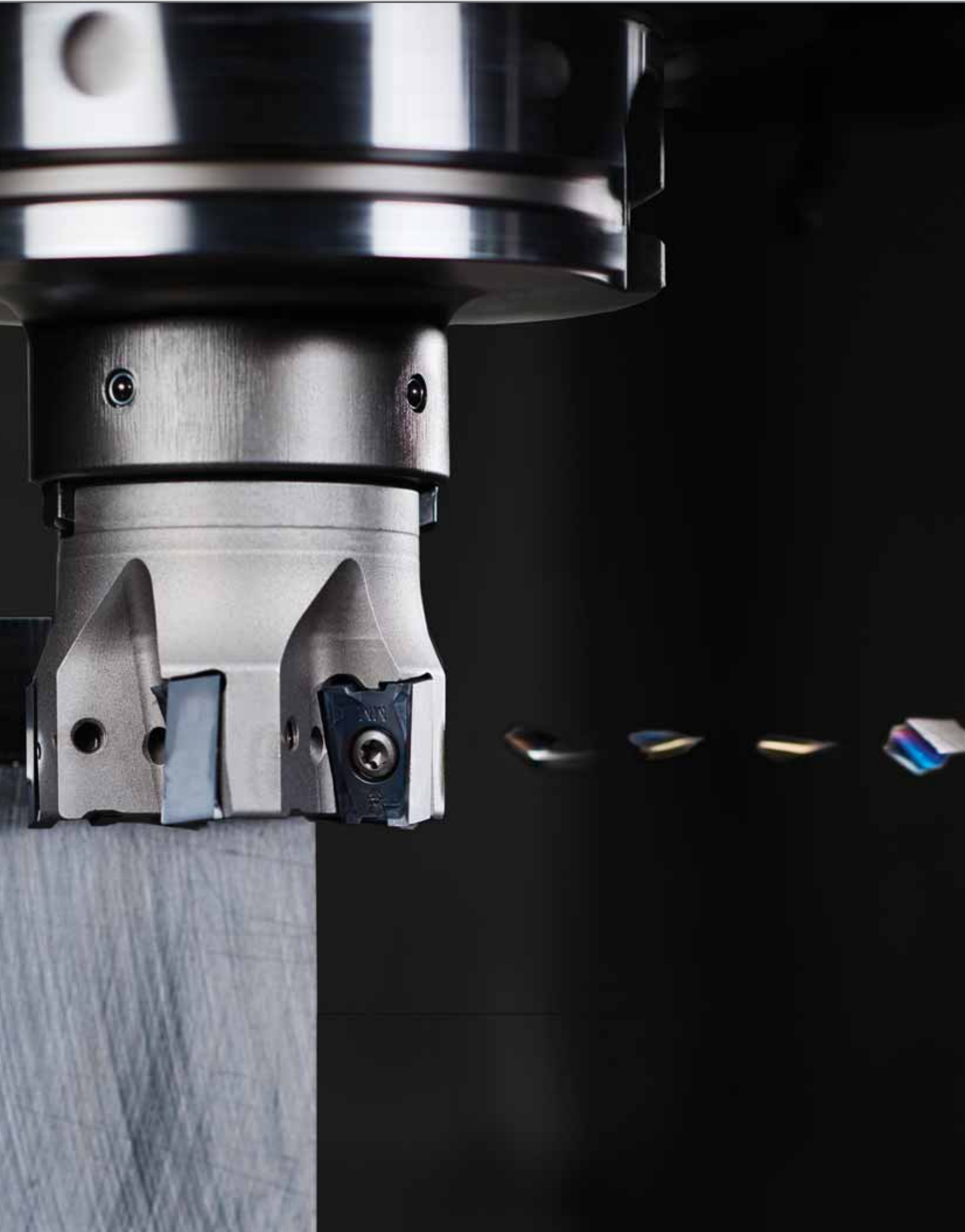
Being as productive and profitable as possible is your fundamental goal. With the addition of NOVO™ to your team, your goal can be achieved. NOVO possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

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

01

THE DIGITAL SOURCE FOR DELIVERING SMART MACHINING SOLUTIONS

widia.com/novo**NOVO**™ 



Indexable Milling

Indexable Milling Introduction.....	E2-E19
Face Mills	F1-F60
90° Shoulder Mills.....	G1-G61
Helical Mills.....	H1-H11
Slotting Mills	I1-I19
Copy Mills.....	J1-J98





NEW PRODUCTS

Our latest metalcutting innovations are designed to deliver higher productivity, longer tool life, and increased application versatility.

For more information about the latest products and services from WIDIA™, please contact your WIDIA Representative or Authorised WIDIA Distributor, or visit widia.com.

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.



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.

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

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

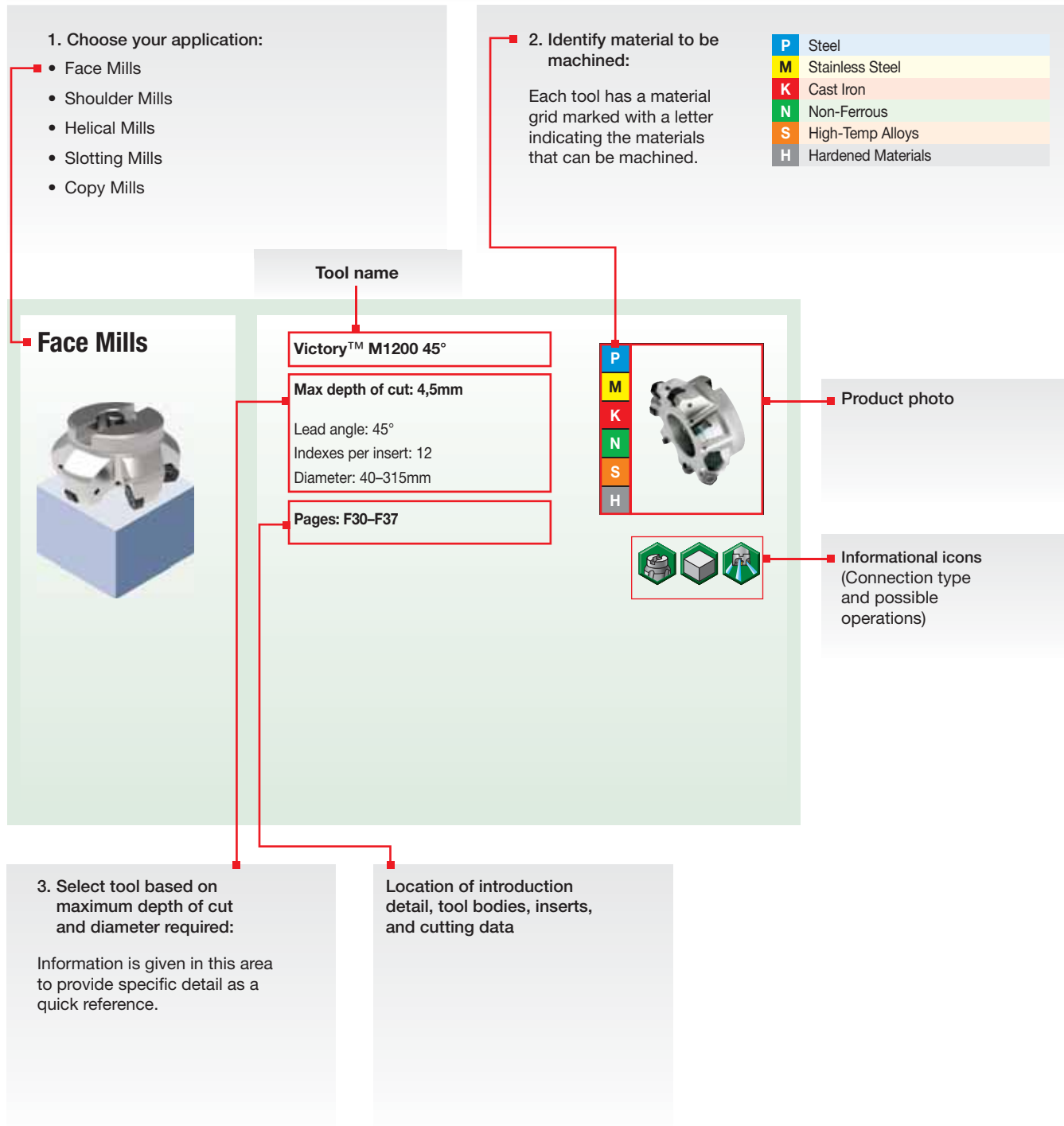
1. Choose your application:

- Face Mills
- Shoulder Mills
- Helical Mills
- Slotting Mills
- Copy Mills

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



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	67,8	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		Heavy Machining	
	Geometry	Grade	Geometry	Grade 5A	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

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

■ HNGJ-GD

catalogue number	cutting edges	D	L10	S	BS	Re	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	3037586	3093721	5427370	5228974	5883349	5883350	5883350

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]

Material Group		WP25PM		WP35CM			WS30PM			WP40PM 6A			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	-	-	-	-	-	-	-	-	-	-	-

■ Recommended Starting Feeds [mm]

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)												Insert Geometry			
	5%			10%			20% 6B			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.

Face Mills

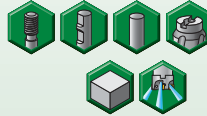
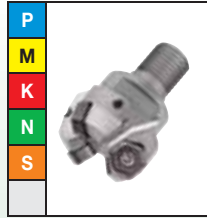


Victory™ M1200 Mini HF 15°

Max depth of cut: 1,7mm

Lead angle: 15°
Indexes per insert: 12
Diameter: 25–80mm

Pages: F5–F11

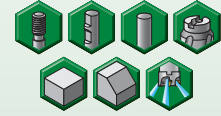
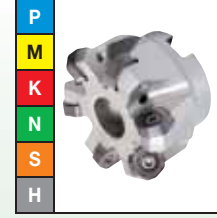


Victory™ M1200 Mini 45°

Max depth of cut: 3,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 25–120mm

Pages: F12–F19

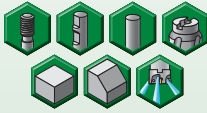


Victory™ M1200 Mini HD 59°

Max depth of cut: 4,7mm

Lead angle: 59°
Indexes per insert: 12
Diameter: 40–125mm

Pages: F20–F23

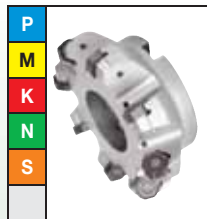


Victory™ M1200 HF 14.5°

Max depth of cut: 2,2mm

Lead angle: 14.5°
Indexes per insert: 12
Diameter: 50–160mm

Pages: F26–F29

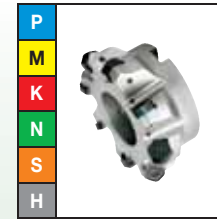


Victory™ M1200 45°

Max depth of cut: 4,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 40–315mm

Pages: F30–F37



Victory™ M1200 HD 59°

Max depth of cut: 6mm

Lead angle: 59°
Indexes per insert: 12
Diameter: 50–160mm

Pages: F38–F41



(continued)

Face Mills

(continued)

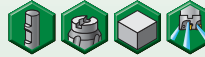


M640

Max depth of cut: 4,8mm

Lead angle: 58°
Indexes per insert: 6
Diameter: 32–125mm

Pages: F44–F49

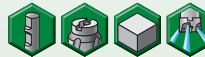


M660 SN1205..

Max depth of cut: 6,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 20–160mm

Pages: F52–F57



M660 SN1505..

Max depth of cut: 8,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 100mm

Pages: F58–F60



90° Shoulder Mills

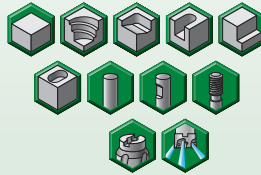
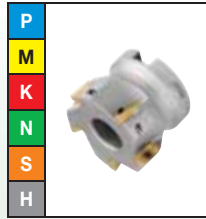


VSM11™

Max depth of cut: 11,7mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 16–125mm

Pages: G4–G16

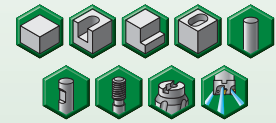
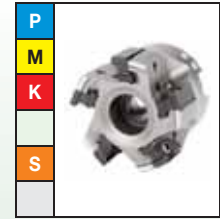


VSM490™-15

Max depth of cut: 15mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 25–160mm

Pages: G32–G40

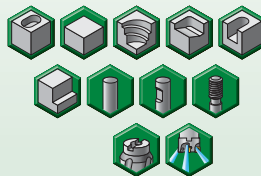


VSM17™

Max depth of cut: 16,33mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 25–160mm

Pages: G20–G29

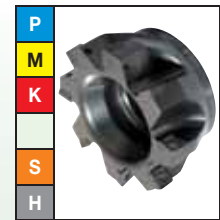


M690 SD1204..

Max depth of cut: 10mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–160mm

Pages: G54–G57



M690 SD1506..

Max depth of cut: 12mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–125mm

Pages: G58–G61

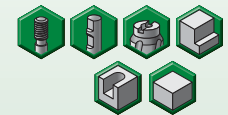
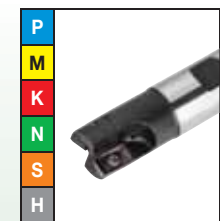


M680

Max depth of cut: 14,0mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 25mm–160mm

Pages: G44–G51



Helical Mills



M300

Max depth of cut: 112mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 50–80mm

Pages: H4–H11



Slotting Mills

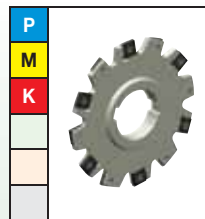


M95

**Slot Width Range:
4–10mm**

Indexes per insert: 4
Diameter: 100–200mm

Pages: I4–I7

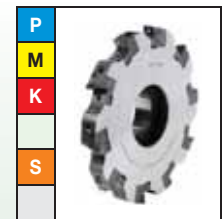


M900™

**Slot Width Range:
12–22mm**

Indexes per insert: 2
Diameter: 100–315mm

Pages: I10–I16, I18–I19



Copy Mills

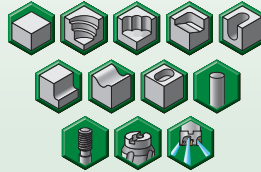
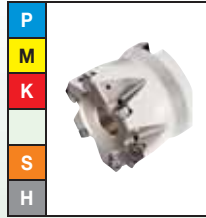


M370™

Max depth of cut: up to 2mm

Indexes per insert: 6
Diameter: 25–125mm

Pages: J4–J16

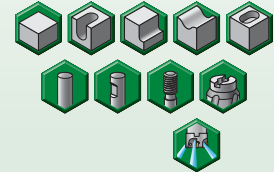
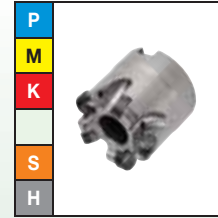


M200™

Max depth of cut: up to 5mm

Indexes per insert: up to 12
Diameter: 25–125mm

Pages: J20–J39

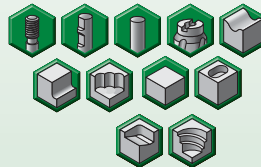


M100™

Max depth of cut: 6mm

Diameter: 24–125mm

Pages: J42–J67

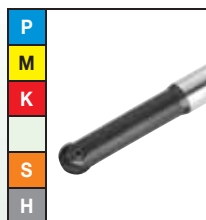


M270™ Ball Nose

Max depth of cut: 5–16mm

Diameter: 10–32mm

Pages: J70–J85

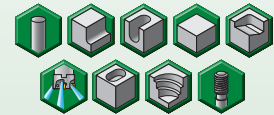
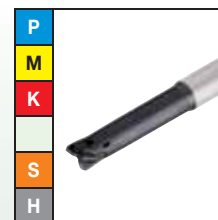


M270 Toroidal

Max depth of cut: 0,3–4mm

Diameter: 10–20mm

Pages: J86–J91

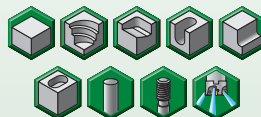
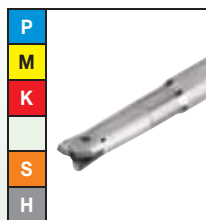


M270 High Feed

Max depth of cut:
0,6–1,1mm

Diameter: 10–20mm

Pages: J92–J98



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

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.

H

Insert Shape

- A
- B
- C
- E
- H
- L
- O
- R
- S
- T
- W
- X

N

Insert Clearance Angle

- A 3°
- B 5°
- C 7°
- D 15°
- E 20°
- F 25°
- G 30°
- N 0°
- P 11°

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

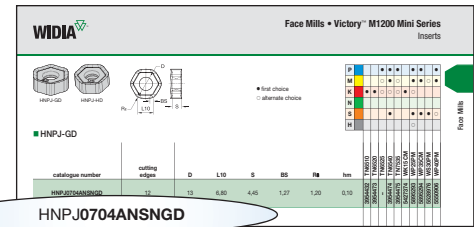
insert thickness

iC	tolerances on "iC"		tolerances on "M"	
	classes J, K, L, M, N (+/-)	class U (+/-)	classes M & N (+/-)	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.



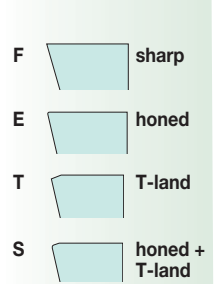
07
Size
(Cutting Edge Length)

04
Insert Thickness

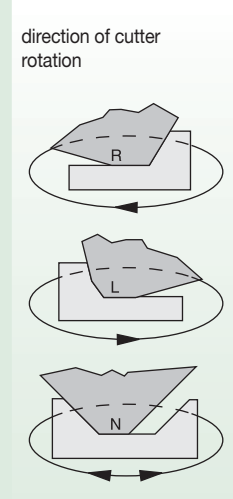
symbol	thickness
T1	1,98
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94

AN
Corner Configuration

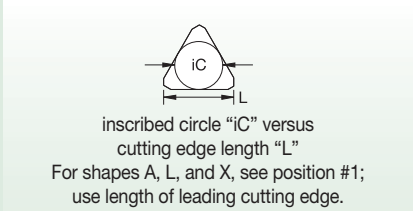
S
Cutting Edge Form



N
Insert Hand



GD
Edge Geometry



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					

radius			
MO	round insert	leading or major cutting edge facet or wiper edge assumed direction of feed motion lead angle K	wiper edge clearance P A 3° B 5° C 7° D 15° E 20° F 25° G 30° N 0° P 11°
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	E 75°	
32	3,2mm	P 90°	

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.

- 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	D2	L	L2	Aq1 max	Z	max RPM	coolant supply	kg
3957995	M1200D100Z03C100HN07L800	40	45.7	72	38	40	40	3.5	4	15000	Yes	0.26
				40				3.5	5	15000	Yes	0.26

M1200D100Z03C100HN07L800

Indexable Milling Tool Bodies

M1200

Series

D

Cutting Diameter

100

Z

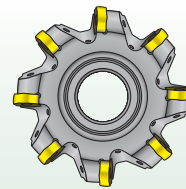
Number of Flutes

03

C

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.

• 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	D2	L	L2	Ag1 max	Z max	RPM	coolant	weight	kg
3857995	M1200D100Z03C100HN07L800	40	48,7	22	38	40	3,5	4	15000	Yes	0,26	
3857996	M1200D100Z03C100HN07L800	20	24,7	12	18	20	1,75	5	15000	Yes	0,05	

M1200D100Z03C100HN07L800

Indexable Milling Tool Bodies

100

Shank/Pilot Diameter

H

Insert Shape

N

Insert Clearance Angle

07

Insert Size (Cutting Edge Length)

L **800**

Overall Length of Tool
Used for all cylindrical shank and long version Weldon® if required (standard Weldon without)

A	M
B	O
C	P
D	R
E	S
H	T
K	V
L	W
	X Special Design

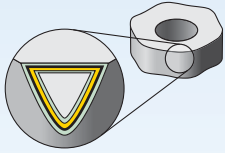
C
D
E
F
G
N
P

Optional uses as required

LH Left Hand

C Carbide Shank

HM Heavy Metal Shank



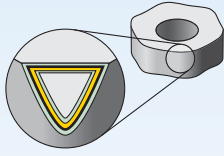
Modern coating technologies provide higher speed capabilities, greater productivity, and longer tool life.

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 -Al ₂ O ₃ -TiOx)									
TN2525		▽▽		▽▽			▽▽	•	
HC-H20 • PVD-TiAlN									
TN6501					▽▽▽			•	•
HC-N03 • PVD-TiB ₂									
TN6510				▽▽				•	
HC-K10 • PVD-TiAlN Nanolayer									
TN6520				▽▽				•	•
HC-K20 • PVD-TiAlN Nanolayer									



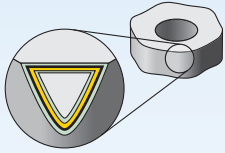
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primary use		alternate use	
▼▼▼	Light (finishing)	▽▽▽	Light (finishing)
▼▼	Medium	▽▽	Medium
▼	Heavy (roughing)	▽	Heavy (roughing)

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 ₂ O ₃ -TiN									
TN7535		▼	▽	▽				•	
HC-P35 • MT-CVD/CVD-TiN-TiCN-Al ₂ O ₃									
TTI25		▼▼▼	▽▽▽					•	•
HT-P15 • Cermet									
THM				▽	▼	▽		•	•
HW-K15 • Uncoated									



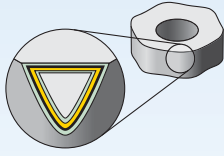
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P	Steel
M	Stainless Steel
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primary use		alternate use	
▽▽▽	Light (finishing)	▽▽▽	Light (finishing)
▽▽	Medium	▽▽	Medium
▽	Heavy (roughing)	▽	Heavy (roughing)

Grade		P	M	K	N	S	H	dry	with coolant
THM-U					▽▽▽			•	•
HF-N05 • Uncoated									
TTM/TTM08		▽▽	▽▽	▽▽				•	•
HW-P25 • Uncoated									
WK15PM				▽▽				•	•
PVD-TiAlN Nanolayer									
WK15CM™				▽▽				•	
MT-CVD/TiN-TiCN-Al ₂ O ₃									
WP20CM		▽▽		▽▽					
MT-CVD/TiN-TiCN-Al ₂ O 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-AITiN Multilayer									
WU35PM		▽	▽			▽		•	•
PVD-AITiN Multilayer									
WP35CM		▽	▽	▽				•	
MT-CVD/TiN-TiCN-Al ₂ O ₃									
WP40PM™		▽	▽			▽		•	•
PVD TiAlN-AlCrN Multilayer									
WK25YM				▽▽				•	
Silicon Nitride									
WDN00U™					▽▽▽ ▽▽▽ ▽				•
Ultra-fine grain PCD									



Indexable Milling • Face Mills

M1200 Mini • First Choice for Taper 40 Spindle Machines	F2–F23
M1200 • First Choice for Taper 50 Spindle Machines.....	F24–F41
M640 • High Positive Geometries for Low Power Machines	F42–F49
M660 • Heavy-Duty Applications	F50–F60



One Series Meets Every Face Milling Need •

WIDIA™ Victory™ M1200 Mini

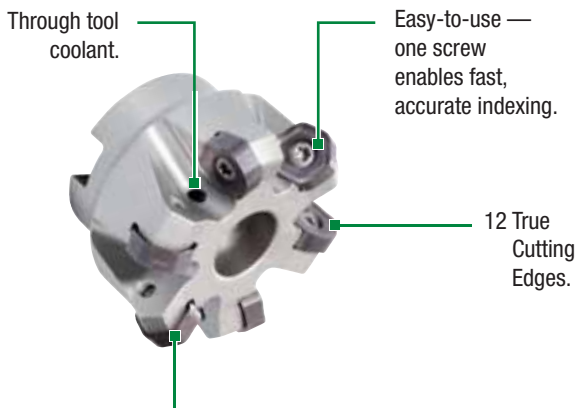
For consistent performance, look no further than the WIDIA Victory™ M1200 Mini. This easy-to-use product ensures great tool life, reduced machining time, and maximum productivity.



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.



Comprehensive standard offering for coarse, medium, and fine pitch cutter bodies to match all shop floor needs.

Latest soft cutting edge insert design for all material groups

<p>-FNLDJ</p> 	<p>-ENLD</p> 
	
<p>Machining Aluminium</p>	<p>Light Machining</p>
<p>-SNGD</p> 	<p>-SNHD</p> 
	
<p>General Purpose</p>	<p>Heavy Machining</p>

Face Mills

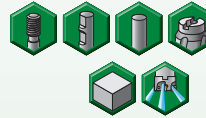
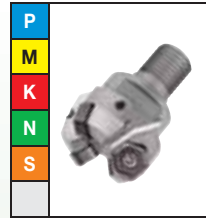


Victory™ M1200 Mini HF 15°

Max depth of cut: 1,7mm

Lead angle: 15°
Indexes per insert: 12
Diameter: 25–80mm

Pages: F5–F11

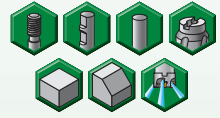
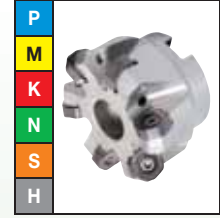


Victory™ M1200 Mini 45°

Max depth of cut: 3,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 25–120mm

Pages: F12–F19

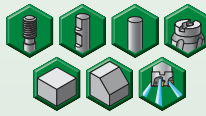
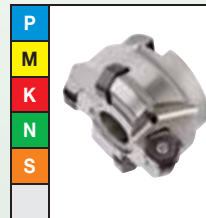


Victory™ M1200 Mini HD 59°

Max depth of cut: 4,7mm

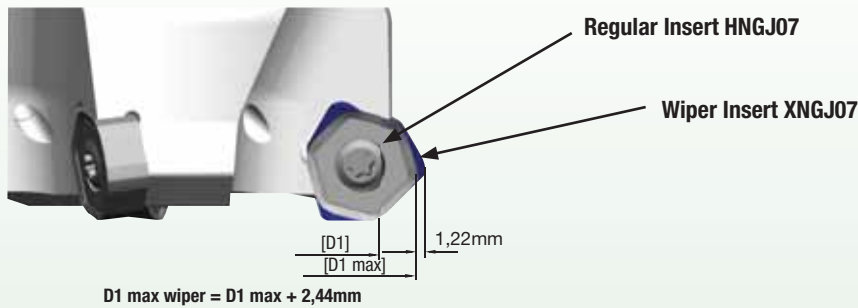
Lead angle: 59°
Indexes per insert: 12
Diameter: 40–125mm

Pages: F20–F23

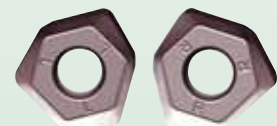


■ **Easy-to-use wiper insert setup to achieve excellent surface floor finish**

Wiper insert overlapping vs. regular insert



- 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

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

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°

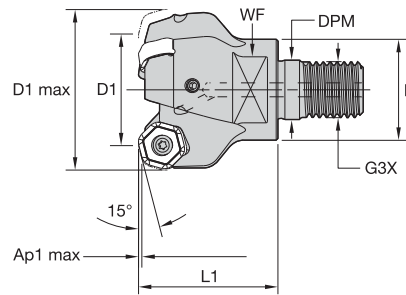

12 True
Cutting
Edges

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.



Face Mills

■ 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

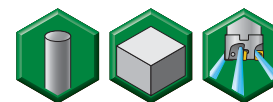

 insert
screw


Nm

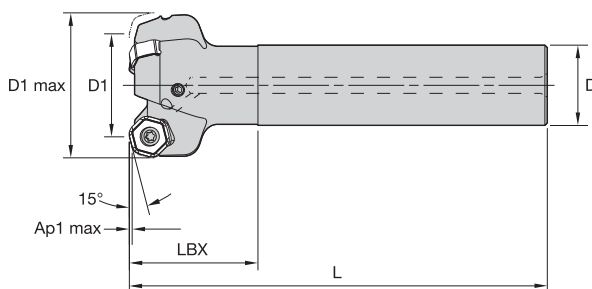

 Torx
wrench

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.



Face Mills



■ Cylindrical Shanks

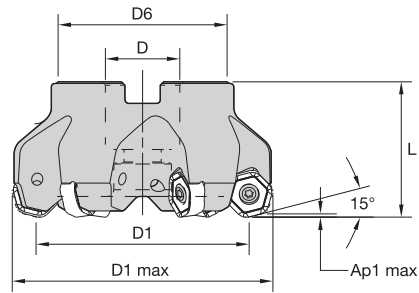
order number	catalogue number	D1	D1 max	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4136880	M1200HF025Z02A20HN07L120	25	39,1	20	120	32	1,7	2	20000	Yes	0,33
4136881	M1200HF025Z03A20HN07L120	25	39,1	20	120	32	1,7	3	20000	Yes	0,31
4136882	M1200HF032Z03A25HN07L130	32	46,1	25	130	40	1,7	3	17600	Yes	0,52
4136883	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.



Face Mills

■ 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

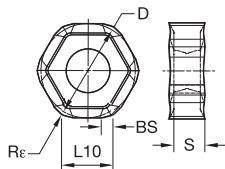
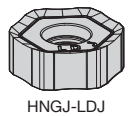
■ Spare Parts



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		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	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	-	-	-	-	-	-

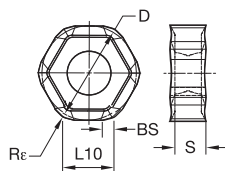
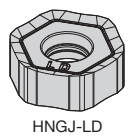


● first choice
○ alternate choice

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

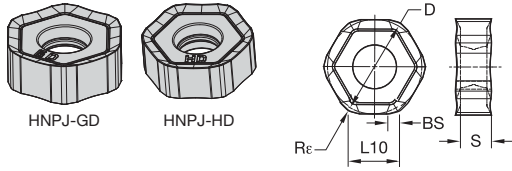


● first choice
○ alternate choice

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	3954430	5895291	5895292	5528975	5550905	
HNGJ070432ANENLD	12	13	6,80	4,48	-	3,20	0,08	3954428	-	-	-	-	-	-	-	-	-



● first choice
○ alternate choice

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	3954481	3954477	3954478	-	3954479	3954480	5427375	5895295	5895296	-	5550907
HNPJ070432ANSNHD	12	13	6,80	4,42	-	3,20	0,14	3954482	-	-	3954483	3954484	-	-	-	-	-	5895297

■ Recommended Starting Speeds [m/min]

Face Mills

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

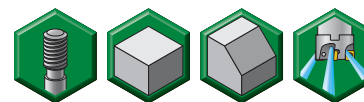
■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
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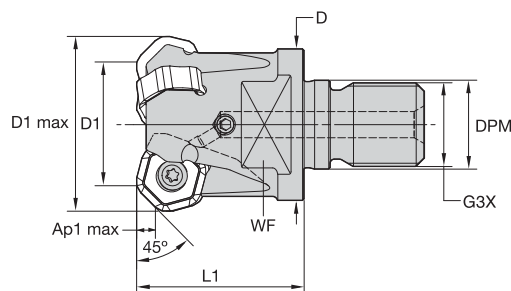
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
.F.LDJ	0,48	0,89	1,81	0,34	0,64	1,29	0,26	0,48	0,96	0,22	0,42	0,83	0,21	0,38	0,76	.F.LDJ
.E.LD	0,48	1,38	2,85	0,34	0,99	2,00	0,26	0,74	1,48	0,22	0,64	1,28	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.

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- Maximum number of teeth per diameter.



Face Mills



■ Screw-On End Mills

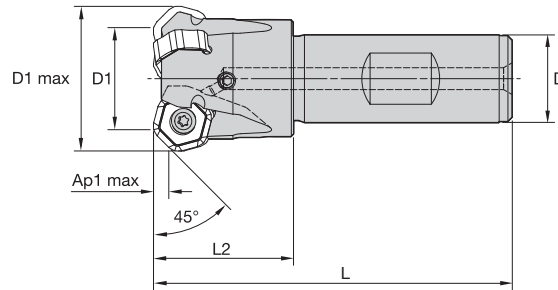
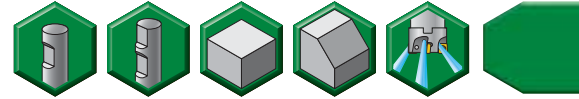
order number	catalogue number	D1	D1 max	D	DPM	G3X	L1	WF	Ap1 max	Z	max RPM	coolant supply	kg
3957839	M1200D025Z02M16HN07	25	33,7	29	17,0	M16	32	22	3,5	2	20000	Yes	0,13
3957840	M1200D025Z03M16HN07	25	33,7	29	17,0	M16	32	22	3,5	3	20000	Yes	0,13
3957841	M1200D032Z03M16HN07	32	40,7	29	17,0	M16	40	22	3,5	3	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.



Face Mills

■ 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

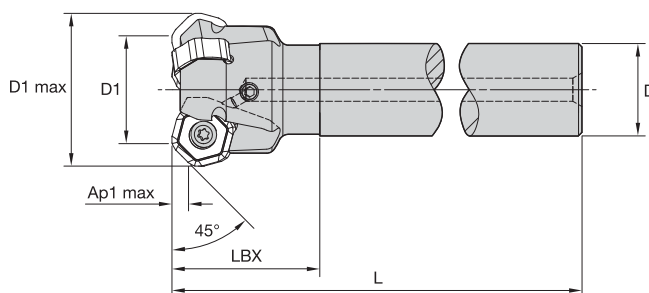
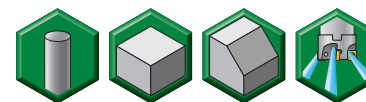

 insert
screw


Nm


 Torx
driver

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



insert screw



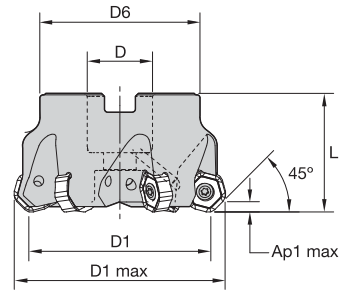
Nm



Torx driver

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.



Face Mills

■ 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

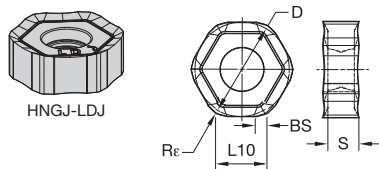


D1	insert screw	Nm	Torx driver	socket-head cap screw	mounting screw with coolant grooves	coolant screw assembly	coolant lock screw	coolant cap
40	12146034500	3,5	12148082400	—	12146109200	—	—	—
50	12146034500	3,5	12148082400	12146120500	—	—	—	—
63	12146034500	3,5	12148082400	12146120500	—	—	—	—
80	12146034500	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		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	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	-	-	-	-	-	-

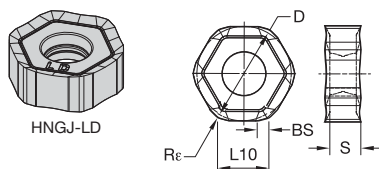


● first choice
○ alternate choice

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

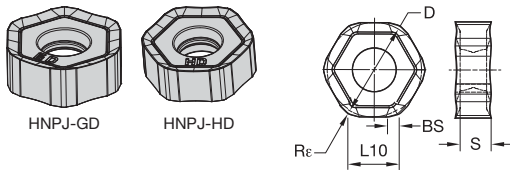


● first choice
○ alternate choice

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									



● first choice
○ alternate choice

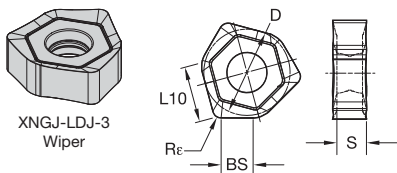
P	●	●	●	●	●	●	●	●	●	●	●	●	●
M	○	○	○	○	○	○	○	○	○	○	○	○	○
K	●	●	○	○	○	○	○	○	○	○	○	○	○
N	●	●	○	○	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○	○	○	○	○

■ 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	3954481	3954477	3954478	-	3954479	3954480	5427375	5895295	5895296	5550907
HNPJ070432ANSNHD	12	13	6,80	4,42	-	3,20	0,14	3954482	-	-	3954483	3954484	-	-	-	-	5895297



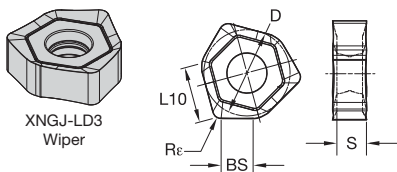
● first choice
○ alternate choice

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

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]

Face Mills

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

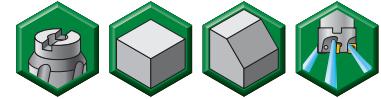
■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
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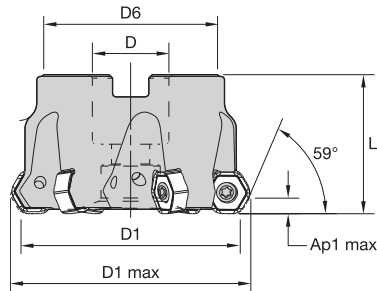
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
.F..LDJ	0,17	0,32	0,65	0,13	0,23	0,47	0,09	0,17	0,35	0,08	0,15	0,31	0,08	0,14	0,28	.F..LDJ
.E..LD	0,17	0,50	1,00	0,13	0,36	0,72	0,09	0,27	0,54	0,08	0,23	0,47	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.



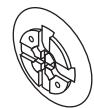
Face Mills



■ 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



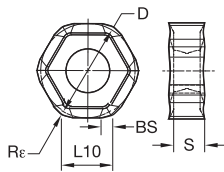
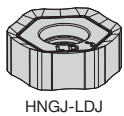
D1	insert screw	Nm	Torx driver	socket-head cap screw	mounting screw with coolant grooves	coolant screw assembly	coolant lock screw	coolant cap
40	12146034500	3,5	12148082400	—	12146109200	—	—	—
50	12146034500	3,5	12148082400	12146120500	—	—	—	—
63	12146034500	3,5	12148082400	12146120500	—	—	—	—
80	12146034500	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		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	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	-	-	-	-	-	-

Face Mills

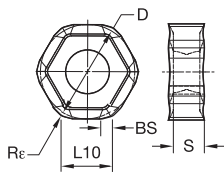
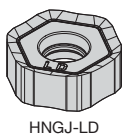


● first choice
○ alternate choice

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

■ HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Re	hm	TN6501	THM-U
HNGJ0704ANFNLDJ	12	13	6,80	4,48	1,60	1,20	0,08	3954414	3954332

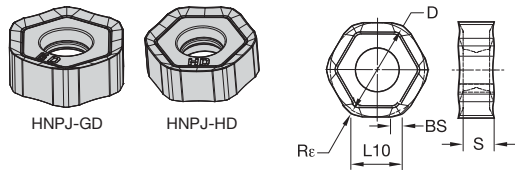


● first choice
○ alternate choice

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

■ HNGJ-LD

catalogue number	cutting edges	D	L10	S	BS	Re	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	3954430	—	—	5895291	5895292	5528975	5550905
HNGJ070432ANENLD	12	13	6,80	4,48	—	3,20	0,08	3954428	—	—	—	—	—	—	—	—	—



● first choice
○ alternate choice

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	5427375	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	3954481	3954477	-	3954479	TN7535	5427375	5895295	5895296	-	5550907
HNPJ070432ANSNHD	12	13	6,80	4,42	-	3,20	0,14	3954482	3954478	-	-	-	-	-	-	-	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)															Insert Geometry
	5%			10%			20%			30%			40-100%			
.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.

One Series Meets Every Face Milling Need •

WIDIA™ Victory™ M1200 Series

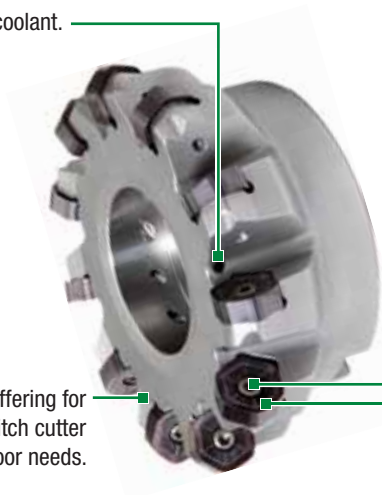
M1200



- 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.

Through tool coolant.



Comprehensive standard offering for coarse, medium, and fine pitch cutter bodies to match all shop floor needs.

Easy-to-use — one screw enables fast, accurate indexing.

The latest technology with twelve true cutting edges and high-precision pressed and ground inserts.

Face Mills

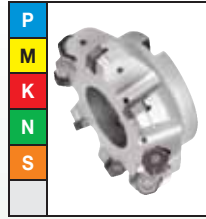


Victory™ M1200 HF 14.5°

Max depth of cut: 2,2mm

Lead angle: 14.5°
Indexes per insert: 12
Diameter: 50–160mm

Pages: F26–F29

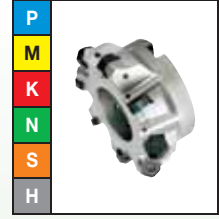


Victory™ M1200 45°

Max depth of cut: 4,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 40–315mm

Pages: F30–F37

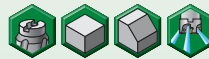


Victory™ M1200 HD 59°

Max depth of cut: 6mm

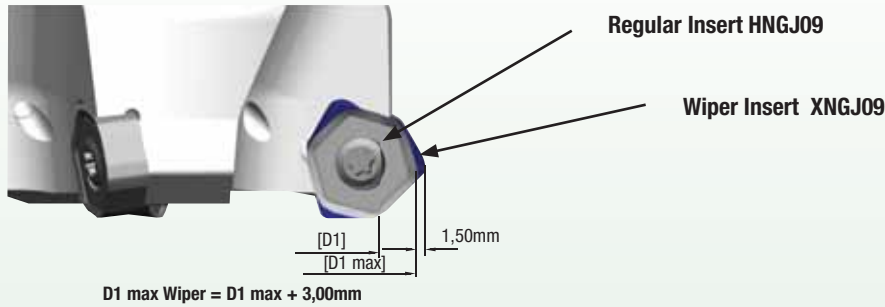
Lead angle: 59°
Indexes per insert: 12
Diameter: 50–160mm

Pages: F38–F41

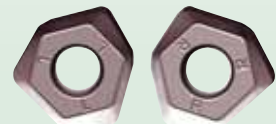


■ **Easy-to-use wiper insert setup to achieve excellent surface floor finish**

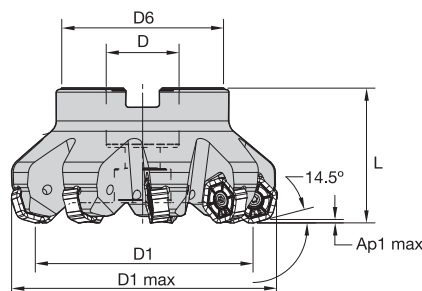
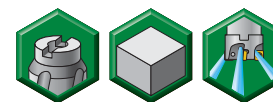
Wiper insert overlapping vs. regular insert



- 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.



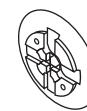
- Twelve cutting edges.
- High feed rates for rough face milling.
- Use standard M1200 inserts.
- Do not load wiper inserts.



■ 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

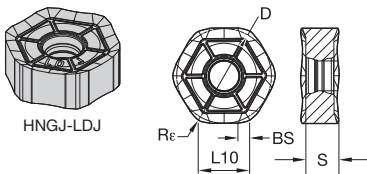


D1	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw assembly	coolant lock screw	coolant cap
50	12146034500	3,5	12148082400	12146120500	12146101000	—	—	—
63	12146034500	3,5	12148082400	12146120500	12146101000	—	—	—
80	12146034500	3,5	12148082400	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		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	-	-	-	-	-	-

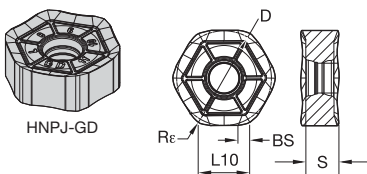


● first choice
○ alternate choice

P	●		
M	●		
K	●		
N	●	●	●
S	●		
H	●		

■ HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Re	hm	TN6501	THM-U
HNGJ0905ANFNLDJ	12	16	8,58	5,56	1,80	1,20	0,02	3865373	3606383



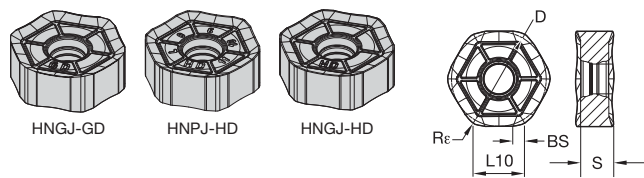
● first choice
○ alternate choice

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

■ HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Re	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

Face Mills



● first choice
○ alternate choice

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

■ Recommended Starting Feeds [mm]

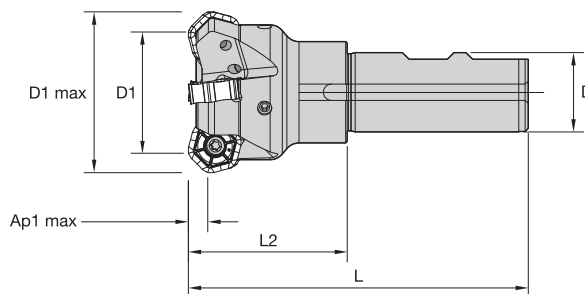
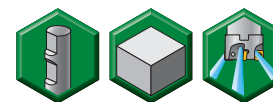
Light Machining	General Purpose	Heavy Machining
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Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
.F..LDJ	0,45	0,90	1,84	0,33	0,65	1,31	0,25	0,48	0,97	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



insert screw



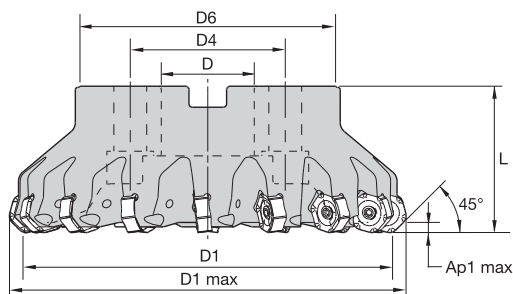
Nm



Torx driver

D1	40	insert screw	12146034500	Nm	3,5	Torx driver	12148082400
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- Twelve cutting edges.
- First choice for general face milling.
- Low cutting forces for maximum productivity.



Face Mills

■ Shell Mills

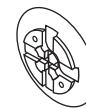
order number	catalogue number	D1	D1 max	D	D4	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
3957970	M1200D040Z03HN09	40	51,0	22	—	39	40	4,4	3	15800	Yes	0,26
3957971	M1200D040Z04HN09	40	51,0	22	—	39	40	4,4	4	15800	Yes	0,25
3325312	M1200D050Z04HN09	50	61,0	22	—	38	40	4,5	4	12700	Yes	0,32
3325693	M1200D050Z05HN09	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

Face Mills



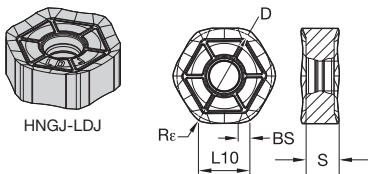
D1	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant screw assembly	coolant lock screw	coolant cap
40	12146034500	3,5	12148082400	–	12146109200	–	–	–
50	12146034500	3,5	12148082400	–	–	–	–	–
63	12146034500	3,5	12148082400	–	–	–	–	–
80	12146034500	3,5	12148082400	12748701000	–	–	–	–
100	12146034500	3,5	12148082400	–	–	12146109400	–	–
125	12146034500	3,5	12148082400	–	–	–	12146107000	1214611000
160	12146034500	3,5	12148082400	–	–	–	12146107000	1214611100
200	12146034500	3,5	12148082400	–	–	–	–	1214611200
250	12146034500	3,5	12148082400	–	–	–	–	1214611300
315	12146034500	3,5	12148082400	–	–	–	–	1214611400

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	-	-	-	-	-	-

Face Mills

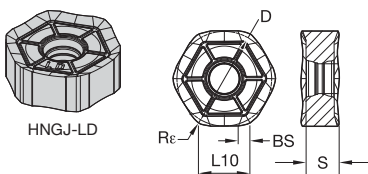


● first choice
○ alternate choice

P	●		
M	●		
K	●		
N	●	●	●
S	●		
H			

■ HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Re	hm	TN6501	THM-U
HNGJ0905ANFNLDJ	12	16	8,58	5,56	1,80	1,20	0,02	3865373	3606383



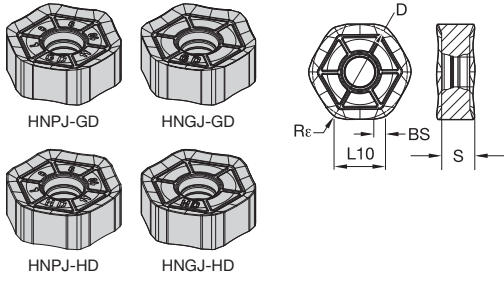
● first choice
○ alternate choice

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

■ HNGJ-LD

catalogue number	cutting edges	D	L10	S	BS	Re	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	

Face Mills



● first choice
○ alternate choice

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

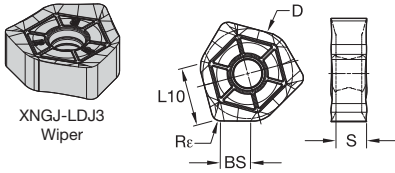
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3119541	3614650	3037596	3093721	5427370	—	5528974	5895349	5895350

■ 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	—	—	—	—	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	3563900	3564083	3564084	—	—	—	—	—	—
HNGJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,17	3563901	3563902	3564085	—	—	—	—	—	—
								—	—	—	—	—	—	—	—	—
								—	—	—	—	—	—	—	—	—
								—	—	—	—	—	—	—	—	—
								—	—	—	—	—	—	—	—	—
								—	—	—	—	—	—	—	—	—



XNGJ-LDJ3 Wiper

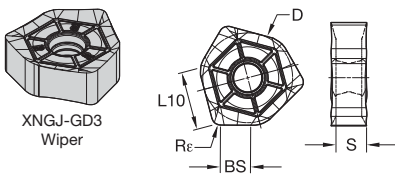
● first choice
○ alternate choice

P	■	■	■	■
M	■	■	■	■
K	■	■	■	■
N	■	■	■	■
S	■	■	■	■
H	■	■	■	■



catalogue number	cutting edges	D	L10	S	BS	Re	hm	TN6501	THM-U
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.



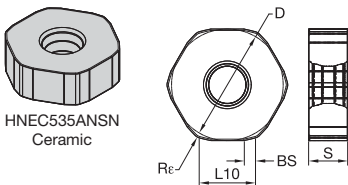
XNGJ-GD3 Wiper

● first choice
○ alternate choice

P	■	■	○	○	○	○	○	○	○	○	○	○	○	○
M	■	■	○	○	○	○	○	○	○	○	○	○	○	○
K	■	■	○	○	○	○	○	○	○	○	○	○	○	○
N	■	■	○	○	○	○	○	○	○	○	○	○	○	○
S	■	■	○	○	○	○	○	○	○	○	○	○	○	○
H	■	■	○	○	○	○	○	○	○	○	○	○	○	○

catalogue number	cutting edges	D	L10	S	BS	Re	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
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.



HNEC535ANSN Ceramic

● first choice
○ alternate choice

P	■	■	■	■
M	■	■	■	■
K	■	■	■	■
N	■	■	■	■
S	■	■	■	■
H	■	■	■	■

catalogue number	cutting edges	D	L10	S	BS	Re	hm	WK25YM
HNEC0905ANSN	12	16	9,17	5,56	1,95	1,20	0,19	5910033

■ Recommended Starting Speeds [m/min]

Face Mills

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.

Face Mills

Recommended Starting Feeds

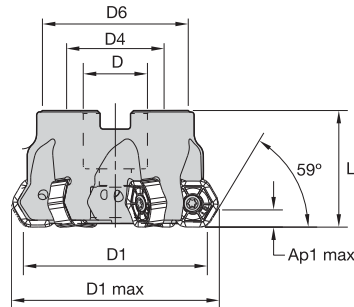
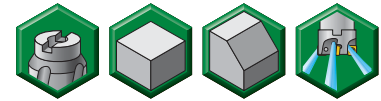
■ Recommended Starting Feeds [mm]

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 $A_{p1\ max}$ with standard insert.



Face Mills

■ Shell Mills

order number	catalogue number	D1	D1 max	D	D4	D6	L	$A_{p1\ max}$	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

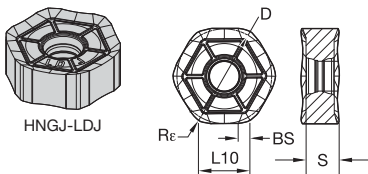
D1	insert screw	Nm	Torx driver	socket-head cap screw	coolant screw assembly	coolant lock screw	coolant cap
50	12146034500	3,5	12148082400	12146120500	—	—	—
63	12146034500	3,5	12148082400	12146120500	—	—	—
80	12146034500	3,5	12148082400	12748701000	—	—	—
100	12146034500	3,5	12148082400	—	12146109400	—	—
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	-	-	-	-	-	-

Face Mills

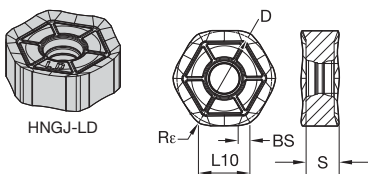


● first choice
○ alternate choice

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

■ HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Re	hm	TN6501	THM-U
HNGJ0905ANFNLDJ	12	16	8,58	5,56	1,80	1,20	0,02	3865373	3606383



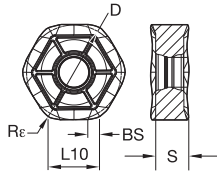
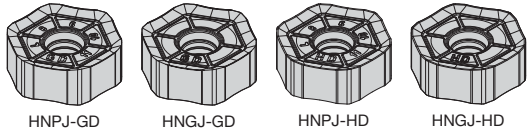
● first choice
○ alternate choice

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

■ HNGJ-LD

catalogue number	cutting edges	D	L10	S	BS	Re	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	3090017	5895346	I	5528973	5895347	5895348

Face Mills



● first choice
○ alternate choice

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

■ HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Re	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	Re	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	Re	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNPJ090543ANSNHD	12	16	8,50	5,44	—	4,34	0,13	3670864	3670866	—	—	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	Re	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	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	275 245 220
	2	- - -	390 250 190	215 190 180	175 155 140	280 250 230	215 190 180
	3	- - -	300 230 160	180 160 145	155 145 125	235 210 190	180 160 145
N	1	2400 1440 1200	- - -	- - -	- - -	- - -	- - -
	2	1640 980 800	- - -	- - -	- - -	- - -	- - -
	3	960 600 480	- - -	- - -	- - -	- - -	- - -
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		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

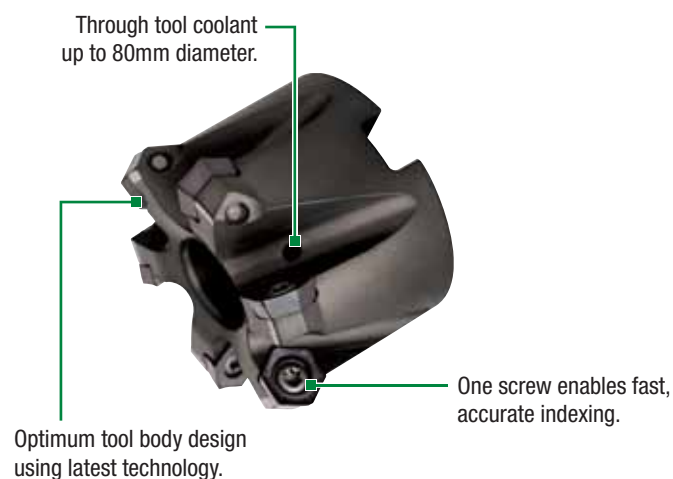
M640



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

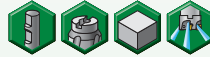
Max depth of cut: 4,8mm

Lead angle: 58°

Indexes per insert: 6

Diameter: 32–125mm

Pages: F44–F49



■ Insert Offering



Low cutting force wiper inserts:
Special wiper design for very soft cutting in finishing operations with high productivity.

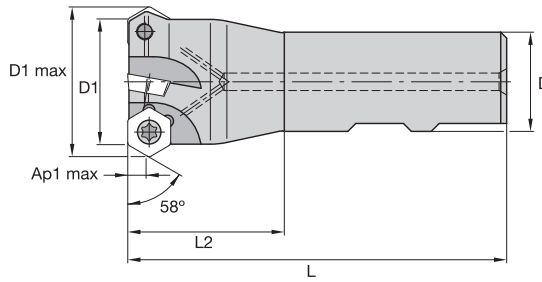
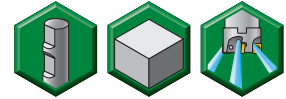


Six effective cutting edges.

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



insert screw



Nm



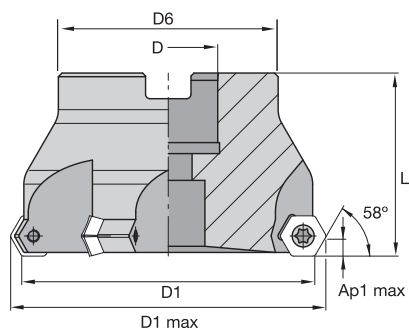
Torx driver

D1	32	12148038800	4,0	1214800600
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- Six cutting edges.
- Highly positive rake for low-power machines or light fixtures.
- Geometries and grades for all applications.



Face Mills



■ 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

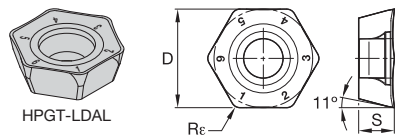
■ Spare Parts



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		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-



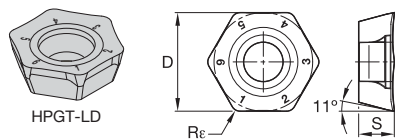
● first choice
○ alternate choice

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

■ HPGT-LDAL

catalogue number	cutting edges	D	S	Rε	hm	TN6501	THM-U	THM
HPGT06T3DZFRDLAL	6	11	4,00	0,90	0,08	2957548	2288107	2288106

NOTE: Ap1 max = 3,2mm with this geometry.



● first choice
○ alternate choice

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

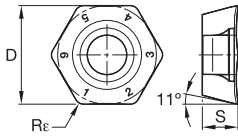
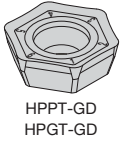
■ HPGT-LD

catalogue number	cutting edges	D	S	Rε	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HPGT06T3DZERLD	6	11	3,99	0,98	0,08	2288072	2957585	2957547	2957587	2288070	—	—	—	5895784	—	—	5895785

NOTE: Ap1 max = 3mm with this geometry.



Face Mills



● first choice
○ alternate choice

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

■ HPPT-GD

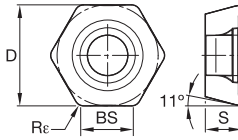
catalogue number	cutting edges	D	S	Rε	hm
HPPT06T3DZENG	6	11	3,97	0,98	0,10

TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
I	I	2957583	2957586	2957552	2271760	2271759	-	5895788	-	5895790	5895789

■ HPGT-GD

catalogue number	cutting edges	D	S	Rε	hm
HPGT06T3DZENG	6	11	3,97	0,98	0,10

TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
2288069	2957589	I	2957588	2957546	2288067	2288066	5427387	5895782	5528978	I	5895783



● first choice
○ alternate choice

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

■ HPGT-GD Wiper

catalogue number	cutting edges	D	S	BS	Rε	hm
HPGT06T3DZERGD3W	3	11	4,00	2,88	0,98	0,10

TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
I	2957549	I	2957584	I	2288103	I	5427388	5895786	I	I	5895787

■ Recommended Starting Speeds [m/min]

Face Mills

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.

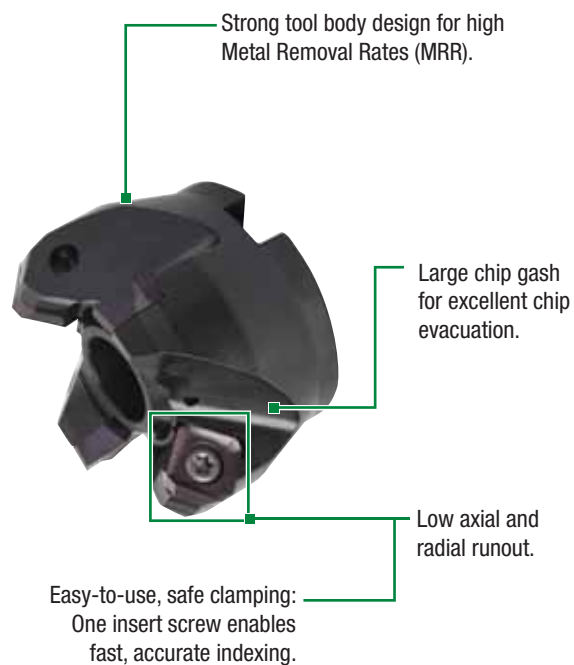
The Ideal Heavy-Duty Face Milling Platform •
M660 Series

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

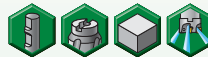


M660 SN1205..

Max depth of cut: 6,4mm

Lead angle: 45°
 Indexes per insert: 4
 Diameter: 20–160mm

Pages: F52–F57



M660 SN1505..

Max depth of cut: 8,4mm

Lead angle: 45°
 Indexes per insert: 4
 Diameter: 100mm

Pages: F58–F60



■ 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.

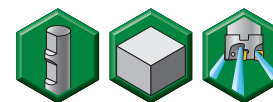
Integrated wiper facet: Good surface finish in heavy roughing applications.

Positive rake angle:

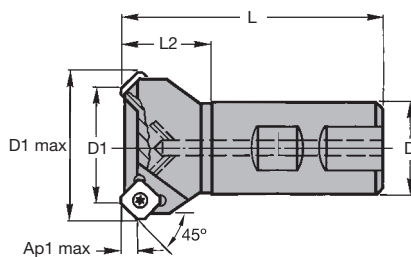
- Soft cutting action.
- Less spindle power requirement.
- Less chipping on workpiece in cast iron.
- Less burrs on workpiece in steel.
- High feed rate capability.



- Four cutting edges.
- Strong tool body design.
- Excellent chip evacuation.



Face Mills



■ Weldon Shanks

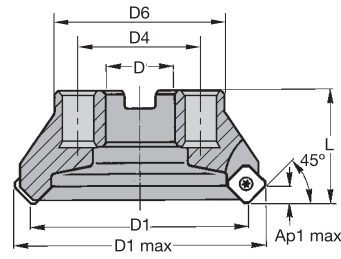
order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
2002367	12396202200	20	33,8	25	86	30	6,4	2	17000	Yes	0,30
2002370	12396202600	25	38,7	25	91	35	6,4	2	15000	Yes	0,35

■ 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**

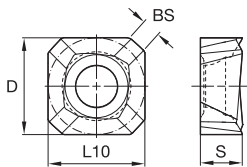


D1	insert screw	Nm	Torx driver
50	12148007200	3,5	12148007500
63	12148007200	3,5	12148007500
80	12148007200	3,5	12148007500
100	12148007200	3,5	12148007500
125	12148007200	3,5	12148007500
160	12148007200	3,5	12148007500

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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..



● first choice
○ alternate choice

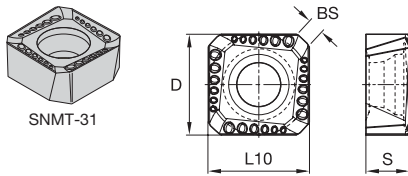
P	●	●	●	●	●	●	●	●
M	●	○	○	○	○	○	○	○
K	○	○	○	●	○	○	○	○
N	○	○	○	○	○	○	○	●
S	●	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○

■ SNKT-20

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TT125	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	TT125	THM
SNKT1205AZR21	4	12,70	12,70	5,56	1,54	0,15	-	2022373	-	5427383	-	2022374	2022375

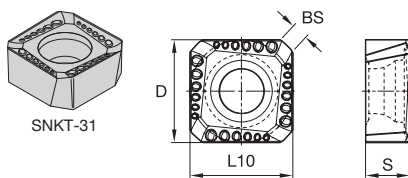


● first choice
○ alternate choice

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	TT125	THM
SNMT1205AZR31	4	12,70	12,70	5,56	1,54	0,16	●	●	●	●	●	●	●	●	●	●

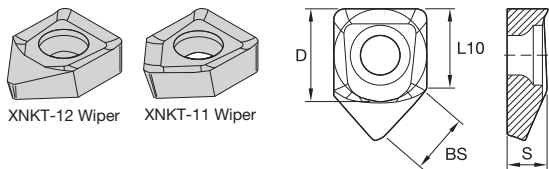


● first choice
○ alternate choice

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

■ SNKT-31

catalogue number	cutting edges	D	L10	S	BS	hm	TN6525	TN6540	TN7525	TN7535	WK15CM	WP40PM	TT125	THM
SNKT1205AZR31	4	12,70	12,70	5,56	1,54	0,16	○	○	○	○	○	○	○	○



● first choice
○ alternate choice

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

■ XNKT-12 Wiper

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TT125	THM
XNKT1205AZTR12	1	12,70	12,70	5,15	8,00	0,04	○	○	○	○	○	○	○

■ XNKT-11 Wiper

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TT125	THM
XNKT1205AZER11	1	12,70	12,70	5,15	8,00	0,04	○	○	○	○	○	○	○

■ Recommended Starting Speeds [m/min]

Face Mills

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.

Face Mills

Recommended Starting Feeds

■ Recommended Starting Feeds [mm]

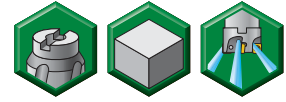
Light Machining	General Purpose	Heavy Machining
-----------------	-----------------	-----------------

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

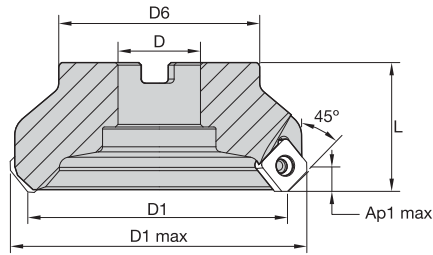
NOTE: Use "Light Machining" value as starting feed rate.



- Four cutting edges.
- Strong tool body design.
- Thick inserts for reliability.



Face Mills



■ 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



insert screw



Nm



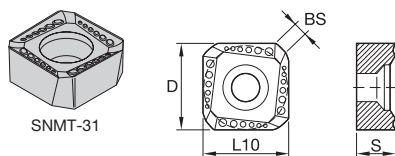
Torx driver

D1	100	12148007200	3,5	12148007500
----	-----	-------------	-----	-------------

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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..



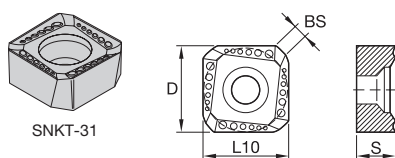
SNMT-31

● first choice
○ alternate choice

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



SNKT-31

● first choice
○ alternate choice

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]

Face Mills

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.

Making the Grade in Innovative Metalcutting Technology



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

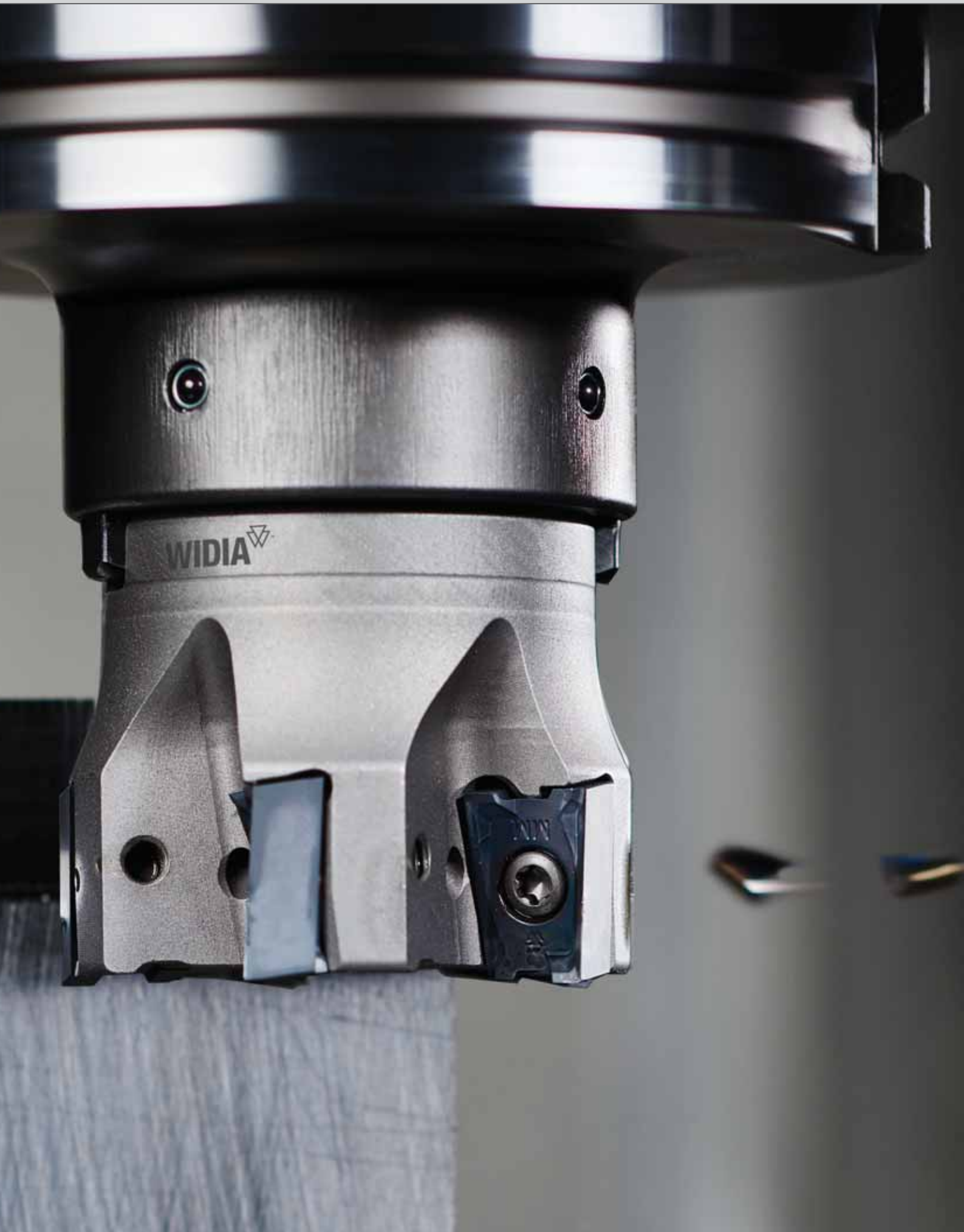
Victory™ Milling Grades

Our new Victory milling grades are designed to deliver higher productivity, longer tool life, and increased application versatility.

- 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.

To learn more about the benefits of the new **WIDIA™ Victory milling grades**, contact your local distributor.

WIDIA 



Indexable Milling • 90° Shoulder Mills

VSM11 • Versatile – Single-Sided 90° Shoulder Mill Platform	G2–G16
VSM17 • Versatile – Single-Sided 90° Shoulder Mill Platform	G18–G29
VSM490-15 • Double-Sided Shoulder Milling Platform with Four Cutting Edges	G30–G40
M680 • 90° Shoulder Mill Platform	G42–G51
M690 • Square Insert Shoulder Mill Platform	G52–G61



WIDIA™ Victory™ Shoulder Mill 11™ •
VSM11™

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.

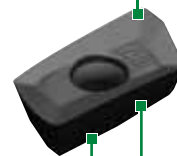
Features

- 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.

Multiple corner nose radii available.



Optimised cutting edge and positive rake face for reduced cutting forces and softer cutting action.

Innovative cutting geometry provides superior wall and surface finish.

90° Shoulder Mills



VSM11™

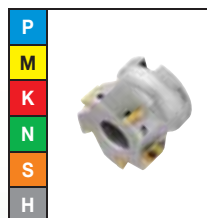
Max depth of cut: 11,7mm

Lead angle: 90°

Indexes per insert: 2

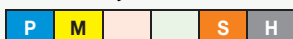
Diameter: 16–125mm

Pages: G4–G16



■ Insert Offering

XDCT-ML



Light to medium machining.
First choice for stainless steel
and titanium.
Periphery ground.

XDPT-MM



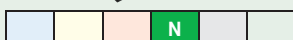
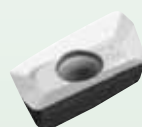
Medium to heavy machining.
First choice for general purpose.
Precision pressed to size.

XDPT-MH



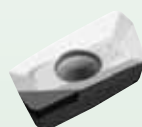
First choice for heavy-duty machining.
Steel and cast iron materials.
Precision pressed to size.

XDCT-ALP



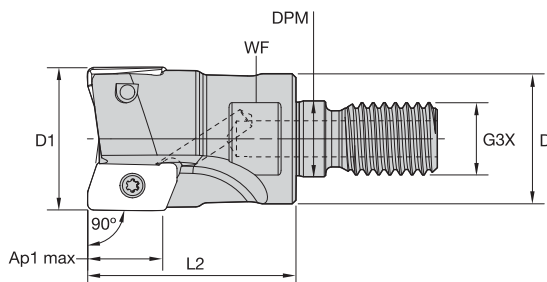
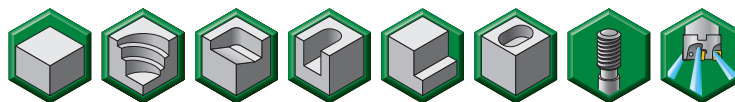
Roughing and finishing
of aluminium alloys.
High precision.
Periphery ground.

XDCW-PCD



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

192.432



Nm

1,0

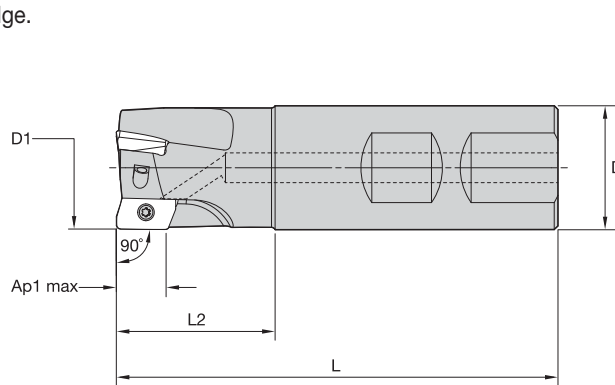
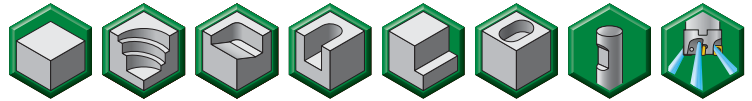


wrench

170.028

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page G16.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.



Shoulder Mills

■ **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

192.432



Nm

1,0

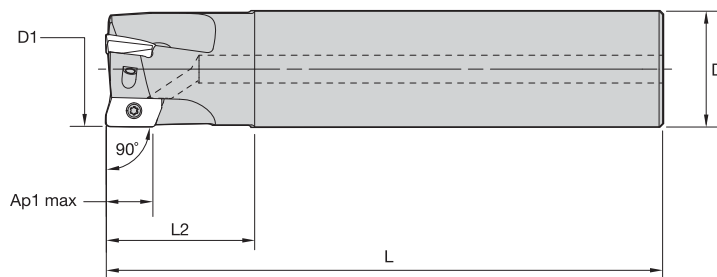
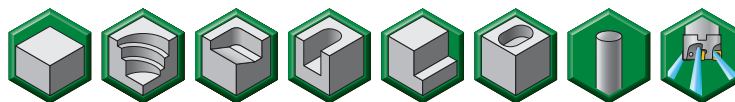


wrench

170.028

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page G16.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.



Shoulder Mills

■ 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

192.432



Nm

1,0

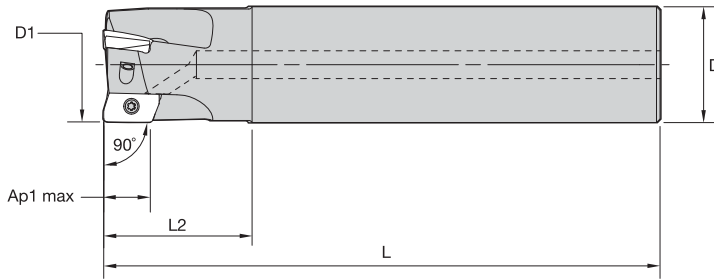
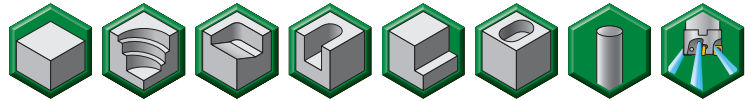


wrench

170.028

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page G16.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.



Shoulder Mills

■ 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

192.432



Nm

1,0

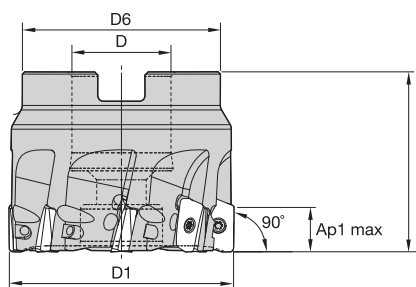
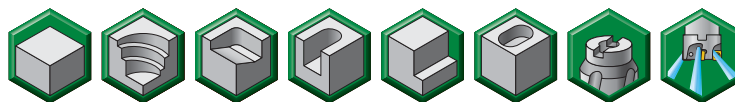


wrench

170.028

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page G16.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.



Shoulder Mills

■ 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



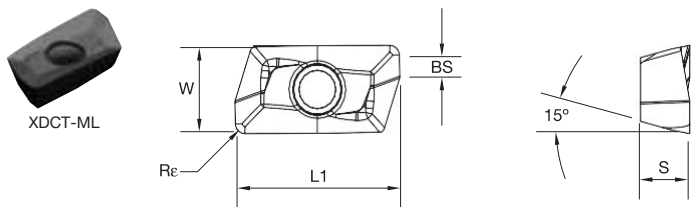
D1	insert screw	Nm	wrench	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw assembly
40,0	192.432	1,0	170.028	MS1294	MS1294CG	-
50,0	192.432	1,0	170.028	12146120500	MS1234CG	-
63,0	192.432	1,0	170.028	12146120500	MS1234CG	-
80,0	192.432	1,0	170.028	125.230	MS2038CG	-
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		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-

Shoulder Mills



• -ML is a light- to medium-machining geometry and is the first choice for stainless steel and titanium materials.

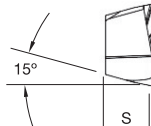
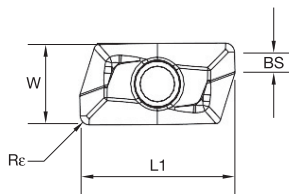
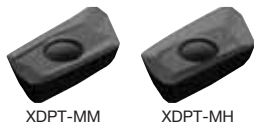
● first choice
○ alternate choice



	P	M	K	N	S	H
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



- first choice
- alternate choice



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

- -MM is a medium- to heavy-machining geometry and is the first choice for general purpose and universal applications.

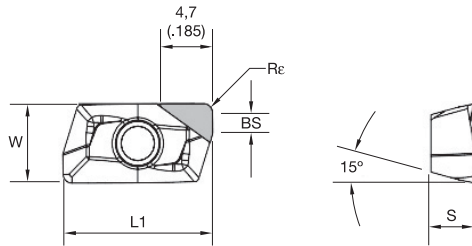
■ XDPT-MM

catalogue number	cutting edges	L1	BS	S	W	Re	hm	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
XDPT110404PDSRMM	2	13,43	2,06	4,00	6,90	0,40	0,06	●	○	○	○	○	○	○	○
XDPT110408PDSRMM	2	13,44	1,68	4,00	6,90	0,79	0,06	○	○	○	○	○	○	○	○
XDPT110412PDSRMM	2	13,44	1,29	4,00	6,90	1,20	0,06	○	○	○	○	○	○	○	○
XDPT110416PDSRMM	2	13,51	0,85	4,13	6,95	1,60	0,06	○	○	○	○	○	○	○	○
XDPT110420PDSRMM	2	13,51	0,45	4,13	6,95	2,00	0,06	○	○	○	○	○	○	○	○
XDPT110424PDSRMM	2	13,37	—	4,01	6,94	2,40	0,06	○	○	○	○	○	○	○	○
XDPT110431PDSRMM	2	12,91	—	4,00	6,89	3,10	0,06	○	○	○	○	○	○	○	○

- -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	Re	hm	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
XDPT110408PDSRMH	2	13,44	1,68	4,00	6,90	0,79	0,13	○	○	○	○	○	○	○	○
XDPT110412PDSRMH	2	13,44	1,29	4,00	6,90	1,20	0,13	○	○	○	○	○	○	○	○
XDPT110416PDSRMH	2	13,44	0,90	4,00	6,90	1,59	0,13	○	○	○	○	○	○	○	○



- -PCD is the first choice for roughing and finishing of abrasive non-ferrous materials and aluminium alloys.



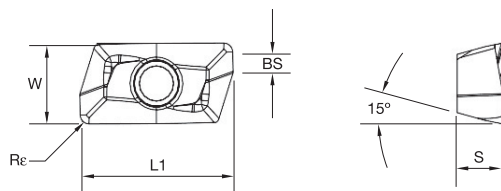
P	●
M	○
K	○
N	●
S	○
H	○

- first choice
- alternate choice



XDCW-PCD

catalogue number	cutting edges	L1	BS	S	W	Re	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



- -ALP is the first choice for roughing and finishing of aluminium alloys.



P	●
M	○
K	○
N	●
S	○
H	○

- first choice
- alternate choice

XDCT-ALP

catalogue number	cutting edges	L1	BS	S	W	Re	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	0,02	6055634	6055635
XDCT110416PDFRALP	2	13,44	0,88	4,00	6,89	1,60	0,02	6055598	6055599
XDCT110424PDFRALP	2	13,44	0,16	4,00	6,88	2,40	0,02	6055600	6055631
XDCT110432PDFRALP	2	12,86	—	4,00	6,89	3,20	0,02	6055632	6055633

■ Recommended Starting Speeds [m/min]

Shoulder Mills

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.

Shoulder Mills

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.

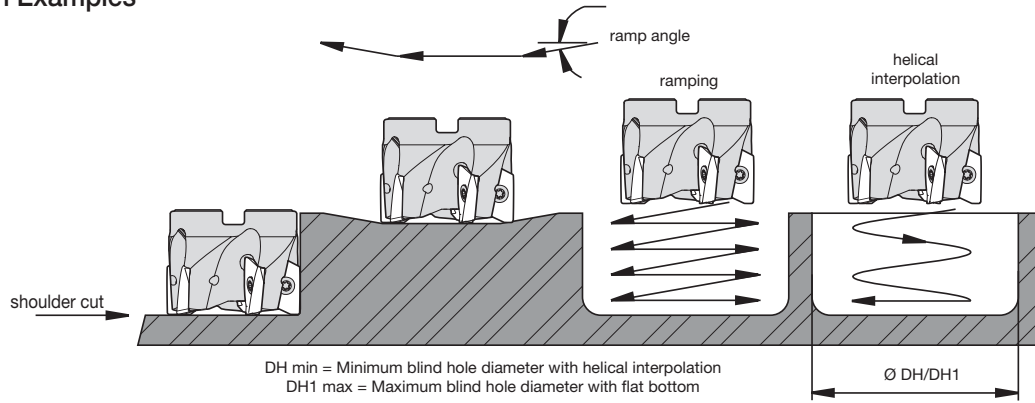


■ VSM11 Starter Kits • Metric

order number	catalogue number	diameter D1 (mm)	cutter body type	material group	content				
					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	VSM11KITS050Z05WP40PM	50	Shell	P	VSM11D050Z05S022XD11	10	XDPT110408PDSRMM	WP40PM	5
5719051	VSM11KITS040Z06WP40PM	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

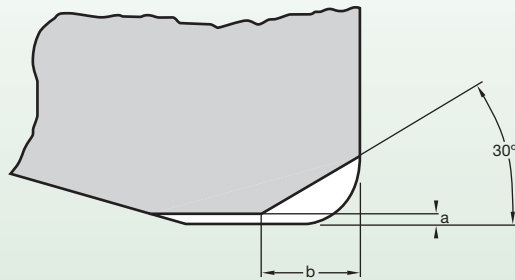


Shoulder Mills

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.

**Modification Instructions for Use of Larger Radii Inserts
(Shoulder Mills and Helical Mills)**



insert corner radius	material to remove	
	a	b
3,1mm	0,2mm	1,8mm



Shoulder Mills

Engineered to Achieve Superior Surface Quality



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

Victory™ Shoulder Mill Series

The Victory Shoulder Mill (VSM) family of tools provides a comprehensive solution for your most challenging shoulder milling applications. The unique design of the VSM11™, VSM17™, and VSM490™ is capable of producing a true 90° wall in multiple material types. When combined with the latest WIDIA™ Victory™ grades, VSM from WIDIA provides superior performance at high speeds.

- Innovative cutting geometry provides superior wall and surface finish.
- State-of-the-art step-down capability.
- Real soft cutting action results in lower cutting forces and low machine power consumption.
- VSM11 and VSM17 offer aggressive ramping capabilities.
- VSM490 provides outstanding step-down capabilities in applications that require multiple passes.

To learn more about the benefits of the WIDIA™ Victory Shoulder Mill Series, contact your local distributor.

WIDIA 

WIDIA™ Victory™ Shoulder Mill 17™ •
VSM17™



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.

Multiple corner nose radii available.



Optimised cutting edge and positive rake face for reduced cutting forces and softer cutting action.

Innovative cutting geometry provides superior wall and surface finish.

90° Shoulder Mills

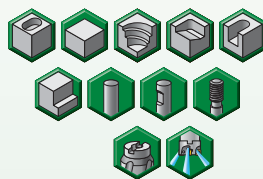


VSM17™

Max depth of cut: 16,33mm

Lead angle: 90°
 Indexes per insert: 2
 Diameter: 25–160mm

Pages: G20–G29



■ Insert Offering

XDPT-MM



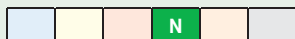
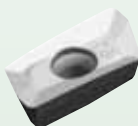
Medium to heavy machining.
 First choice for general purpose.
 Precision pressed to size.

XDPT-MH



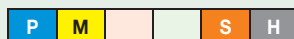
First choice for heavy-duty machining.
 Steel and cast iron materials.
 Precision pressed to size.

XDCT-ALP

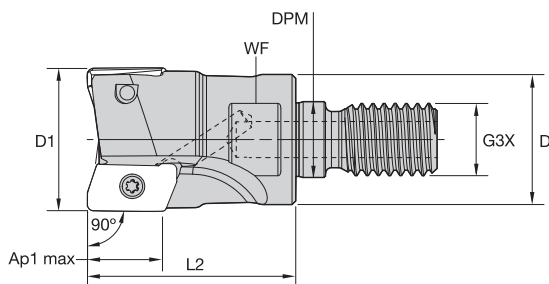
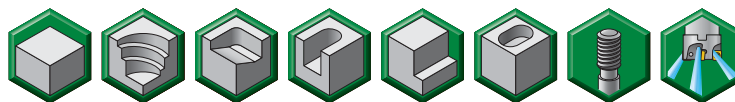


Roughing and finishing
 of aluminium alloys.
 High precision.
 Periphery ground.

XDCT-ML



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
5988132	VSM17D32Z02M016XD17	32	29	17,0	M16	40	24	16,3	2	5.7	Yes	34700	0,18
5988092	VSM17D032Z03M16XD17	32	29	17,0	M16	40	24	16,3	3	5.7	Yes	34700	0,17
5988131	VSM17D40Z03M016XD17	40	29	17,0	M16	40	24	16,2	3	4.0	Yes	29800	0,20
5988093	VSM17D040Z04M16XD17	40	29	17,0	M16	40	24	16,2	4	4.0	Yes	29800	0,20

■ Spare Parts



insert screw

191.725



Nm

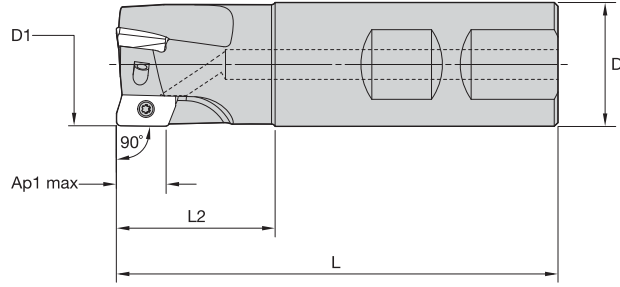
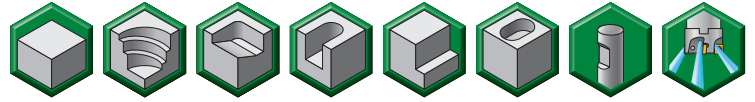
3,5



wrench

170.025

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page G16.



Shoulder Mills

■ **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

191.725



Nm

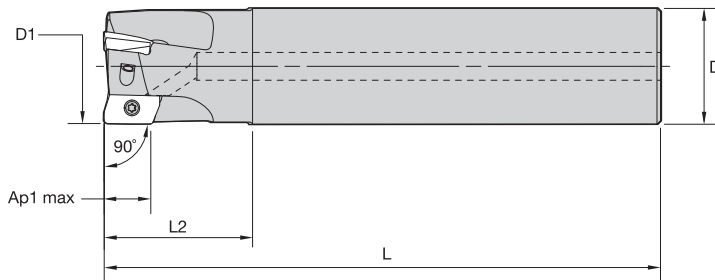
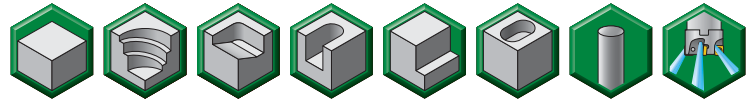
3,5



wrench

170.025

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page G16.



Shoulder Mills

■ 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

191.725



Nm

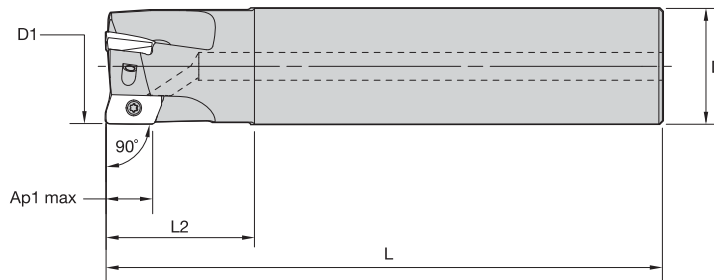
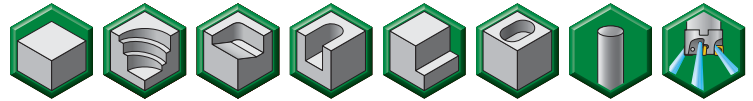
3,5



wrench

170.025

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page G16.



Shoulder Mills

■ 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

191.725



Nm

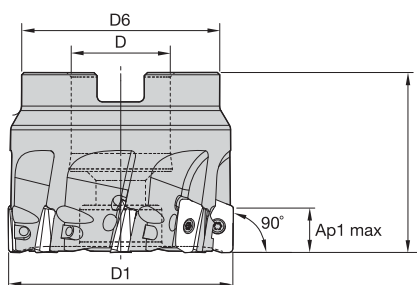
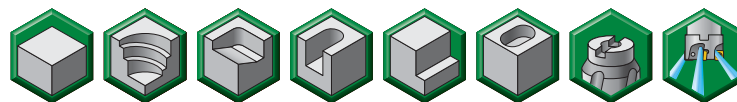
3,5



wrench

170.025

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page G16.

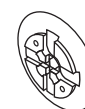


Shoulder Mills

■ 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 G16.

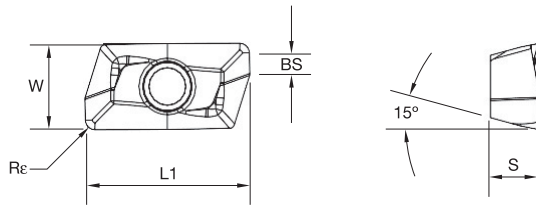
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	.S..MM	WP25PM	.S..MM	WP25PM	-	-

Shoulder Mills



XDCT-ML



- first choice
- alternate choice



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

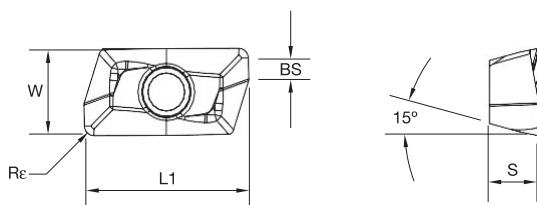
XDCT-ML

catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
XDCT170404PEERML	2	19,15	2,62	4,90	9,60	0,40	0,04	●	●	○	○	○	○
XDCT170408PEERML	2	19,15	2,22	4,90	9,60	0,80	0,04	●	●	○	○	○	○
XDCT170412PEERML	2	19,16	1,82	4,90	9,60	1,20	0,04	●	●	○	○	○	○
XDCT170416PEERML	2	19,17	1,42	4,90	9,60	1,60	0,04	●	●	○	○	○	○
XDCT170420PEERML	2	19,17	1,01	4,90	9,60	2,00	0,04	●	●	○	○	○	○
XDCT170424PEERML	2	19,17	0,63	4,90	9,60	2,40	0,04	●	●	○	○	○	○
XDCT170432PEERML	2	18,85	—	4,88	9,59	3,20	0,04	●	●	○	○	○	○
XDCT170440PEERML	2	18,33	—	4,87	9,59	4,00	0,04	●	●	○	○	○	○

Shoulder Mills



XDCT-ALP

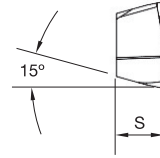
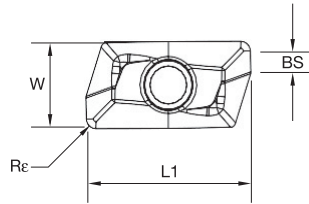


● first choice
○ alternate choice

P			
M			
K			
N	●	●	
S			
H			

■ XDCT-ALP

catalogue number	cutting edges	L1	BS	S	W	Re	hm	WIDIA	
								WN10HM	WN25PM
XDCT170404PEFRALP	2	19,15	2,62	4,90	9,60	0,40	0,02	6007341	6007220
XDCT170408PEFRALP	2	19,15	2,22	4,90	9,60	0,80	0,02	6007345	6007344
XDCT170412PEFRALP	2	19,16	1,82	4,90	9,60	1,20	0,02	6007342	6001537
XDCT170416PEFRALP	2	19,17	1,42	4,90	9,60	1,60	0,02	6001256	6001254
XDCT170420PEFRALP	2	19,17	1,01	4,90	9,60	2,00	0,02	6001252	6001254
XDCT170424PEFRALP	2	19,17	0,63	4,90	9,60	2,40	0,02	6001238	6001240
XDCT170432PEFRALP	2	18,85	—	4,88	9,59	3,20	0,02	6001238	6001240
XDCT170440PEFRALP	2	18,33	—	4,87	9,59	4,00	0,02	6001238	6001240



● first choice
○ alternate choice

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

■ XDPT-MM

catalogue number	cutting edges	L1	BS	S	W	Re	hm	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
XDPT170404PESRMM	2	19,15	2,52	4,90	9,60	0,40	0,10	●	○	○	○	○	○
XDPT170408PESRMM	2	19,15	2,15	4,90	9,60	0,80	0,10	●	○	○	○	○	○
XDPT170412PESRMM	2	19,16	1,77	4,90	9,60	1,20	0,10	●	○	○	○	○	○
XDPT170416PESRMM	2	19,17	1,38	4,90	9,60	1,60	0,10	●	○	○	○	○	○
XDPT170420PESRMM	2	19,17	0,99	4,90	9,60	2,00	0,10	●	○	○	○	○	○
XDPT170424PESRMM	2	19,17	0,62	4,90	9,60	2,40	0,10	●	○	○	○	○	○
XDPT170432PESRMM	2	18,85	—	4,89	9,59	3,20	0,10	●	○	○	○	○	○
XDPT170440PESRMM	2	18,33	—	4,87	9,59	4,00	0,10	●	○	○	○	○	○

■ XDPT-MH

catalogue number	cutting edges	L1	BS	S	W	Re	hm	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
XDPT170408PESRMH	2	19,15	2,10	4,91	9,60	0,80	0,13	●	○	○	○	○	○
XDPT170412PESRMH	2	19,16	1,73	4,91	9,60	1,20	0,13	●	○	○	○	○	○

Shoulder Mills

■ Recommended Starting Speeds [m/min]

Shoulder Mills

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

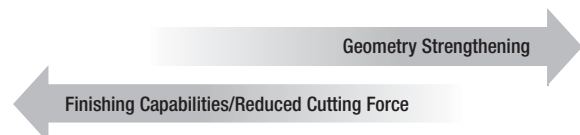
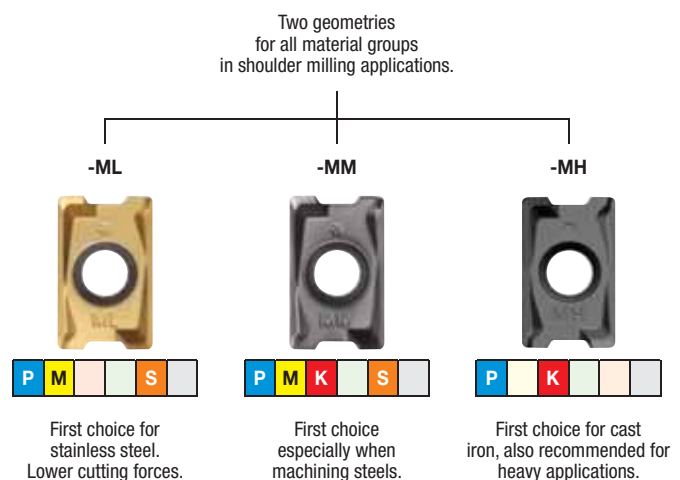
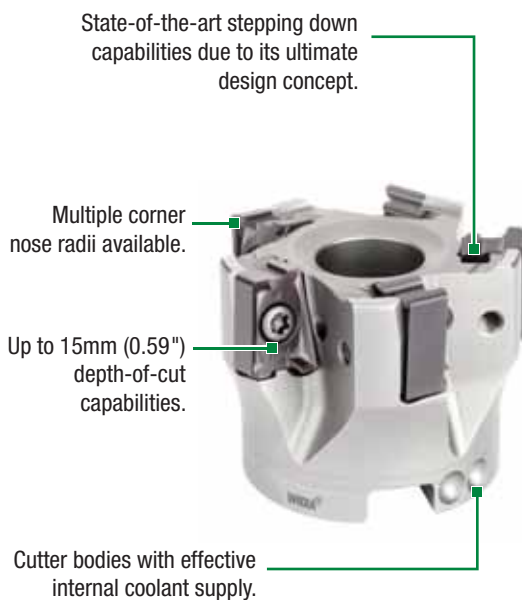
Double-Sided Shoulder Mill •
VSM490™ -15

VSM490-15

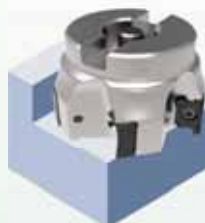


WIDIA™ Victory™ Shoulder Milling Series (VSM series) is specially engineered to achieve excellent surface quality as well as higher material removal rates in shoulder milling applications. The VSM490 series, with its unique design, enables the tool to be applied in multiple passes (stepping down) with 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

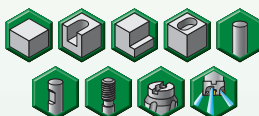
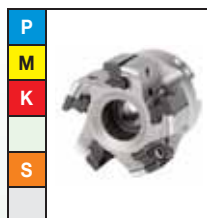
Max depth of cut: 15mm

Lead angle: 90°

Indexes per insert: 4

Diameter: 25–160mm

Pages: G32–G40



VSM490™-15 • Unbeatable Performance in Shoulder Milling

- “Stepless” solution.
- No mismatch when machining walls in different steps.

Innovative cutting geometry provides superior wall and surface finish.



Integrated wiper facet for excellent floor finishing.

Competitor Tool • Wall Quality



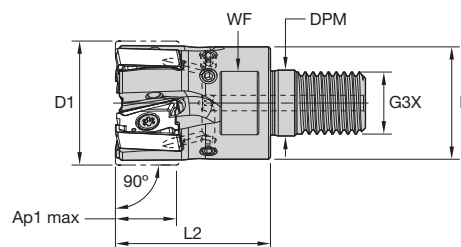
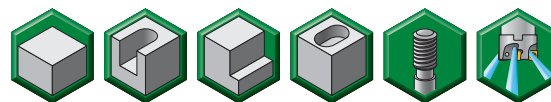
Traditional tools are designed to achieve a 90° wall, but exhibit poor performance when machining walls in multiple passes.

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.



Shoulder Mills

■ 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

MS-2071



Nm

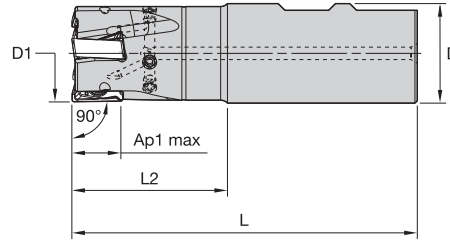
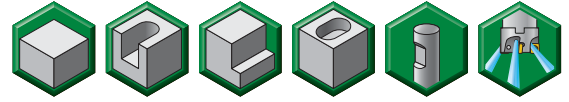
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Torx Plus driver

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.



Shoulder Mills

■ **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

MS-2071



Nm

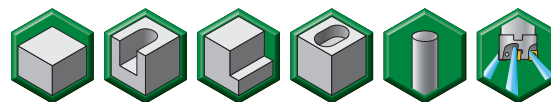
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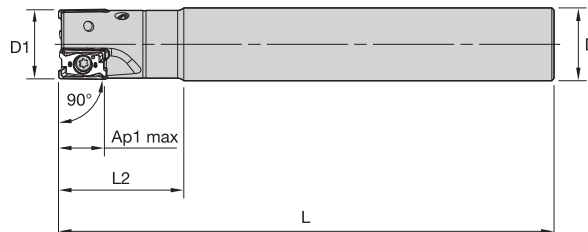
Torx Plus driver

DT151P

- 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.



Shoulder Mills



■ 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

MS-2071



Nm

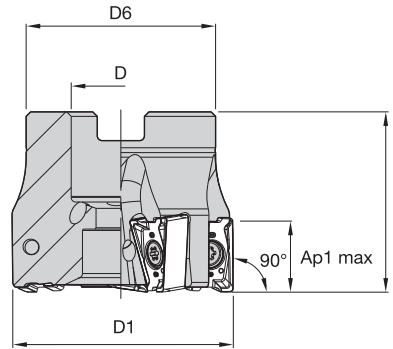
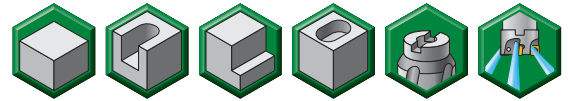
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Torx Plus driver

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.



Shoulder Mills

■ 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

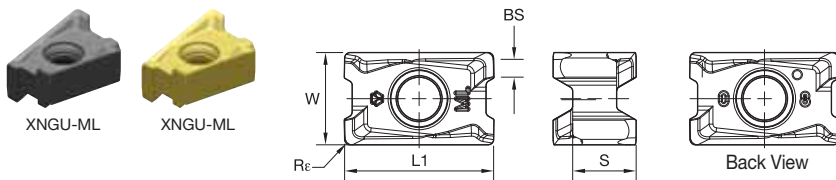
D1	insert screw	Nm	Torx Plus driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw assembly	coolant lock screw	coolant shower plate
40	MS-2071	3,5	DT15IP	125.825	MS1294CG	—	—	—
50	MS-2071	3,5	DT15IP	125.025	MS1234CG	—	—	—
63	MS-2071	3,5	DT15IP	125.025	MS1234CG	—	—	—
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

Shoulder Mills

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-	-	-	-	-



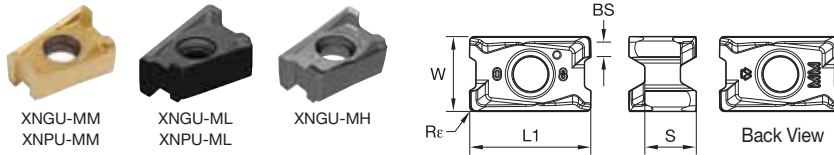
• -ML geometry is the first choice for machining stainless steel. With reduced cutting forces, this is recommended for improved wall finishing capabilities in steels.

● first choice
○ alternate choice

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	|	|



- -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

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

■ Recommended Starting Speeds [m/min]

Shoulder Mills

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 Programme 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 programme 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 

Your General-Purpose Shoulder Mill Solution •

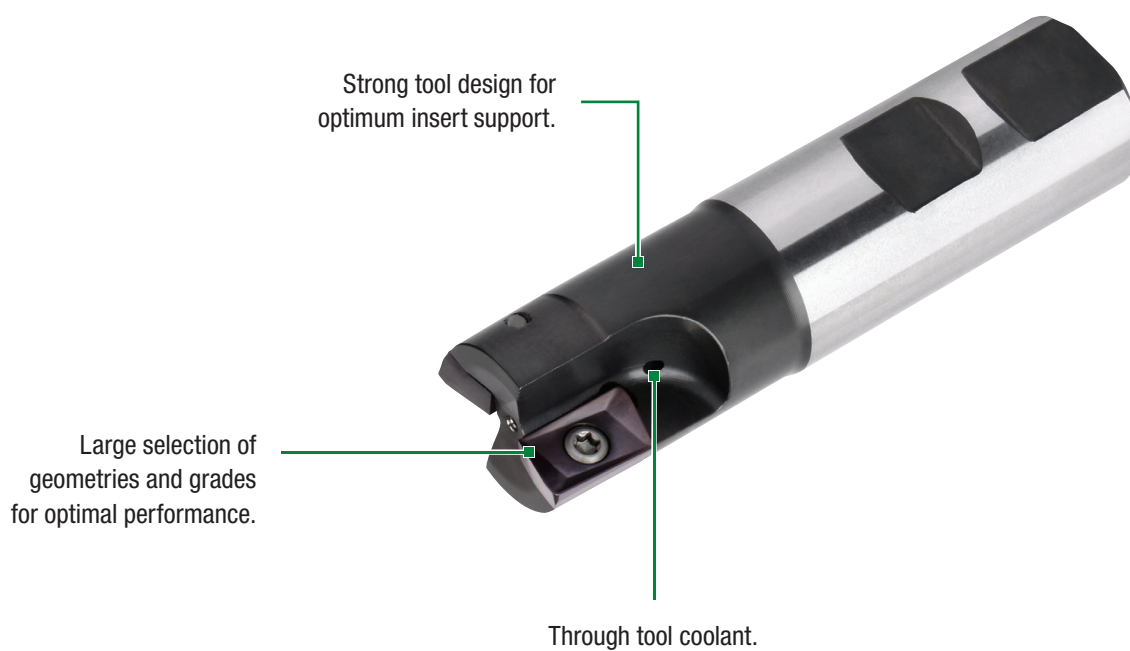
M680 Series 90° Shoulder Mill

For a large selection of geometries and grades for optimal stable insert support, look no further than the M680 Series for your most challenging milling operations. The small, strong inserts provide reliable results every time.

M680



- Wide selection of inserts to machine all material types.
- Two insert sizes optimise your application.
- Pockets designed for optimal accuracy with 90° shoulders.



90° Shoulder Mills



M680

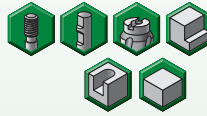
Max depth of cut: 14,0mm

Lead angle: 90°

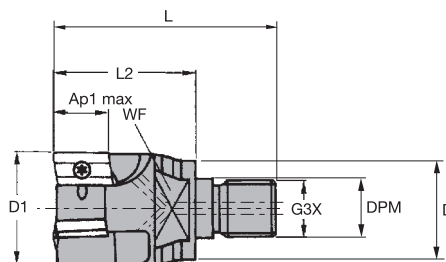
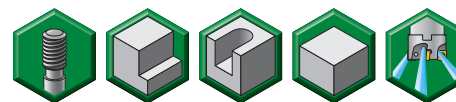
Indexes per insert: 2

Diameter: 25mm–160mm

Pages: G44–G51



- General-purpose shoulder mill.
- Excellent selection of grades and geometries.
- Strong insert providing high reliability.



Shoulder Mills

■ Screw-On

order number	catalogue number	D1	D	DPM	G3X	L	L2	WF	Ap1 max	Z	max RPM	coolant supply	kg
2003477	12396932600	25	24	12,5	M12	52	30	19	14,0	2	8800	Yes	0,2
2003517	12396933000	32	28	17,0	M16	63	40	22	14,0	3	7800	Yes	0,3
2003521	12396933200	35	28	17,0	M16	63	40	22	14,0	3	7200	Yes	0,3
2003540	12396933400	40	28	17,0	M16	63	40	22	14,0	4	7000	Yes	0,3

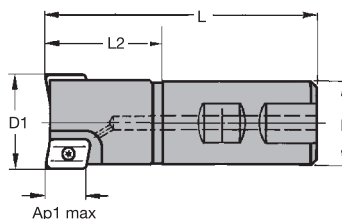
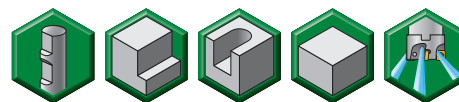
NOTE: Standard milling cutters will accept insert nose radii up to 2mm without modification.
For tool body modification instructions, see page G16.

■ Spare Parts



D1	insert screw	Nm	Torx driver
25	12148038800	4,0	12148000600
32	12148038800	4,0	12148000600
35	12148038800	4,0	12148000600
40	12148038800	4,0	12148000600

- General-purpose shoulder mill.
- Excellent selection of grades and geometries.
- Strong insert offering high reliability.



Shoulder Mills

■ **Weldon Shanks**

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
2003475	12396922600	25	25	96	40	14,0	2	17500	Yes	0,3
2003515	12396923000	32	32	100	40	14,0	3	15500	Yes	0,5
2003539	12396923400	40	32	110	50	14,0	4	14000	Yes	0,8

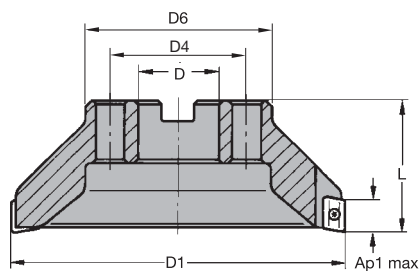
NOTE: Standard milling cutters will accept insert nose radii up to 2mm without modification.
For tool body modification instructions, see page G16.

■ **Spare Parts**



D1	insert screw	Nm	Torx driver
25	12148038800	4,0	12148000600
32	12148038800	4,0	12148000600
40	12148038800	4,0	12148000600

- General-purpose shoulder mill.
- Excellent selection of grades and geometries.
- Strong insert providing high reliability.



Shoulder Mills

■ Shell Mills

order number	catalogue number	D1	D	D4	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2003535	12396903600	40	22	—	39	45	14,0	4	14000	Yes	0,2
2003553	12396903800	50	22	—	42	40	14,0	4	12500	Yes	0,3
2003554	12396904000	50	22	—	42	40	14,0	5	12500	Yes	0,3
2003561	12396904200	63	22	—	50	40	14,0	5	11000	Yes	0,5
2003578	12396904600	80	27	—	60	50	14,0	6	9500	Yes	1,0
2003594	12396905000	100	32	—	78	50	14,0	8	8500	No	1,4
2003681	12396905400	125	40	—	89	63	14,0	9	7500	No	2,6
2003782	12396905800	160	40	66,7	90	63	14,0	12	7000	No	3,4

NOTE: Standard milling cutters will accept insert nose radii up to 2mm without modification.
For tool body modification instructions, see page G16.

■ Spare Parts

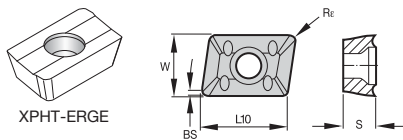


D1	insert screw	Nm	Torx driver
40	12148038800	4,0	12148000600
50	12148038800	4,0	12148000600
63	12148038800	4,0	12148000600
80	12148038800	4,0	12148000600
100	12148038800	4,0	12148000600
125	12148038800	4,0	12148000600
160	12148038800	4,0	12148000600

■ **Insert Selection Guide**

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1-P2	XPHT-GE	WP40PM	XPHT..	WP40PM	XPHT..	WP40PM
P3-P4	XPHT-GE	TN6540	XPHT..	WP40PM	XPHT..	WP40PM
P5-P6	XPHT-GE	TN6540	XPHT..	WP40PM	XPHT..	WP40PM
M1-M2	XPHT-GE	TN6540	XPHT..	TN6540	XPHT-MR	TN6540
M3	XPHT-GE	TN7535	XPHT..	WP40PM	XPHT-MR	TN7535
K1-K2	XPHT-GE	TN6510	XPHT..	TN6520	XPHT-MR	WK15CM
K3	XPHT-GE	TN6510	XPHT..	TN7535	XPHT-MR	WK15CM
N1-N2	XPHT-ALP	TN6501	XPHT-ALP	TN6501	XPHT-ALP	TN6501
N3	XPHT-ALP	TN6501	XPHT-ALP	TN6501	XPHT-ALP	TN6501
S1-S2	XPHT-GE	TN6540	XPHT..	TN6540	XPHT-MR	TN6540
S3	XPHT-GE	WS30PM	XPHT..	TN6540	XPHT-MR	TN6540
S4	XPHT-GE	TN6540	XPHT..	TN6540	XPHT-MR	TN6540
H1	XPHT-GE	WS30PM	XPHT..	TN6540	XPHT-MR	TN6540

Shoulder Mills

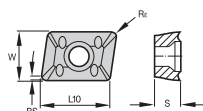
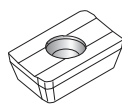
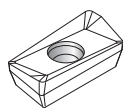


- first choice
- alternate choice

P				
M				
K				○
N	●	●	●	
S				○
H				

■ **XPHT-ALP**

catalogue number	cutting edges	W	L10	S	BS	Re	hm	TN6501	THM-U	THM
XPHT160404ALP	2	9,80	15,67	4,66	1,70	0,40	0,08	|	2031794	|
XPHT160408ALP	2	9,80	15,67	4,66	1,70	0,80	0,08	2964136	2031797	|
XPHT160412ALP	2	9,80	15,67	4,66	1,40	1,20	0,08	|	2031799	|



● first choice
○ alternate choice

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

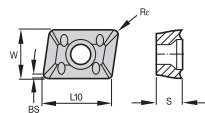
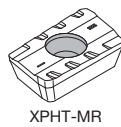
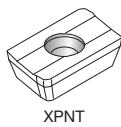
Shoulder Mills

XPHT-ERGE

catalogue number	cutting edges	W	L10	S	BS	Re	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM	WP40PM	TTI25	
XPHT160408ERGE	2	9,44	15,67	4,76	1,80	0,80	0,12	●	○	○	○	○	○	○	○	○	○	○	○
XPHT160412ERGE	2	9,44	15,67	4,76	1,50	1,20	0,12	○	○	○	○	○	○	○	○	○	○	○	○
XPHT160416ERGE	2	9,44	15,67	4,76	0,80	1,67	0,06	○	○	○	○	○	○	○	○	○	○	○	○

XPHT

catalogue number	cutting edges	W	L10	S	BS	Re	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM	WP40PM	TTI25
XPHT160404	2	9,53	15,67	4,76	2,17	0,40	0,16	○	○	○	○	○	○	○	○	○	○	○
XPHT160408	2	9,53	15,67	4,76	1,80	0,80	0,16	○	○	○	○	○	○	○	○	○	○	○
XPHT160412	2	9,53	15,67	4,76	1,50	1,20	0,16	○	○	○	○	○	○	○	○	○	○	○
XPHT160416	2	9,53	15,67	4,76	0,80	1,60	0,16	○	○	○	○	○	○	○	○	○	○	○
XPHT160420	2	9,53	15,67	4,76	0,50	2,00	0,16	○	○	○	○	○	○	○	○	○	○	○
XPHT160425	2	9,53	15,67	4,76	1,20	2,50	0,16	○	○	○	○	○	○	○	○	○	○	○
XPHT160432	2	9,53	15,67	4,76	1,20	3,17	0,16	○	○	○	○	○	○	○	○	○	○	○
XPHT160440	2	9,53	15,67	4,76	1,20	4,00	0,16	○	○	○	○	○	○	○	○	○	○	○



- first choice
- alternate choice

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

XPNT

catalogue number	cutting edges	W	L10	S	BS	Re	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM	WP40PM	TT125
XPNT160412	2	9,53	15,88	4,79	1,20	1,20	0,16	2029074	-	-	2964141	2964174	2030333	2030319	5427395	-	-	-

XPHT-MR

catalogue number	cutting edges	W	L10	S	BS	Re	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM	WP40PM	TT125
XPHT160412MR	2	9,53	15,67	4,76	1,70	1,20	0,18	2029056	-	-	-	2964142	2029058	2030378	5427390	-	-	-

Shoulder Mills

■ Recommended Starting Speeds [m/min]

Shoulder Mills

Material Group		THM-U	TN2510	TN6501	TN6510	TN6520	TN6525	TN6540
P	0	- - -	- - -	- - -	- - -	- - -	340 265 235	300 235 200
	1	- - -	550 485 450	- - -	- - -	- - -	340 265 235	300 235 200
	2	- - -	340 310 275	- - -	- - -	- - -	265 210 180	210 160 140
	3	- - -	310 275 255	- - -	- - -	- - -	235 180 155	180 140 115
	4	- - -	230 215 190	- - -	- - -	- - -	195 140 120	150 110 90
	5	- - -	275 250 230	- - -	- - -	- - -	260 195 165	200 150 125
	6	- - -	190 170 145	- - -	- - -	- - -	170 135 110	135 100 85
M	1	- - -	225 200 175	- - -	- - -	- - -	160 100 65	110 65 50
	2	- - -	205 175 160	- - -	- - -	- - -	100 65 40	65 40 35
	3	- - -	160 145 125	- - -	- - -	- - -	105 65 45	70 40 35
K	1	190 170 150	350 300 250	- - -	400 290 215	375 265 190	230 205 185	185 170 150
	2	- - -	300 250 210	- - -	350 235 170	325 210 160	180 160 150	145 130 115
	3	- - -	250 210 165	- - -	280 215 165	250 190 135	150 135 120	130 120 105
N	1	2000 1200 1000	- - -	2000 1200 1000	- - -	- - -	- - -	- - -
	2	1365 815 665	- - -	1365 815 665	- - -	- - -	- - -	- - -
	3	800 500 400	- - -	800 500 400	- - -	- - -	- - -	- - -
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	- - -	- - -	- - -	- - -	- - -

(continued)

(Recommended Starting Speeds [m/min] – continued)

Material Group		TN7525			TN7535			TTI25			WK15CM			WP40PM			WS30PM		
P	0	340	260	235	455	395	370	360	300	250	-	-	-	295	260	245	-	-	-
	1	340	260	235	455	395	370	360	300	250	-	-	-	295	260	245	-	-	-
	2	260	210	180	280	255	230	260	210	180	-	-	-	250	215	180	-	-	-
	3	235	180	155	255	230	205	260	210	180	-	-	-	230	195	160	-	-	-
	4	195	140	120	190	175	160	220	180	150	-	-	-	205	170	135	-	-	-
	5	260	195	165	260	230	210	265	195	165	-	-	-	170	155	135	-	-	-
	6	170	135	110	160	135	110	120	90	75	-	-	-	150	115	90	-	-	-
M	1	205	185	155	205	185	155	400	260	180	-	-	-	195	170	155	225	200	185
	2	185	160	140	185	160	140	270	170	120	-	-	-	175	150	125	205	180	145
	3	145	130	115	145	130	115	265	175	120	-	-	-	130	115	90	155	135	105
K	1	315	235	200	295	265	240	185	155	130	420	385	340	-	-	-	-	-	-
	2	270	200	165	235	210	190	150	120	105	335	295	275	-	-	-	-	-	-
	3	200	165	140	195	175	160	120	105	85	280	250	230	-	-	-	-	-	-
N	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S	1	-	-	-	-	-	-	-	-	-	-	-	-	40	35	30	45	40	30
	2	-	-	-	-	-	-	-	-	-	-	-	-	40	35	30	45	40	30
	3	-	-	-	-	-	-	-	-	-	-	-	-	50	40	30	55	45	30
	4	-	-	-	-	-	-	-	-	-	-	-	-	65	50	35	85	60	40
H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Shoulder Mills

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%			
XPHT-ALP	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	XPHT-ALP
XPHT-GE	0,19	0,47	0,70	0,14	0,34	0,50	0,11	0,26	0,38	0,09	0,22	0,33	0,08	0,20	0,30	XPHT-GE
XPHT..	0,22	0,56	0,82	0,16	0,40	0,59	0,12	0,30	0,44	0,10	0,26	0,38	0,10	0,24	0,35	XPHT..
XPNT..	0,22	0,56	0,82	0,16	0,40	0,59	0,12	0,30	0,44	0,10	0,26	0,38	0,10	0,24	0,35	XPNT..
XPHT-MR	0,23	0,59	0,92	0,17	0,43	0,66	0,13	0,32	0,50	0,11	0,28	0,43	0,10	0,25	0,40	XPHT-MR

NOTE: Use "Light Machining" value as starting feed rate.

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.

Positive pockets and geometry for free cutting action.

Strong tool design for optimum insert support.

Accurate PSTS inserts offer excellent shoulder finish.

Designed for optimal chip evacuation.



90° Shoulder Mills



M690 SD1204..

Max depth of cut: 10mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–160mm

Pages: G54–G57

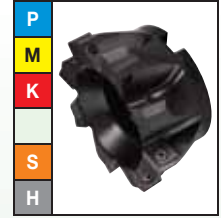


M690 SD1506..

Max depth of cut: 12mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–125mm

Pages: G58–G61



■ Insert Offering

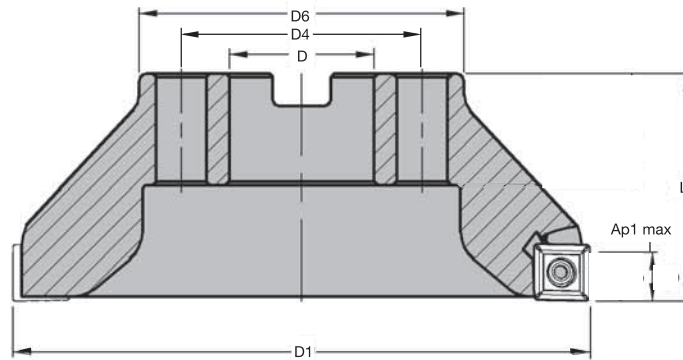
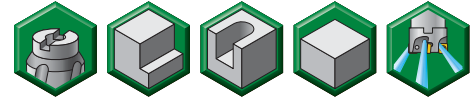


12mm iC insert



15mm iC insert

- Four cutting edges.
- 90° shoulders.
- Excellent for slot and profile milling.



Shoulder Mills

■ 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 G16.

■ Spare Parts



insert screw

12148037700



Nm

4,0



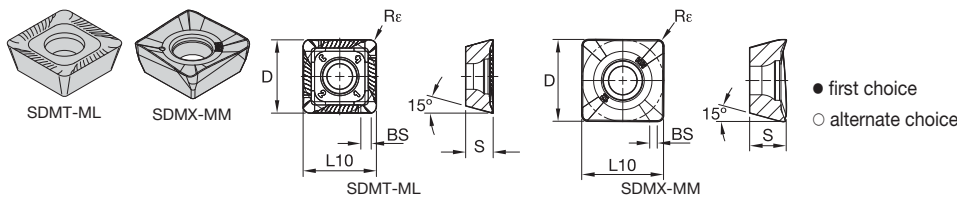
Torx driver

12148000600

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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..



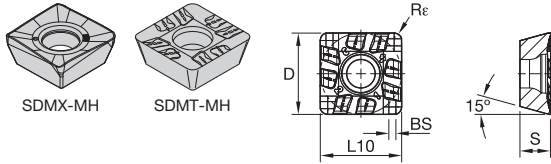
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M	●	○	○	○	○	○	○	○	○
K	●	○	○	○	○	○	○	○	○
N	●								
S	●								
H	●								

■ SDMT-ML

catalogue number	cutting edges	D	L10	S	BS	Re	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	Re	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	-	-	-	-



● first choice
○ alternate choice

P	○	○	○	○	○	○	○	○	○
M	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○

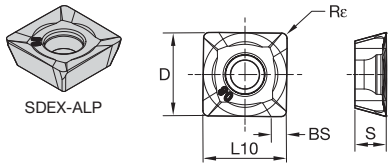
Shoulder Mills

■ SDMX-MH

catalogue number	cutting edges	D	L10	S	BS	Re	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMX120408RMH	4	12,70	12,70	4,76	1,93	0,80	0,14	■	■	■	■	■	■	■	■
SDMX120412RMH	4	12,70	12,70	4,76	1,54	1,20	0,14	■	○	○	○	○	○	○	■
SDMX120416RMH	4	12,70	12,70	4,76	1,50	1,60	0,14	■	■	■	○	○	○	○	■

■ SDMT-MH

catalogue number	cutting edges	D	L10	S	BS	Re	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMT1204PDRMH	4	12,70	12,70	4,81	1,10	1,20	0,14	○	○	○	○	○	○	○	○



● first choice
○ alternate choice

P	○	○	○	○	○	○	○	○	○
M	○	○	○	○	○	○	○	○	○
K	○	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○

■ SDEX-ALP

catalogue number	cutting edges	D	L10	S	BS	Re	hm	THM-U
SDEX120408FRALP	4	12,70	12,70	4,76	1,52	0,80	0,02	5281790

Shoulder Mills

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.

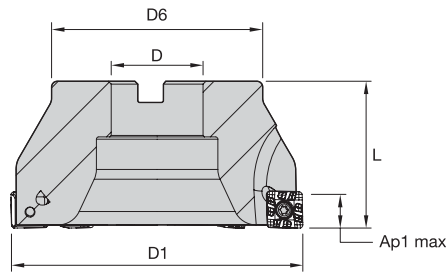
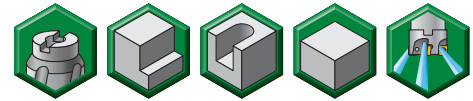
Recommended Starting Feeds
Recommended Starting Feeds [mm]

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.



Shoulder Mills

■ 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

MS2260



Nm

6,0



Torx driver

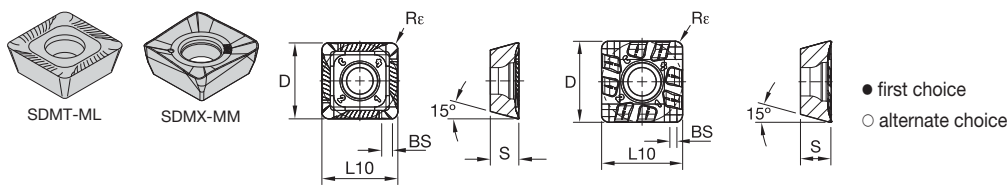
12148007500

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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

Shoulder Mills

Inserts • SD1506..



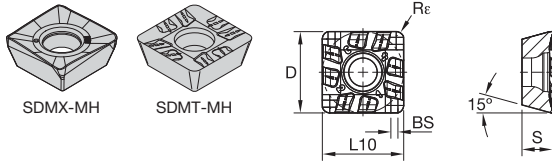
P	○	●	●	●	●	●
M	●	●	○	○	○	○
K	●	○	○	○	○	○
N	○	○	○	○	○	○
S	○	○	○	○	○	○
H	○	○	○	○	○	○

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	○	●	○	○	○

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	○	○	○	○	○



● first choice
○ alternate choice

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

Shoulder Mills

■ 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	●	○	○	○	○
SDMX150616RMH	4	15,88	15,88	6,35	1,51	1,60	0,20	○	○	○	○	○

■ 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	○	○	○	○	○

■ 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.

Shoulder Mills

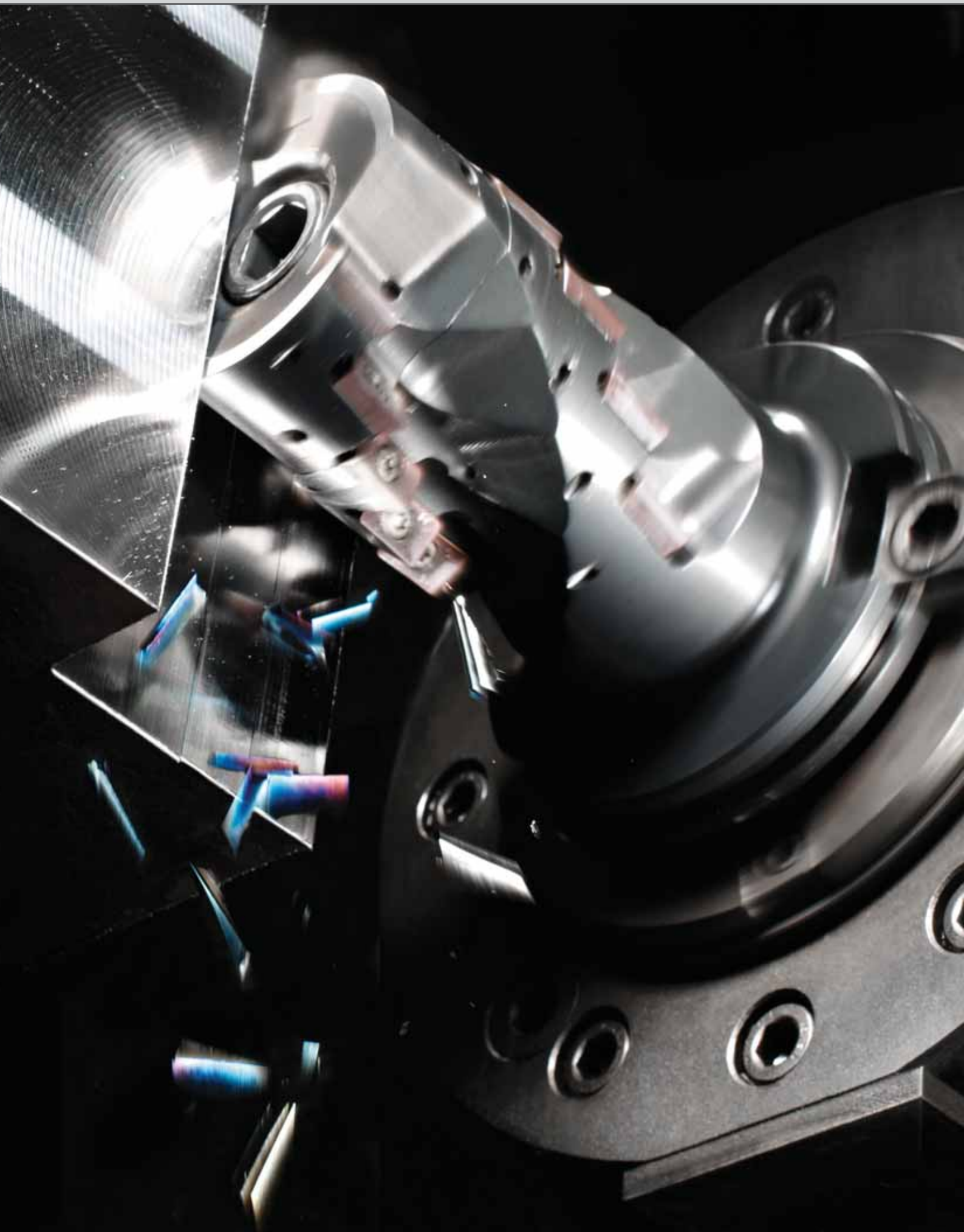
Recommended Starting Feeds

■ 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.



Indexable Milling • Helical Mills

M300 Series..... H2-H11



Reliable Option for Helical Milling Applications •

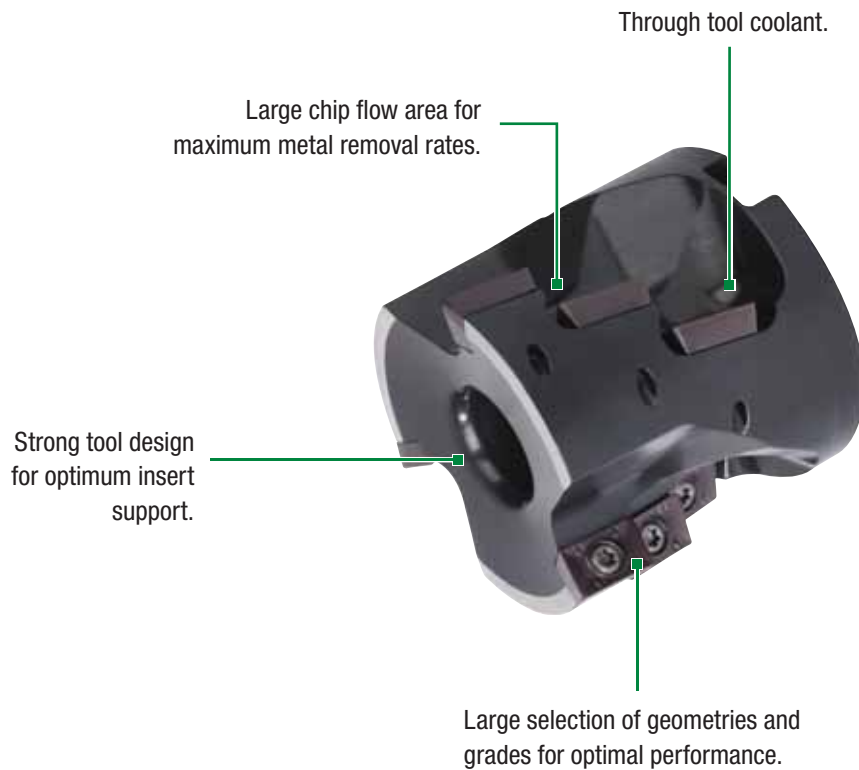
M300 Series

The dependable, general-purpose M300 Series provides high metal removal rates and consistent performance with a large selection of geometries and grades.



M300

- Wide selection of inserts to machine all material types.
- Positive spiral design for smooth cutting.
- Full effective teeth design ensures high performance.



Helical Mills



M300

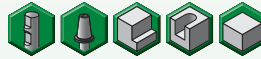
Max depth of cut: 112mm

Lead angle: 90°

Indexes per insert: 2

Diameter: 50–80mm

Pages: H4–H11



Maximum cutting depth (Ap1) and contact width (ae) ratios based on application type

Slot Milling

$ae = 1 \times D1$

$Ap1 \text{ max} = 0,6 \times D1$



**Not recommended in ISO "H" materials.*

Contouring

$ae = 0,25-0,4 \times D1$

$Ap1 \text{ max} = 1 \times D1$

$ae > 0,4 \times D1$

$Ap1 \text{ max} = 0,6 \times D1$



**Not recommended in ISO "H" materials.*

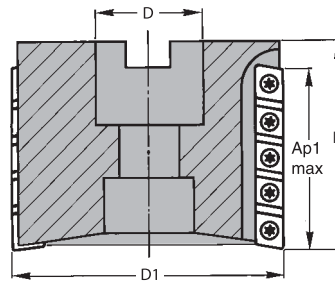
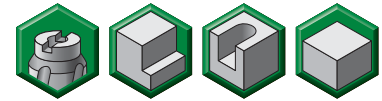
Profiling

$ae = >0,25 \times D1$

$Ap1 \text{ max} = Ap1 \text{ Max}$



- General-purpose helical mill.
- Excellent selection of grades and geometries.
- Strong insert providing high reliability.



Helical Mills

■ Shell Mills

order number	catalogue number	D1	D	L	Ap1 max	Z	Z U	max RPM	coolant supply	kg
2021434	12393080200	50	22	50	28,0	6	3	13090	No	0,4
2021437	12393083200	50	22	65	42,0	12	4	13090	No	0,5
2021435	12393080400	63	27	61	42,0	9	3	11690	No	0,8
2021438	12393083400	63	27	75	56,0	20	5	11690	No	1,0
2021436	12393080600	80	32	70	56,0	16	4	10360	No	1,5
2021439	12393083600	80	32	85	70,0	30	6	10360	No	2,0

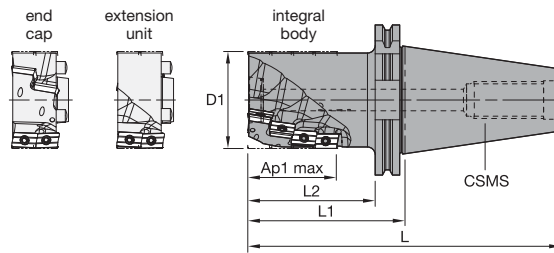
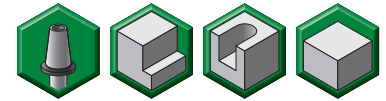
NOTE: Standard milling cutters will accept insert nose radii up to 2mm without modification.
 For tool body modification instructions, see page G16.
 Z = number of pocket seats.
 ZU = number of effective teeth.

■ Spare Parts



D1	insert screw	Nm	Torx driver
50	12148055800	4,0	12148000600
63	12148055800	4,0	12148000600
80	12148055800	4,0	12148000600

- Modular tool design.
- Excellent selection of grades and geometries.
- Strong insert providing high reliability.



■ **Integral**

order number	catalogue number	D1	L	L1	L2	Ap1 max	Z	Z U	CSMS system size	max RPM	kg
2021419	12393040200	50	217	115	96	70,0	15	3	DV50	13090	3,7
2021420	12393040400	63	232	130	111	84,0	18	3	DV50	11690	4,3
2021421	12393040800	80	257	155	136	112,0	32	4	DV50	10360	6,0

NOTE: Standard milling cutters will accept insert nose radii up to 2mm without modification.
For tool body modification instructions, see page G16.
Z = number of pocket seats.
ZU = number of effective teeth.

■ **Spare Parts**

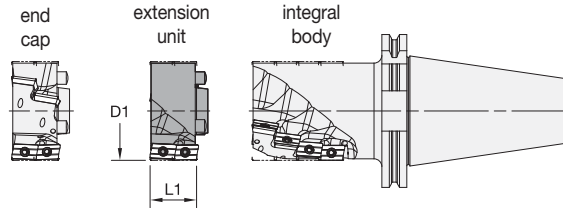


D1	insert screw	Nm	Torx wrench	nose collar	socket-head cap screw
50	12148055800	4,0	12148000600	12393060200	12146021100
63	12148055800	4,0	12148000600	12393060400	12147517100
80	12148055800	4,0	12148000600	12393060800	12147517100

- Modular tool design.
- Excellent selection of grades and geometries.
- Strong insert offering high reliability.



Helical Mills

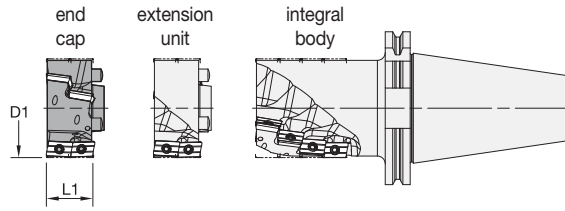


■ Extension Unit

order number	catalogue number	D1	L1	Z U	Z	kg
2021425	12393050200	50	28	3	6	0,3
2021426	12393050400	63	28	3	6	0,3
2021427	12393050800	80	28	4	8	0,6

NOTE: One spacer ring can be added to any M300 integral tool body assembly with matching D1.
 Standard assembly cap screw must be replaced with the following part for correct mounting bolt length:
 50mm — use longer socket head cap screw #12146030700 (M12 x 70).
 63mm and 80mm — use longer socket head cap screw #12146030800 (M16 x 70).
 Z = number of pocket seats.
 ZU = number of effective teeth.

- Modular tool design.
- Excellent selection of grades and geometries.
- Strong insert offering high reliability.



■ End Cap

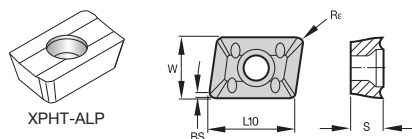
order number	catalogue number	D1	L1	Z U	Z	kg
2021431	12393060200	50	29	3	6	0,3
2021432	12393060400	63	29	3	6	0,4
2021433	12393060800	80	29	4	8	0,7

Note: Z = number of pocket seats.
ZU = number of effective teeth.

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1-P2	XPHT-GE	WP40PM	XPHT..	WP40PM	XPHT..	WP40PM
P3-P4	XPHT-GE	TN6540	XPHT..	WP40PM	XPHT..	WP40PM
P5-P6	XPHT-GE	TN6540	XPHT..	WP40PM	XPHT..	WP40PM
M1-M2	XPHT-GE	TN6540	XPHT..	TN6540	XPHT-MR	TN6540
M3	XPHT-GE	TN7535	XPHT..	WP40PM	XPHT-MR	TN7535
K1-K2	XPHT-GE	TN6510	XPHT..	TN6520	XPHT-MR	WK15CM
K3	XPHT-GE	TN6510	XPHT..	TN7535	XPHT-MR	WK15CM
N1-N2	XPHT-ALP	TN6501	XPHT-ALP	TN6501	XPHT-ALP	TN6501
N3	XPHT-ALP	TN6501	XPHT-ALP	TN6501	XPHT-ALP	TN6501
S1-S2	XPHT-GE	TN6540	XPHT..	TN6540	XPHT-MR	TN6540
S3	XPHT-GE	WS30PM	XPHT..	TN6540	XPHT-MR	TN6540
S4	XPHT-GE	TN6540	XPHT..	TN6540	XPHT-MR	TN6540
H1	XPHT-GE	WS30PM	XPHT..	TN6540	XPHT-MR	TN6540

Helical Mills

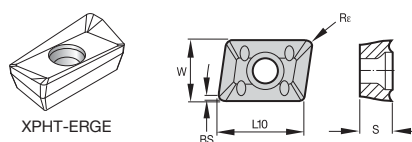


● first choice
○ alternate choice

P	●		
M	●		
K	●		
N	●		
S	●		
H	●		

■ XPHT-ALP

catalogue number	cutting edges	W	L10	S	BS	Re	hm	TN6501	THM-U
XPHT160404ALP	2	9,80	15,67	4,66	1,70	0,40	0,08	●	●
XPHT160408ALP	2	9,80	15,67	4,66	1,70	0,80	0,08	●	●
XPHT160412ALP	2	9,80	15,67	4,66	1,40	1,20	0,08	●	●



● first choice
○ alternate choice

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

■ XPHT-ERGE

catalogue number	cutting edges	W	L10	S	BS	Re	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM	WP40PM	TT125
XPHT160408ERGE	2	9,44	15,67	4,76	1,80	0,80	0,12	●	●	●	●	●	●	●	●	●	●	●
XPHT160412ERGE	2	9,44	15,67	4,76	1,50	1,20	0,12	●	●	●	●	●	●	●	●	●	●	●
XPHT160416ERGE	2	9,44	15,67	4,76	0,80	1,67	0,06	●	●	●	●	●	●	●	●	●	●	●

■ Recommended Starting Speeds [m/min]

Helical Mills

Material Group		THM-U	TN2510	TN6501	TN6510	TN6520	TN6525	TN6540
P	0	- - -	- - -	- - -	- - -	- - -	340 265 235	300 235 200
	1	- - -	550 485 450	- - -	- - -	- - -	340 265 235	300 235 200
	2	- - -	340 310 275	- - -	- - -	- - -	265 210 180	210 160 140
	3	- - -	310 275 255	- - -	- - -	- - -	235 180 155	180 140 115
	4	- - -	230 215 190	- - -	- - -	- - -	195 140 120	150 110 90
	5	- - -	275 250 230	- - -	- - -	- - -	260 195 165	200 150 125
	6	- - -	190 170 145	- - -	- - -	- - -	170 135 110	135 100 85
M	1	- - -	225 200 175	- - -	- - -	- - -	160 100 65	110 65 50
	2	- - -	205 175 160	- - -	- - -	- - -	100 65 40	65 40 35
	3	- - -	160 145 125	- - -	- - -	- - -	105 65 45	70 40 35
K	1	190 170 150	350 300 250	- - -	400 290 215	375 265 190	230 205 185	185 170 150
	2	- - -	300 250 210	- - -	350 235 170	325 210 160	180 160 150	145 130 115
	3	- - -	250 210 165	- - -	280 215 165	250 190 135	150 135 120	130 120 105
N	1	2000 1200 1000	- - -	2000 1200 1000	- - -	- - -	- - -	- - -
	2	1365 815 665	- - -	1365 815 665	- - -	- - -	- - -	- - -
	3	800 500 400	- - -	800 500 400	- - -	- - -	- - -	- - -
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	- - -	- - -	- - -	- - -	- - -

(continued)

(Recommended Starting Speeds [m/min] – continued)

Material Group		TN7525			TN7535			TTI25			WK15CM			WP40PM			WS30PM		
P	0	340	260	235	455	395	370	360	300	250	-	-	-	295	260	245	-	-	-
	1	340	260	235	455	395	370	360	300	250	-	-	-	295	260	245	-	-	-
	2	260	210	180	280	255	230	260	210	180	-	-	-	250	215	180	-	-	-
	3	235	180	155	255	230	205	260	210	180	-	-	-	230	195	160	-	-	-
	4	195	140	120	190	175	160	220	180	150	-	-	-	205	170	135	-	-	-
	5	260	195	165	260	230	210	265	195	165	-	-	-	170	155	135	-	-	-
6	170	135	110	160	135	110	120	90	75	-	-	-	150	115	90	-	-	-	
M	1	205	185	155	205	185	155	400	260	180	-	-	-	195	170	155	225	200	185
	2	185	160	140	185	160	140	270	170	120	-	-	-	175	150	125	205	180	145
	3	145	130	115	145	130	115	265	175	120	-	-	-	130	115	90	155	135	105
K	1	315	235	200	295	265	240	185	155	130	420	385	340	-	-	-	-	-	-
	2	270	200	165	235	210	190	150	120	105	335	295	275	-	-	-	-	-	-
	3	200	165	140	195	175	160	120	105	85	280	250	230	-	-	-	-	-	-
N	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S	1	-	-	-	-	-	-	-	-	-	-	-	-	40	35	30	45	40	30
	2	-	-	-	-	-	-	-	-	-	-	-	-	40	35	30	45	40	30
	3	-	-	-	-	-	-	-	-	-	-	-	-	50	40	30	55	45	30
	4	-	-	-	-	-	-	-	-	-	-	-	-	65	50	35	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.

Helical Mills

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%			
XPHT-ALP	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	XPHT-ALP
XPHT-GE	0,19	0,47	0,70	0,14	0,34	0,50	0,11	0,26	0,38	0,09	0,22	0,33	0,08	0,20	0,30	XPHT-GE
XPHT..	0,22	0,56	0,82	0,16	0,40	0,59	0,12	0,30	0,44	0,10	0,26	0,38	0,10	0,24	0,35	XPHT..
XPNT..	0,22	0,56	0,82	0,16	0,40	0,59	0,12	0,30	0,44	0,10	0,26	0,38	0,10	0,24	0,35	XPNT..
XPHT-MR	0,23	0,59	0,92	0,17	0,43	0,66	0,13	0,32	0,50	0,11	0,28	0,43	0,10	0,25	0,40	XPHT-MR

NOTE: Use "Light Machining" value as starting feed rate.



Indexable Milling • Slotting Mills

M95 • Square Style Insert Slotting Platform 12-17

M900 • Adjustable Slotting Platform 18-119



M95 Series Slotting Mills

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

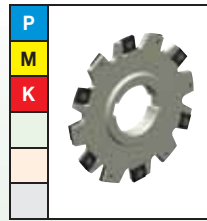


M95

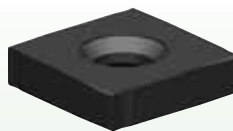
Slot Width Range:
4–10mm

Indexes per insert: 4
Diameter: 100–200mm

Pages: I4–I7

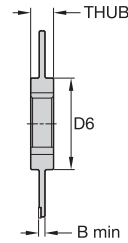
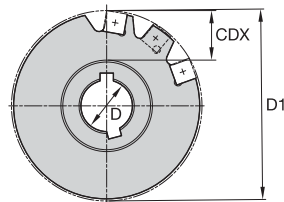
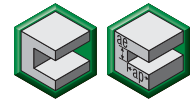


■ Insert Offering



SNHX

Inserts with free-cutting
geometry providing
low cutting forces.



■ 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

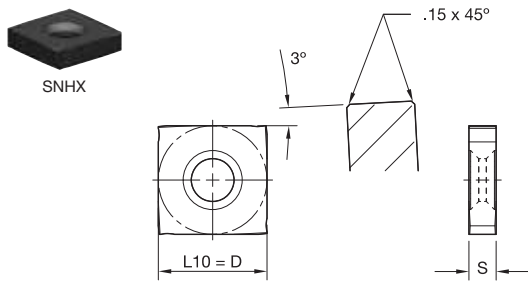


D1	B min	insert screw	Nm	wrench	bushing
100	4	12147548500	1,2	170.023	—
100	5	12147562300	1,2	170.023	12147676800
100	6	12147548600	5,0	170.025	12147676900
100	7	12147548600	5,0	170.025	12147676900
100	8	12147548600	5,0	170.025	12147676900
125	4	12147548500	1,2	170.023	—
125	5	12147562300	1,2	170.023	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		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-	-	-	-	-

Slotting Mills



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

● first choice
○ alternate choice

■ **SNHX • 12,7mm iC**

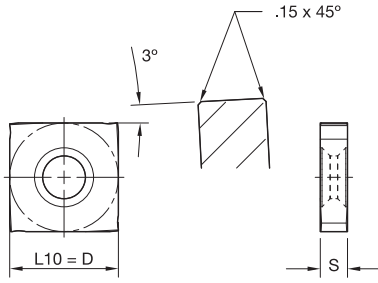
catalogue number	cutting edges	D	L10	S	hm	WK15CM	WP35CM	WP40PM
123506601	4	12,70	12,70	3,18	0,08	5903650	5903674	5903646

■ **SNHX • 11mm iC**

catalogue number	cutting edges	D	L10	S	hm	WK15CM	WP35CM	WP40PM
123506599	4	11,00	11,00	2,30	0,08	5903648	5903672	5903644



SNHX



● first choice
○ alternate choice

P	●	●
M	○	●
K	●	○
N	○	○
S	○	○
H		

■ SNHX • 11mm iC

catalogue number	cutting edges	D	L10	S	hm	5903649	5903673	5903645
123506600	4	11,00	11,00	2,70	0,08	WK15CM	WP35CM	WP40PM

■ SNHX • 12,7mm iC

catalogue number	cutting edges	D	L10	S	hm	5903671	5903675	5903647
123506602	4	12,70	12,70	5,40	0,08	WK15CM	WP35CM	WP40PM

Slotting Mills

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.

WIDIA™ M900™ Series •

Adjustable Slotting Cutters

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

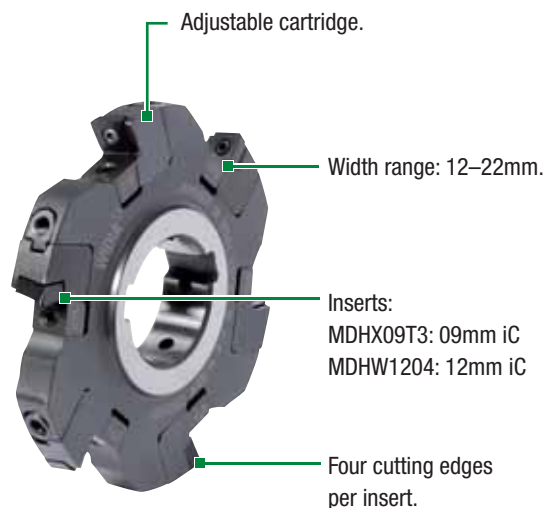
- Insert geometries and grades for various workpiece materials.
- Easy setting for desired width.
- Superior cartridge sliding mechanism.
- Available in arbour and shell mount.
- Two keyways for staggered slotting.
- Strong, reliable pocket seat.

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.



Slotting Mills



M900™

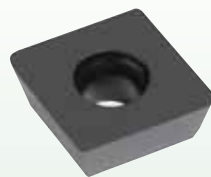
Slot Width Range:
12–22mm

Indexes per insert: 2
Diameter: 100–315mm

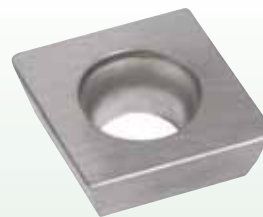
Pages: I10–I16, I18–I19



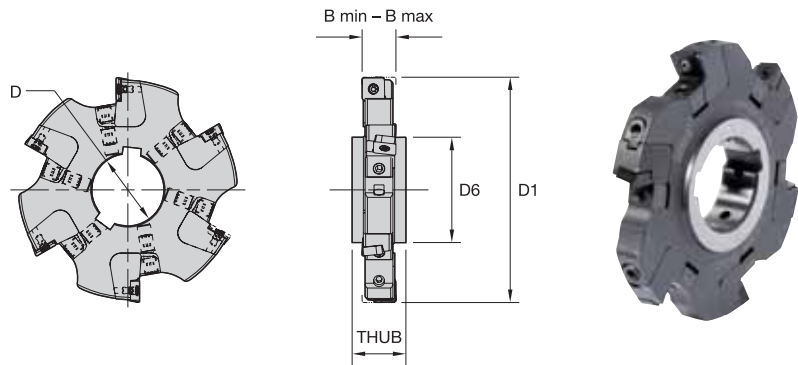
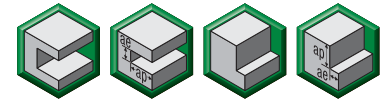
■ Insert Offering



MDHX Geometry
iC 09mm



MDHW Geometry
iC 12mm

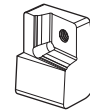


Slotting Mills

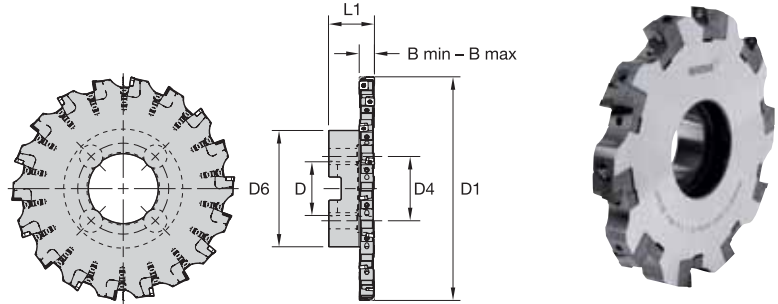
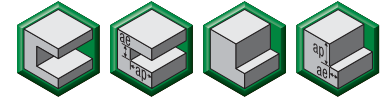
■ Arbour Mount • 9mm

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



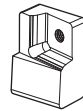
D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
100	12148067200	12749726100	12148574100	12148050000	12748307600	12748210100	12748210200	12748551100	12748551200
100	12148067200	12749726100	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



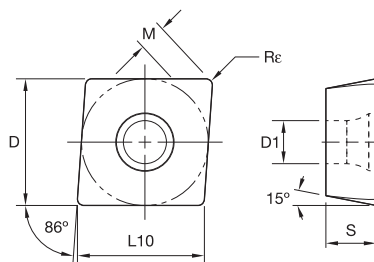
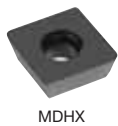
D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
125	12148067200	12749726100	12148574100	12148050000	12748307600	12748210100	12748210200	12748551100	12748551200
100	12148067200	12749726100	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 • MDHX..



● first choice
○ alternate choice

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

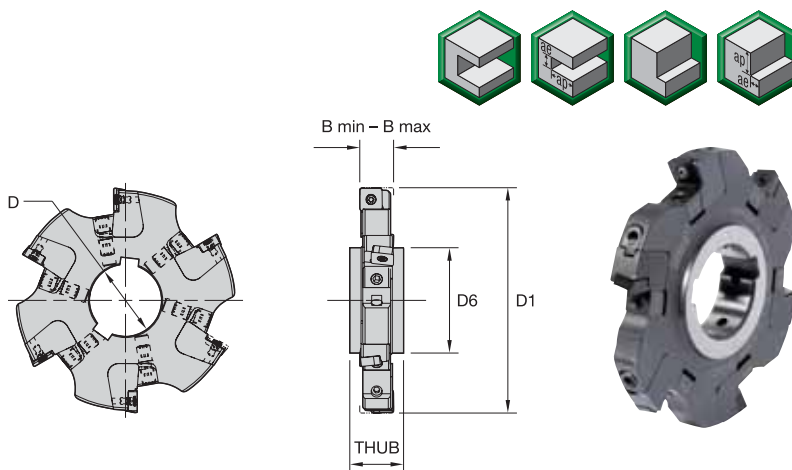
Recommended Starting Feeds

■ Recommended Starting Feeds [mm]

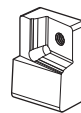
Light Machining	General Purpose	Heavy Machining
-----------------	-----------------	-----------------

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

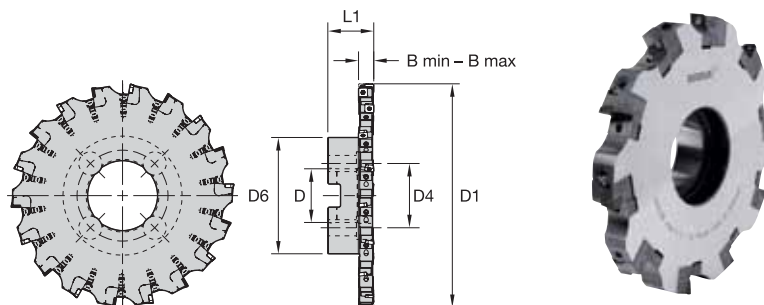
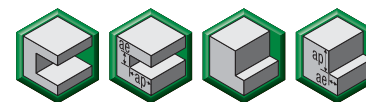
NOTE: Use "Light Machining" value as starting feed rate.


■ 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

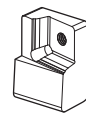
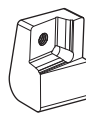


Slotting Mills

■ 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



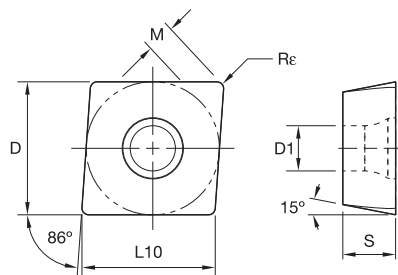
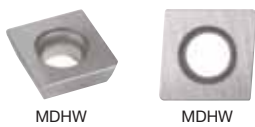
D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
200	12748605300	12749723200	12148574100	12148050000	12748307700	12748210700	12748210800	12748551100	12748551200
200	12748605300	12749723200	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		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-	-	-	-	-

Slotting Mills

Inserts • MDH..



● first choice
○ alternate choice

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

■ **MDHW**

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

■ 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.



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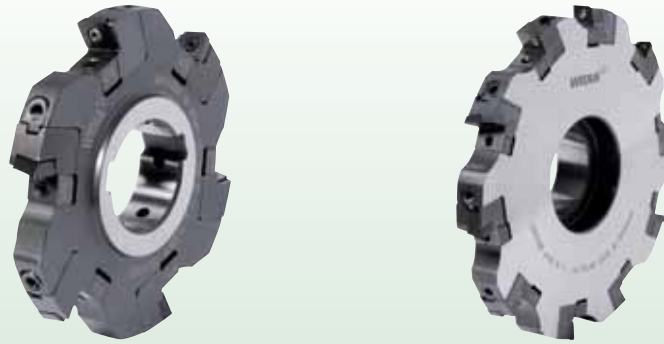
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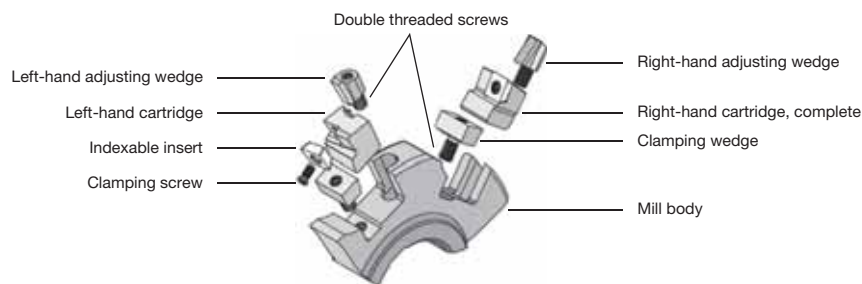
■ Assembly and Operating Instructions



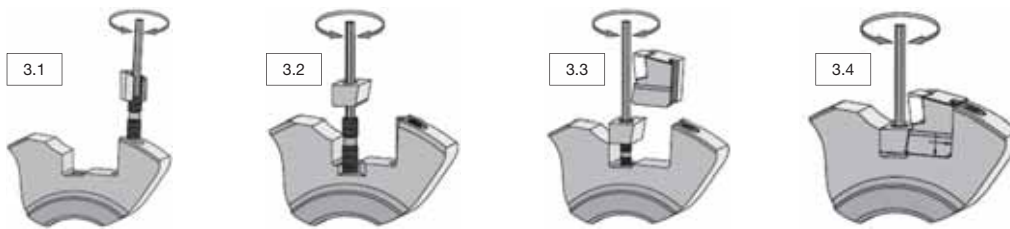
1. General

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



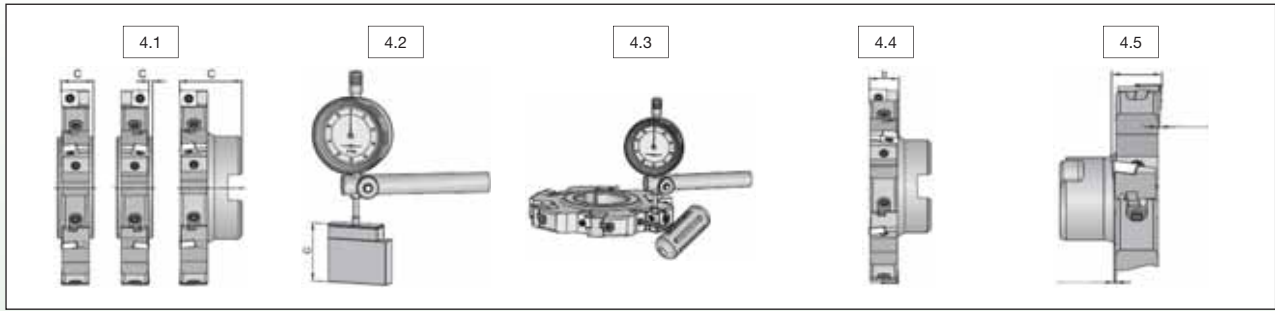
3.1 Turn double threaded screw one turn clockwise in the adjusting wedge. Then insert both parts in the slot in the mill body and turn the double threaded screw clockwise until the adjusting wedge is flush with the milling cutter.

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 $M_{Apre} = 1 \text{ Nm}$ 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 $MA_{pre} = 1 \text{ Nm}$. 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 $MA_{pre} = 1 \text{ Nm}$.
- 4.5 Adjust cartridge to final measurement. Tighten clamping wedge with torque $MA = 4 \text{ Nm}$. 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 • High-Feed Double-Sided Platform.....	J2–J16
M200 • Double-Sided Round Inserts.....	J18–J39
M100 • Positive Round Inserts.....	J40–J67
M270 • Indexable Ball Nose and Toroidal Inserts for Complex Parts.....	J68–J98



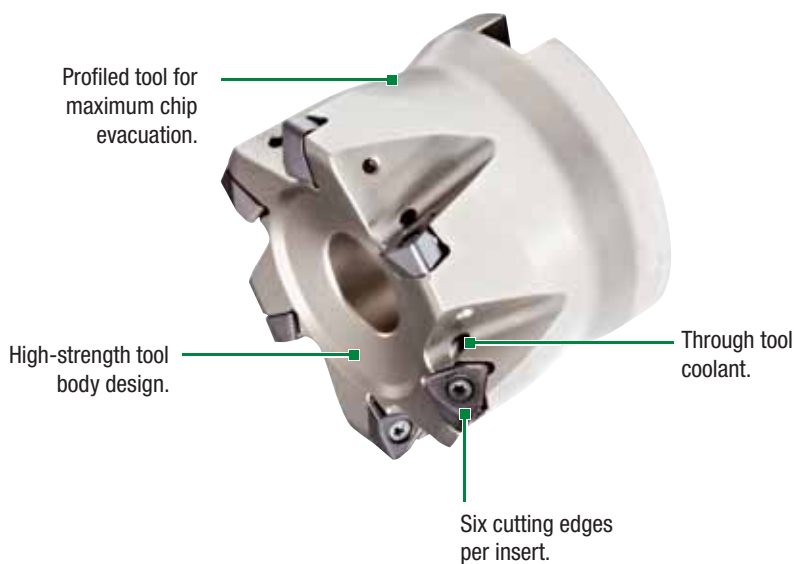
High-Feed Applications •
M370™ Series

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

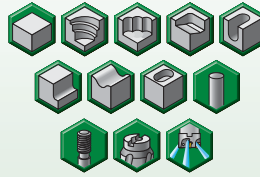
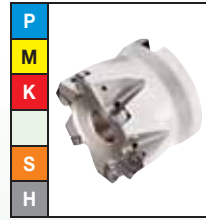


M370™

Max depth of cut: up to 2mm

Indexes per insert: 6
Diameter: 25–125mm

Pages: J4–J16



■ Insert Offering

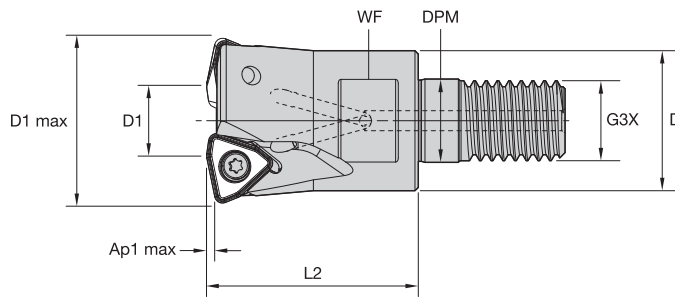
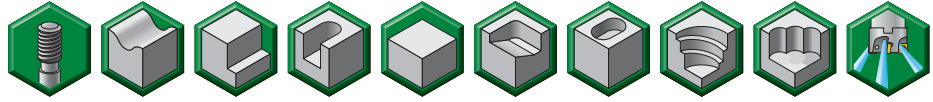


8mm iC Insert WOEJ0804
Up to 1,3mm A_p max
Diameter range 25–80mm



12mm iC Insert WOEJ1207
Up to 2mm A_p max
Diameter range 42–125mm

- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.



■ Screw-On End Mills

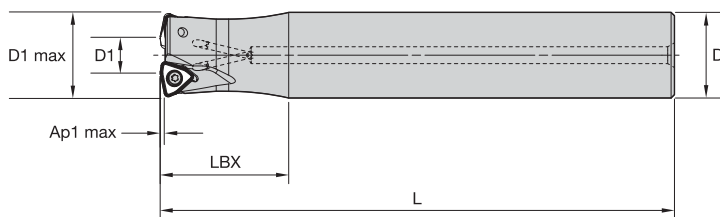
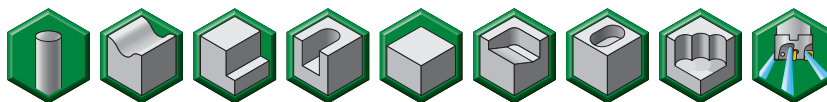
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
4056186	M370D025Z02M12WO08	25	11	21	12,5	M12	35	17	1,3	2	2.1°	46000	Yes	0,09
4170918	M370D025Z03M12WO08	25	11	21	12,5	M12	35	17	1,3	3	2.1°	46000	Yes	0,09
4056187	M370D032Z04M16WO08	32	18	29	17,0	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

Copy Mills

- 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	1,77

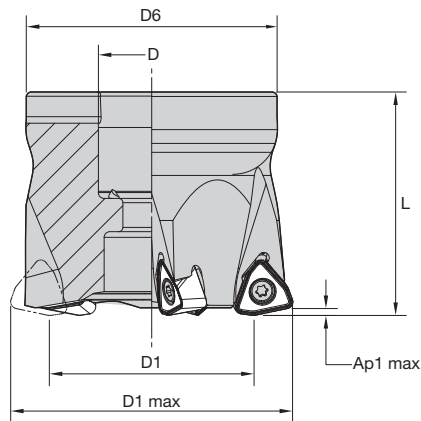
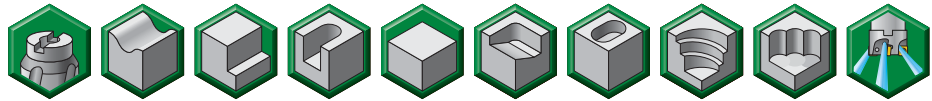
■ Spare Parts



D1 max	insert screw	Nm	wrench
25	MS2219	1,8	DT9IP
28	MS2219	1,8	DT9IP
32	MS2219	1,8	DT9IP

Copy Mills

- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.



Copy Mills

■ 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

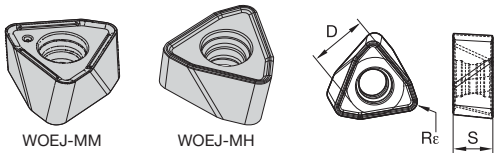
NOTE: Socket-head cap screw with coolant groove must be ordered separately.

■ **Insert Selection Guide**

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-	-	-

iC08 • Inserts • W0.J0804...

Copy Mills



- -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

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

■ **WOEJ-MM**

catalogue number	cutting edges	D	S	Re	TN6520	TN6525	TN7535	WK15CM	WP25PM	WS30PM	WP40PM
WOEJ080412SRMM	6	7,79	4,70	1,22	○	○	○	○	○	○	○

■ **WOEJ-MH**

catalogue number	cutting edges	D	S	Re	TN6520	TN6525	TN7535	WK15CM	WP25PM	WS30PM	WP40PM
WOEJ080412SRMH	6	7,79	4,75	1,22	○	○	○	○	○	○	○

■ 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)

Copy Mills

(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.

Copy Mills

Recommended Starting Feeds

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
-----------------	-----------------	-----------------

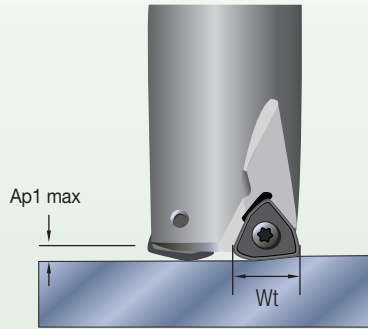
For Plunging Applications

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

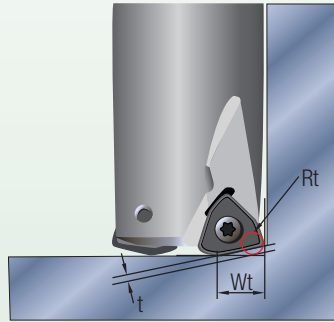
NOTE: Use "Light Machining" value as starting feed rate.

Applying High-Feed Tools

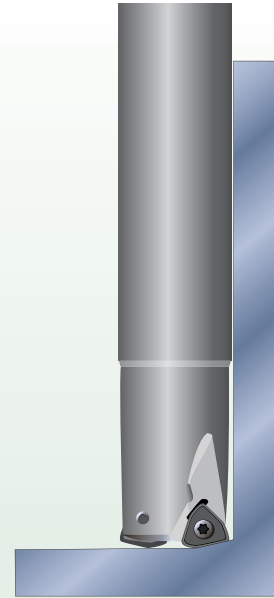
The high-feed concept bases its strategy on small depth of cut and higher fz values, which results in a higher MRR and productivity with low radial forces.



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.

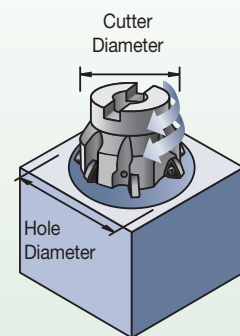
General Programming Information for Applying M370

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

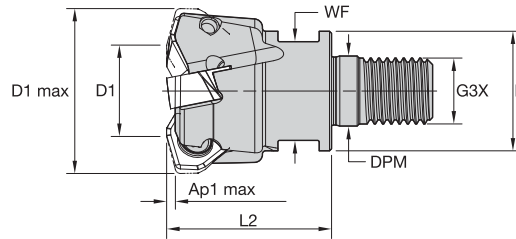
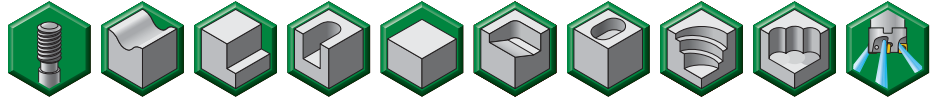
Rt	t	Wt
2,5mm	1mm	7,5mm

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**

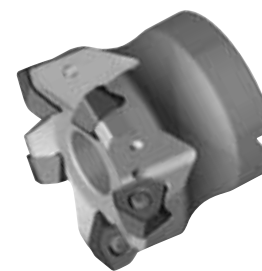
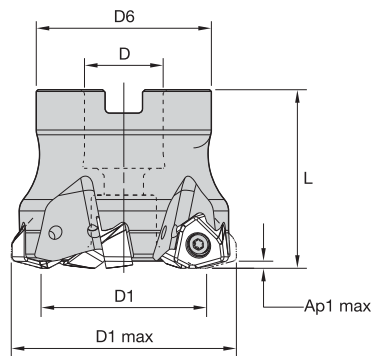
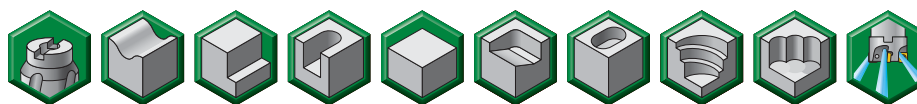
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
5338912	M370D42Z03M16WO12	42	25	29	17,0	M16	40	24	2,0	3	5.1°	21310	Yes	0,22

■ **Spare Parts**

			
	insert screw	Nm	Torx driver
D1 max	MS2085	4,0	DT15IP
42			

Copy Mills

- 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

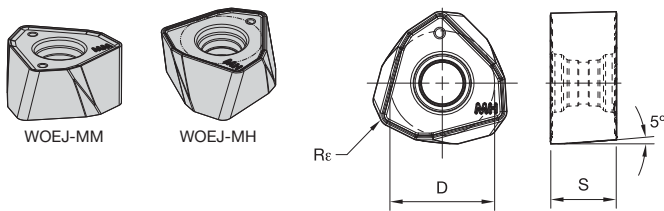
D1 max	insert screw	Nm	Torx Plus driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw	coolant lock screw assembly
50	MS2085	4,0	DT15IP	12146120500	MS1234CG	—	—
52	MS2085	4,0	DT15IP	12146120500	MS1234CG	—	—
63	MS2085	4,0	DT15IP	125.025	MS1234CG	—	—
66	MS2085	4,0	DT15IP	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		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-

iC12 • Inserts • WO.J1207...



- 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

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

■ **WOEJ-MM**

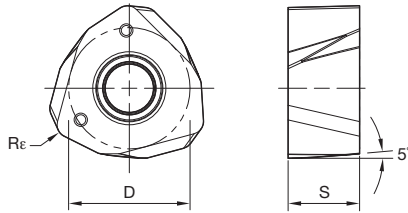
catalogue number	cutting edges	D	S	Rε	WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
WOEJ120712SRMM	6	12,00	7,30	1,27	○	○	○	○	○	○	○

■ **WOEJ-MH**

catalogue number	cutting edges	D	S	Rε	WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
WOEJ120712SRMH	6	12,00	7,30	1,27	○	○	○	○	○	○	○



WOEJ-MR



● first choice
○ alternate choice

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

■ WOEJ-MR

catalogue number	cutting edges	D	S	Re	WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
WOEJ120712SRMR	6	12,00	7,30	1,27	●	○	○	○	○	○	○

Copy Mills

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.

Copy Mills

Recommended Starting Feeds

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
-----------------	-----------------	-----------------

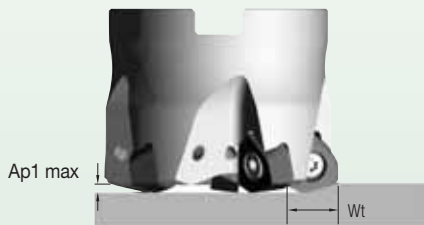
For All Other Applications

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
..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

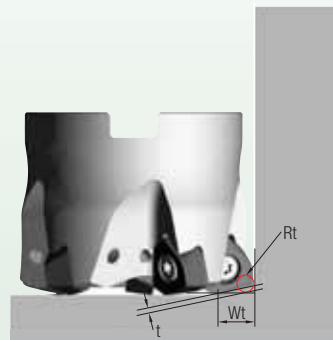
NOTE: Use "Light Machining" value as starting feed rate.

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 A_{p1} 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 R_t value as the insert radius.



Recommended when long overhang is necessary due to lower radial forces. Maximum L/D ratio of $10 \times D$.

General Programming Information for Applying M370

	CAM programming information		
	R_t	W_t	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 •

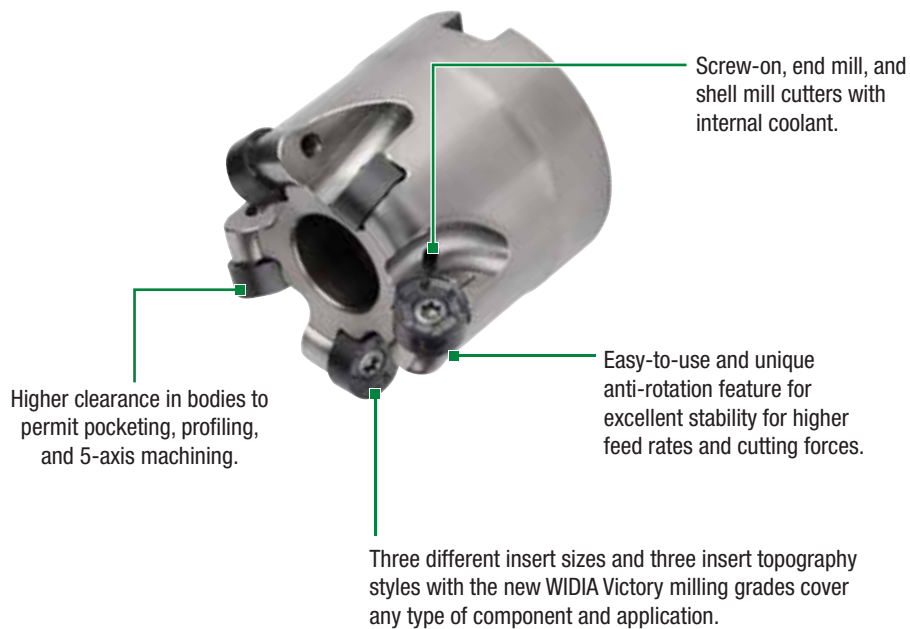
M200™ Series

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.



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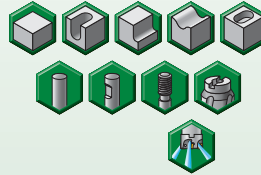
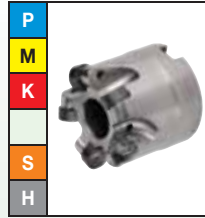


M200™

Max depth of cut: up to 5mm

Indexes per insert: up to 12
Diameter: 25–125mm

Pages: J20–J39



■ Insert Offering



M200 iC 10
10mm iC insert
8 cutting edges

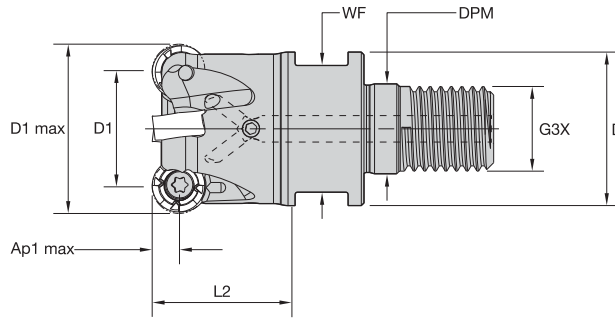
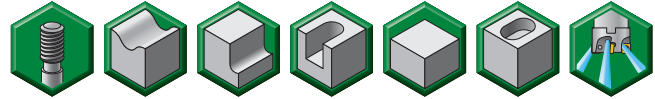


M200 iC 12
12mm iC insert
12 cutting edges



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

191.848



Nm

2,0

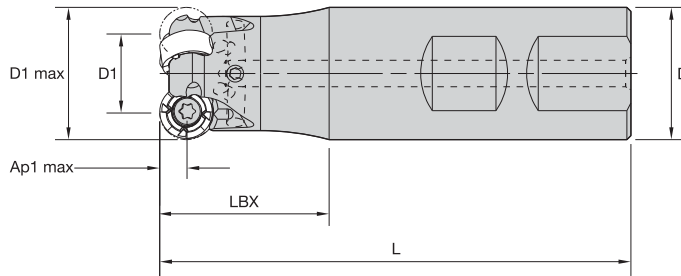


Torx driver

170.025

Copy Mills

- 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

191.848



Nm

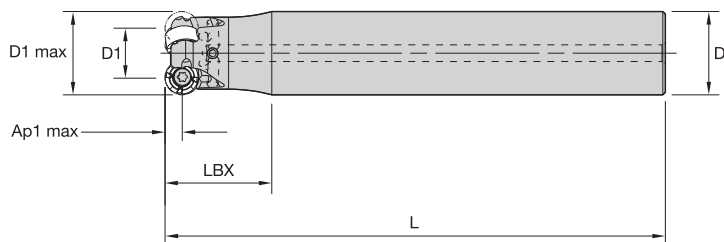
2,0



Torx driver

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	1,42
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

191.848



Nm

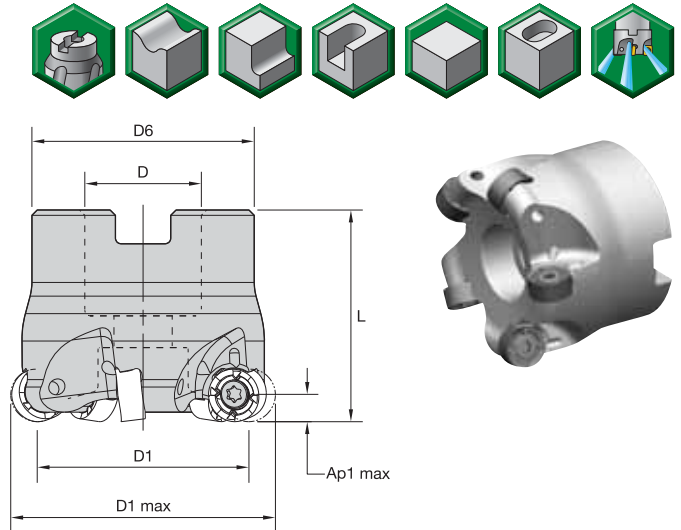
2,0



Torx driver

170.025

- 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.

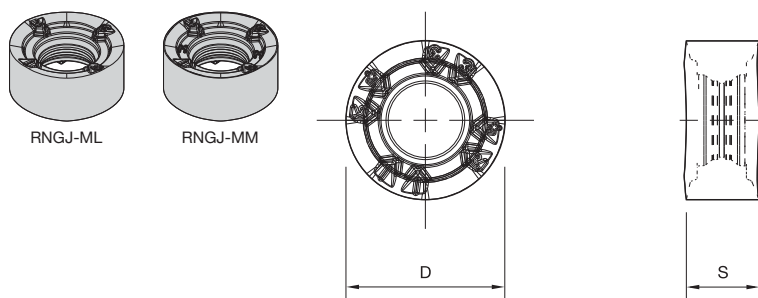
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■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-

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iC10 • Inserts • RN.J10...



- -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

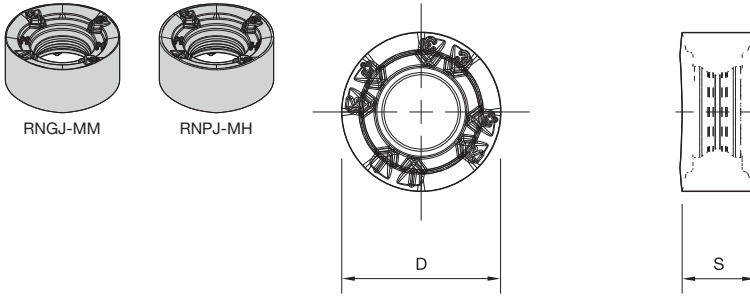
P	●	●	●	●	●	●	●
M	○	○	○	○	○	○	○
K	●	○	○	○	○	○	○
N	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○

■ RINGJ-ML

catalogue number	number of indexes	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ10T3M0EML	8	10,00	4,76	○	○	●	●	●	○	○

■ RINGJ-MM

catalogue number	number of indexes	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ10T3M0SMM	8	10,00	4,76	○	○	○	○	○	○	○



- -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

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

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■ 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	-	-	-	-	-	-	-	-	-	-	-	-

Copy Mills

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

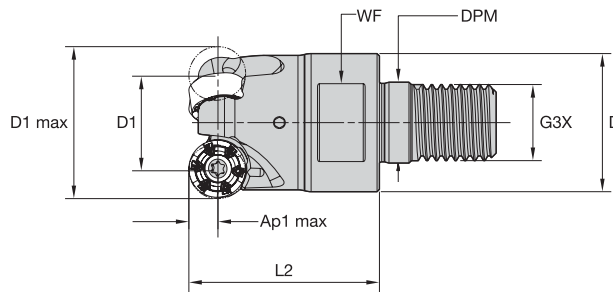
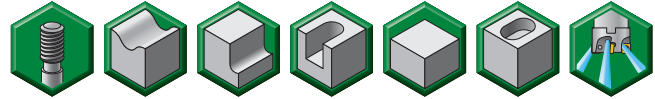
At 0,63 Axial Depth of Cut (ap)

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.

Copy Mills

- 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

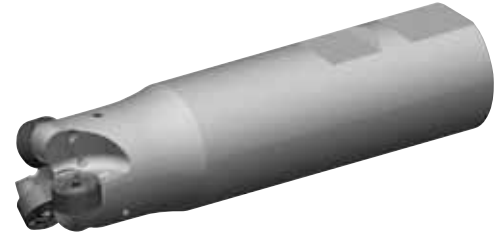
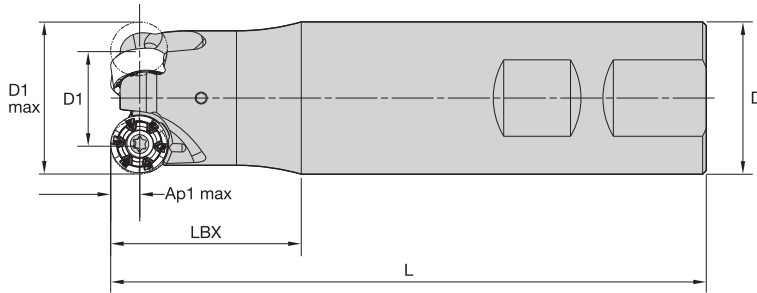
■ Spare Parts



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

Copy Mills

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



■ **Weldon Shanks**

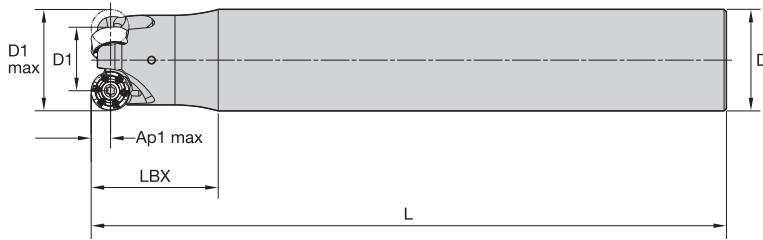
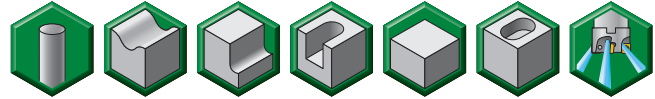
order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4147564	M200D32Z03B32RN12	32	20	32	125	40	3,0	3	39160	Yes	0,65

■ **Spare Parts**

			
D1 max	insert screw	Nm	Torx driver
32	193.492	4,0	170.025

Copy Mills

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



■ Cylindrical End Mills

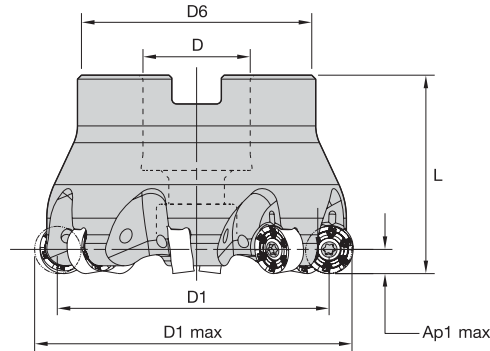
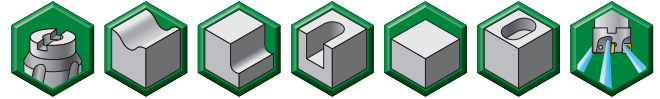
order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4147566	M200D32Z03A32RN12L200	32	20	32	200	40	3,0	3	39160	Yes	1,10
4147567	M200D32Z02A32RN12L250	32	20	32	250	40	3,0	2	39160	Yes	1,41

■ Spare Parts

D1 max	insert screw	Nm	Torx driver
32	193.492	4,0	170.025

Copy Mills

- 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

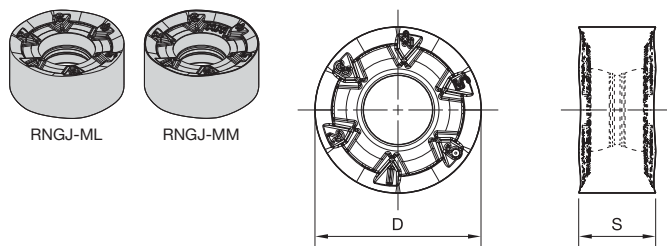
NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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

iC12 • Inserts • RN.J12..



- 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

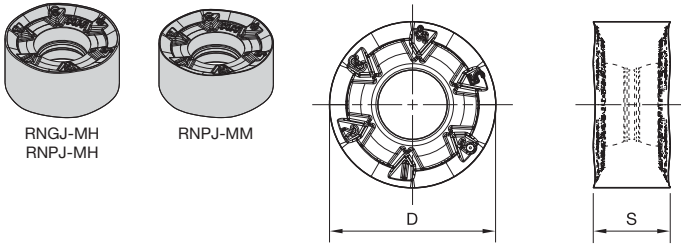
P	●	●	●	●	●	●	●	●	●
M	●	○	○	○	○	○	○	○	○
K	●	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○

■ RINGJ-ML

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ1204M0EML	12	12,00	4,75	●	●	○	○	○	○	○	○

■ RINGJ-MM

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ1204M0SMM	12	12,00	4,75	○	○	○	○	○	○	○	○



- -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

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

■ RNPJ-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	○	○	5276365	5276364	○	5476635	5276363	5542340

Copy Mills

■ 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	-	-	-	-	-	-	-	-	-	-	-	-

Copy Mills

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

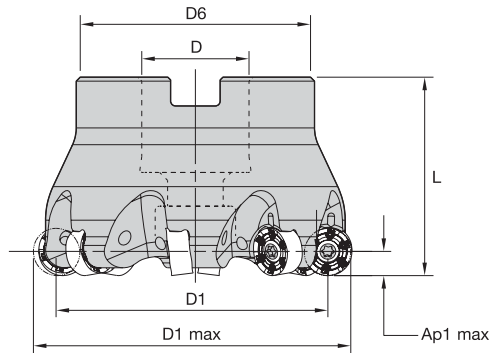
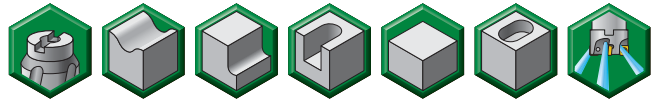
At 0,75 Axial Depth of Cut (ap)

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.

Copy Mills

- 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

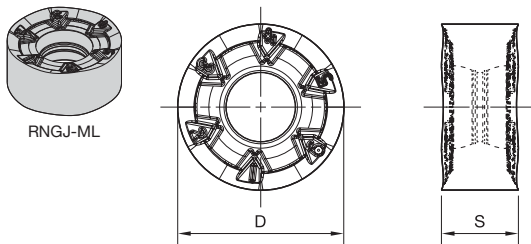
D1 max	insert screw	Nm	wrench	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw	coolant lock screw assembly
50	192.932	4,0	170.026	MS1242	MS1242CG	—	—
52	MS2260	4,0	170.026	MS1242	MS1242CG	—	—
63	MS2260	4,0	170.026	MS1242	MS1242CG	—	—
63	193.343	4,0	170.026	MS1242	MS1242CG	—	—
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		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-

iC16 • Inserts • RN.J16...



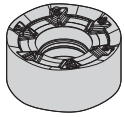
- -ML geometry is the first choice for stainless steel and high-temp alloys.

- first choice
- alternate choice

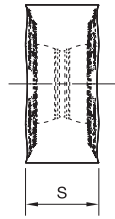
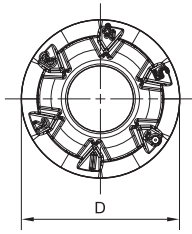
P	●	●	●	●	●	●	●	●	●
M	○	○	○	○	○	○	○	○	○
K	●	○	○	○	○	○	○	○	○
N	○	○	○	○	○	○	○	○	○
S	○	○	○	○	○	○	○	○	○
H	○	○	○	○	○	○	○	○	○

■ **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

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	●	○	○	○	○	○	○

■ RNPJ-MH

catalogue number	cutting edges	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ1605M0SMH	12	16,00	6,35	○	○	○	○	○	○	○

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

■ 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%			
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.

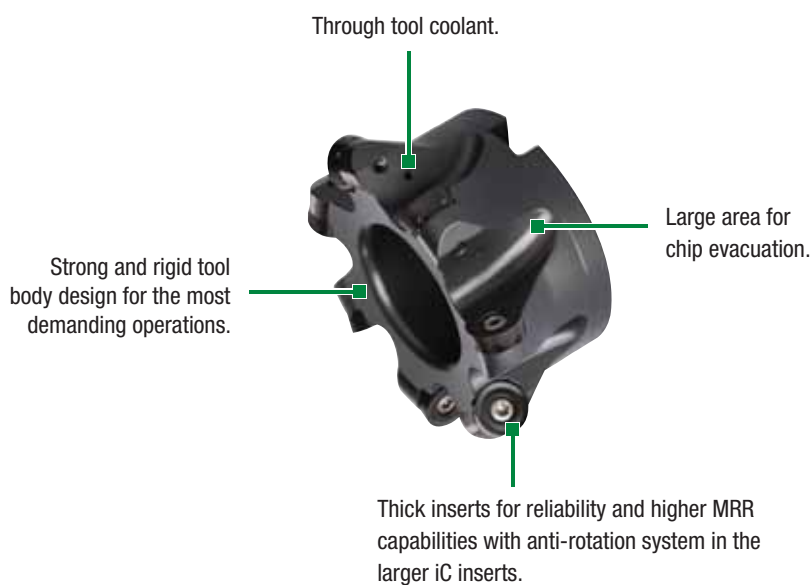
Versatile Platform for All Materials and Applications •
M100™ Series Copy Mills



M100

A trusted multipurpose solution for profiling and copy applications, the M100 Series ensures a reliable platform for all of your copy milling, face milling, helical interpolation, and roughing needs. The strong and rigid body design ensures superior results in even the most demanding operations.

- Thick inserts ensure reliability and consistent results.
- Anti-rotation systems in larger iC inserts provide higher MRR capabilities.
- Increased chip evacuation and through tool coolant for enhanced performance.



Copy Mills

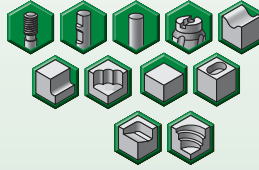
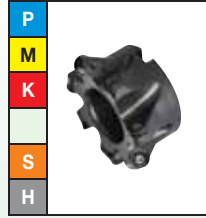


M100™

Max depth of cut: 6mm

Diameter: 24–125mm

Pages: J42–J67



■ Insert Offering



08mm iC
RD Insert Type
Ground and PSTS



10mm iC
RD Insert Type
Ground and PSTS



12mm iC
RD Insert Type
Anti-rotation Feature
Ground and PSTS

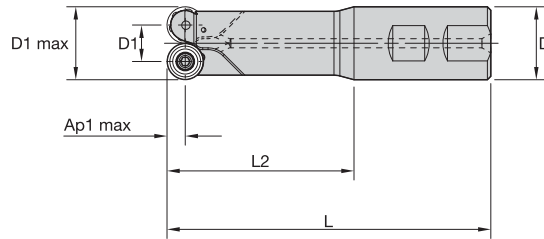
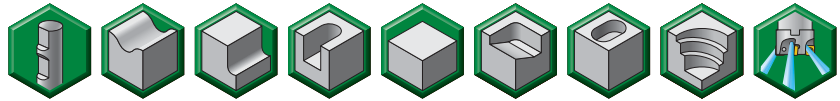


16mm iC
RD Insert Type
Anti-rotation Feature
Ground and PSTS



16mm iC
RC Insert Type
Anti-rotation Feature
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

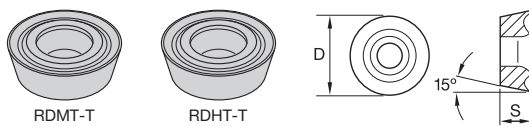
NOTE: All spare parts except the insert screws must be ordered separately.

Copy Mills

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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

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

- Precision ground insert; first choice for light machining.

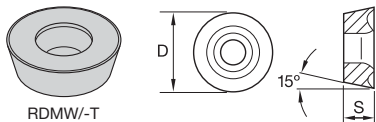
RDHT-T

catalogue number	D	S	hm	TN2510	TN6540	TN7525	TN7535
RDHT0802M0T	8,00	2,38	0,09	●	○	○	○

- 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	○	○	○	○



- Precision pressed insert.
- First choice for roughing operations, especially for steel and cast iron.

- first choice
- alternate choice

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		
		1	660	580	540	360	280	240	410	310	280	545	475	445
P	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

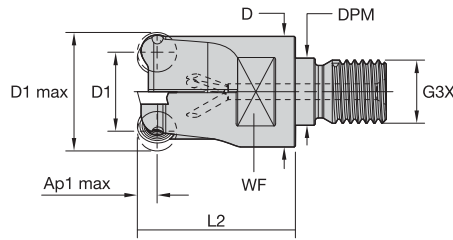
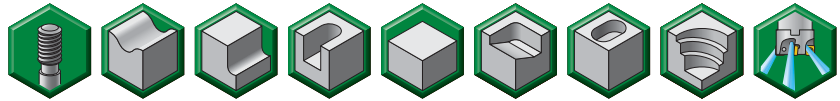
At 0,50 Axial Depth of Cut (ap)

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.

Copy Mills

- 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

12148036700



Nm

3,0

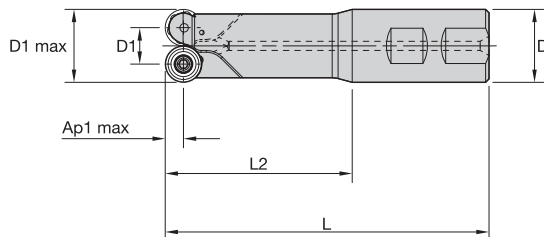
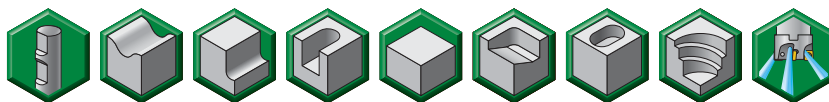


Torx wrench

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

12148036700



Nm

3,0



Torx driver

12148000600

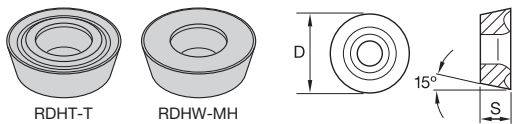
NOTE: All spare parts except the insert screws must be ordered separately.

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1-P2	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	-	-

Copy Mills

iC10 • Inserts



- first choice
- alternate choice

- Precision ground insert; first choice for light machining.

■ RDHT-T

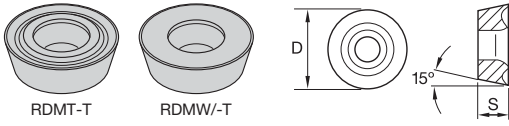
catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TT125
RDHT1003M0T	10,00	3,18	0,14	●	○	○	○	○	○

- Precision ground flat top geometry.

■ RDHW-MH

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TT125
RDHW1003M0MH	10,00	3,18	0,14	●	○	○	○	○	○

P	M	K	N	S	H
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○
○	○	○	○	○	○



- Precision pressed insert; positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

● first choice
○ alternate choice

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

RDMT-T

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TT125
RDMT1003M0T	10,00	3,18	0,14	○	●	○	○	○	○

- 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	TT125
RDMW1003M0	10,00	3,18	0,09	○	○	○	○	○	○
RDMW1003M0T	10,00	3,18	0,14	○	○	○	○	○	○

Copy Mills

■ Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6525			TN6540			TN7525			TN7535			TT125		
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.

Copy Mills

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
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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

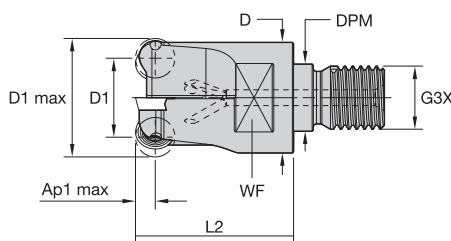
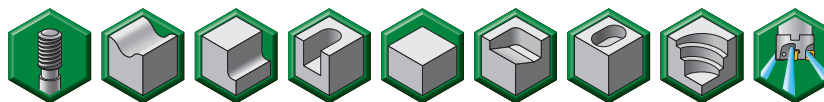
At 0,50 Axial Depth of Cut (ap)

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.

Copy Mills

- 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

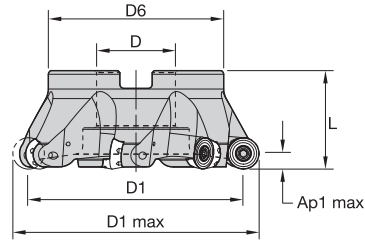
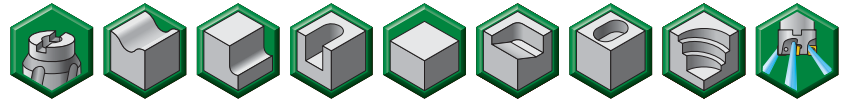
■ Spare Parts



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.

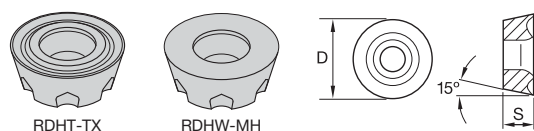
Copy Mills

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-

Copy Mills

iC12 • Inserts



- Precision ground positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys.

- first choice
- alternate choice

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

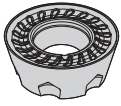
■ RDHT-TX

catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDHT1204M0TX	6	12,00	4,76	0,12	○	○	○	○	○	○	○

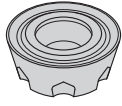
- Precision ground flat top insert.
- Alternative choice for stable milling operations in high-strength steel and hardened materials.

■ RDHW-MH

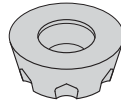
catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDHW1204M0MH	6	12,00	4,76	0,14	○	○	○	○	○	○	○



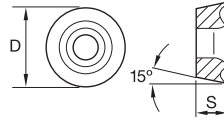
RDPT-MMX



RDMT-TX



RDMW-TX



- 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	-

P	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
M	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
K	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
N	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
S	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
H	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

● first choice
○ alternate choice

Copy Mills

■ 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	-	-	-	-	-	-	-	-	-

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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
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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%			
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)														Insert Geometry	
	5%			10%			20%			30%			40-100%			
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)														Insert Geometry	
	5%			10%			20%			30%			40-100%			
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

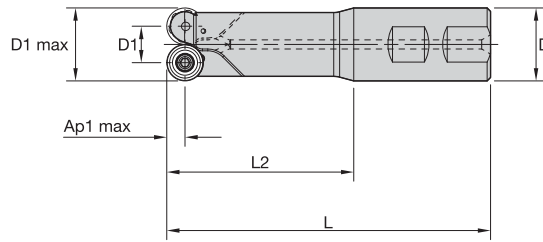
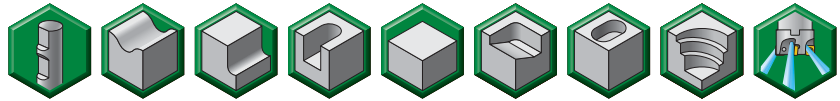
At 0,75 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)														Insert Geometry	
	5%			10%			20%			30%			40-100%			
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.

Copy Mills

- 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

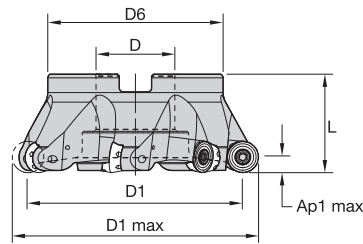
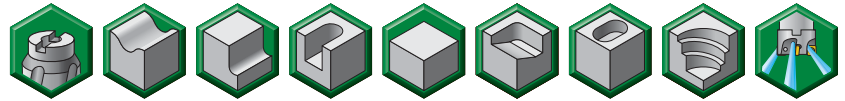
■ Spare Parts

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	—	—

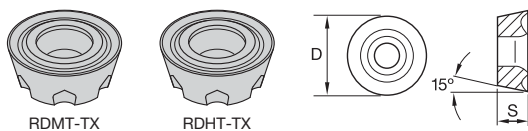
NOTE: All spare parts except the insert screws must be ordered separately.

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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	-	-

Copy Mills

iC16 • Inserts



- Precision ground positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys.

• first choice
○ alternate choice

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

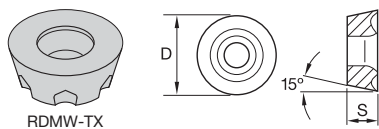
■ RDHT-TX

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TT125
RDHT1605M0TX	16,00	5,56	0,12	●	○	○	○	○	○

- 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	TT125
RDMT1605M0TX	16,00	5,56	0,18	○	○	○	○	○	○



RDMW-TX

- Precision pressed insert.
- First choice for roughing operations, especially for steel and cast iron.

■ RDMW-TX

- first choice
- alternate choice

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

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TT125
RDMW1605M0TX	16,00	5,56	0,15	○	○	●	○	○	○

■ 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.

Copy Mills

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
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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

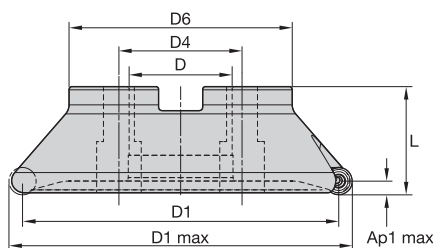
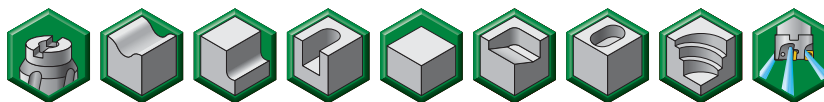
At 1,00 Axial Depth of Cut (ap)

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.

Copy Mills

- 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



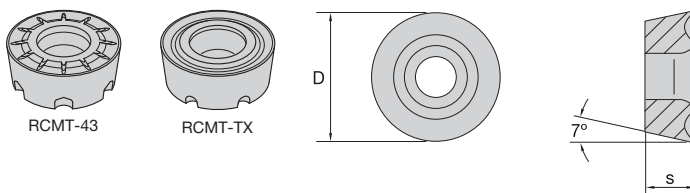
D1 max	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove
50	12148007200	4,0	12148007500	125.025	MS1234CG
52	12148007200	4,0	12148007500	125.025	MS1234CG
63	12148007200	4,0	12148007500	125.230	MS2038CG
66	12148007200	4,0	12148007500	125.230	MS2038CG
80	12148007200	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		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	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



- Optimised geometry providing excellent chip control, even at lower depth of cut.

■ **RCMT-43**

catalogue number	D	S	hm	Material Groups				
				TN2510	TN6525	TN6540	TN7525	TN7535
RCMT1606M043M	16,00	6,35	0,20	●	○	○	○	○

- 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	Material Groups				
				TN2510	TN6525	TN6540	TN7525	TN7535
RCMT1606M0TX	16,00	6,35	0,24	○	○	○	○	○

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

- first choice
- alternate choice

■ 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.

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■ 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 •

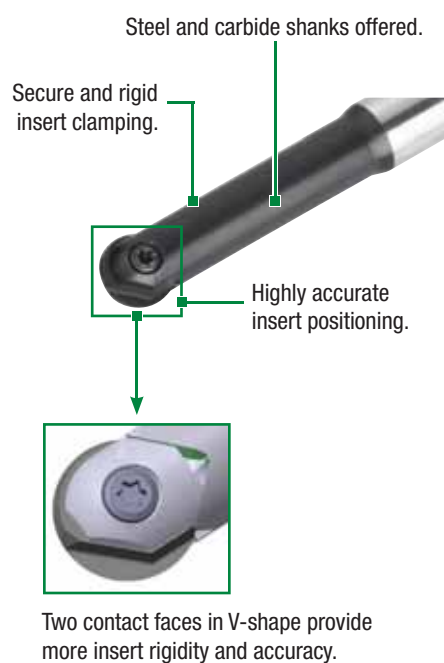
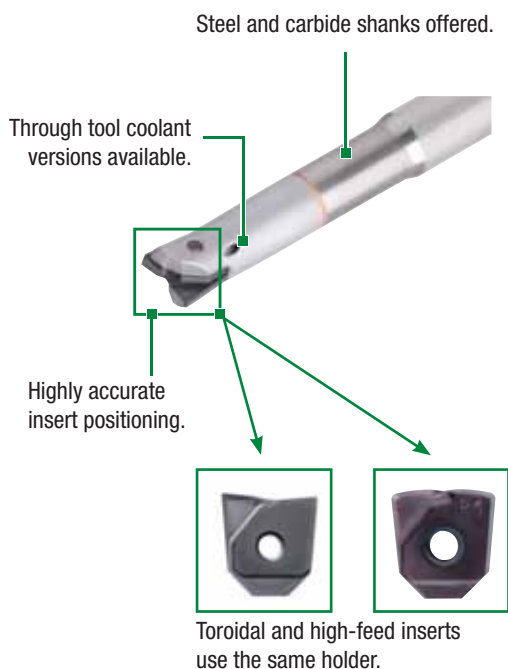
M270™ Series

M270

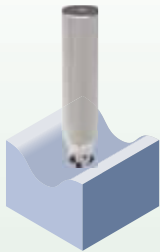


With precision-engineered ball nose, toroidal, and new high-feed inserts, the M270 Series provides the highest accuracy and insert stability for exceptional reliability and performance.

- 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.



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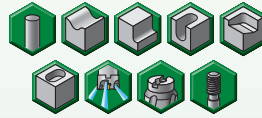
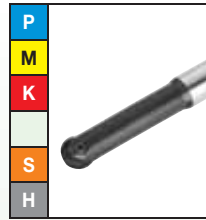


M270™ Ball Nose

Max depth of cut: 5–16mm

Diameter: 10–32mm

Pages: J70–J85

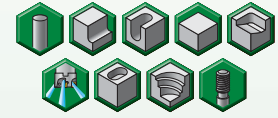
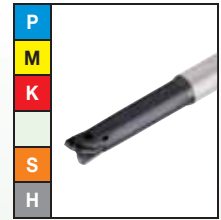


M270 Toroidal

Max depth of cut: 0,3–4mm

Diameter: 10–20mm

Pages: J86–J91

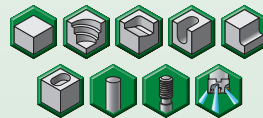
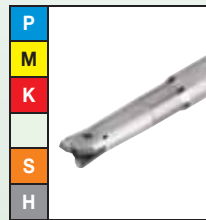


M270 High Feed

Max depth of cut: 0,6–1,1mm

Diameter: 10–20mm

Pages: J92–J98



■ Insert Offering



**Ball nose inserts
BF/BR**

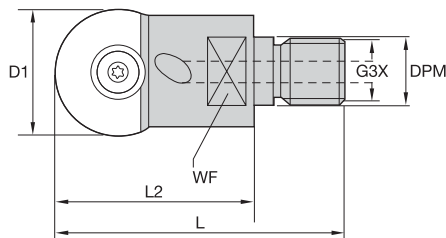


**Toroidal inserts
TF**



**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.

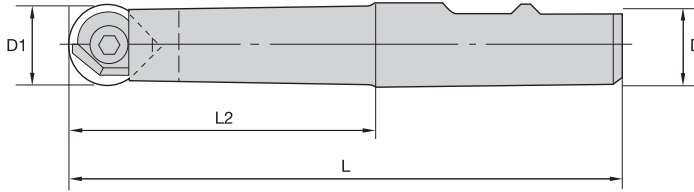
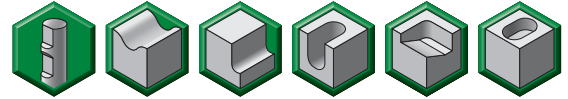
■ Spare Parts



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**

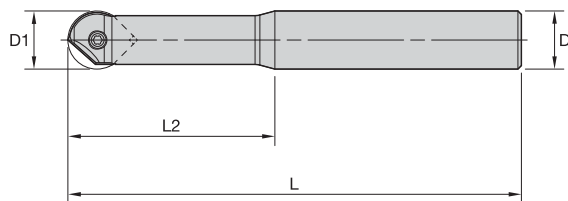
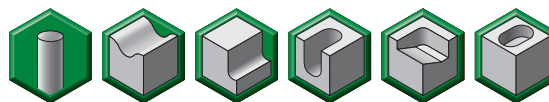


D1	insert screw	Nm	Torx driver
10	12748610500	2,0	12148788900
12	12748610600	2,0	12148788900
16	12748610700	5,0	12148099300
20	12748610800	5,0	12148099300
25	12748610900	7,0	12148086800
32	12748611000	7,0	12146006300

NOTE: All spare parts except the insert screws must be ordered separately.

Copy Mills

- 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.

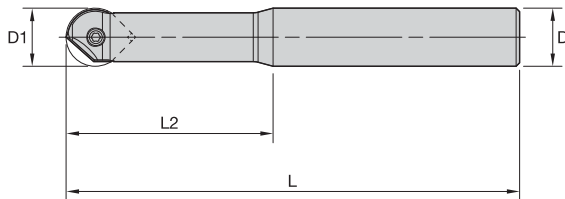
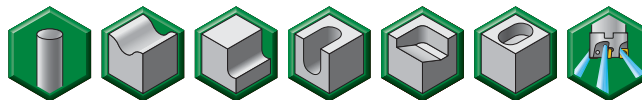
■ Spare Parts



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.

- 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

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■ Insert Selection Guide • .B..20

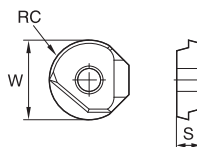
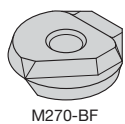
Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1-P2	BF	TN6540	BF	TN6540	BF	TN6540
P3-P4	BF	TN6540	BF	TN6540	BF	TN7535
P5-P6	BF	TN6540	BF	TN7535	BF	TN7535
M1-M2	BF	TN6540	BF	TN6540	BF	TN7535
M3	BF	TN6540	BF	TN6540	BF	TN7535
K1-K2	BR	TN2505	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



- -BF geometry is the first choice for all finishing and light operations.

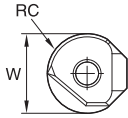
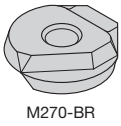
■ M270 BF

- first choice
- alternate choice

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

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catalogue number	W	S	RC	hm	TN2505	TN2510	TN6525	TN6540	TN7525	TN7535
M270BF10	10,00	2,38	5,00	0,08	2012698	2012700	2012718	2012720	2012728	2012730
M270BF12	12,00	3,18	6,00	0,08	2012718	2012720	2012728	2012730	2957538	2957541
M270BF16	16,00	4,76	8,00	0,08	2012748	2012750	2012758	2012760	2957542	2957544
M270BF20	20,00	4,76	10,00	0,10	2012748	2012750	2012758	2012760	2957542	2957544
M270BF25	25,00	4,76	12,50	0,10	2012778	2012780	2012788	2012790	2957542	2957544
M270BF32	32,00	4,76	16,00	0,10	2012778	2012780	2012788	2012790	2957542	2957544



M270-BR

- -BR geometry is the first choice for all semi-finishing and medium-duty applications.

- first choice
- alternate choice

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	○	○	○	○	○	○
M270BR12	12,00	3,18	6,00	0,08	○	○	○	○	○	○
M270BR16	16,00	4,76	8,00	0,08	○	○	○	○	○	○
M270BR20	20,00	4,76	10,00	0,10	○	○	○	○	○	○
M270BR25	25,00	4,76	12,50	0,10	○	○	○	○	○	○
M270BR32	32,00	4,76	16,00	0,10	○	○	○	○	○	○



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■ 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	-	-	-	-	-	-

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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
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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.

■ Recommended Starting Feeds [mm] • .B..12

Light Machining	General Purpose	Heavy Machining
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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%			
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)															Insert Geometry
	5%			10%			20%			30%			40-100%			
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)															Insert Geometry
	5%			10%			20%			30%			40-100%			
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)															Insert Geometry
	5%			10%			20%			30%			40-100%			
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.

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■ Recommended Starting Feeds [mm] • .B..16

Light Machining	General Purpose	Heavy Machining
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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	0,14	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)															Insert Geometry
	5%			10%			20%			30%			40-100%			
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)															Insert Geometry
	5%			10%			20%			30%			40-100%			
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)															Insert Geometry
	5%			10%			20%			30%			40-100%			
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
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At 10,00 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	0,19	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)															Insert Geometry
	5%			10%			20%			30%			40-100%			
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)															Insert Geometry
	5%			10%			20%			30%			40-100%			
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)															Insert Geometry
	5%			10%			20%			30%			40-100%			
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.

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■ Recommended Starting Feeds [mm] • .B..25

Light Machining	General Purpose	Heavy Machining
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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
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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

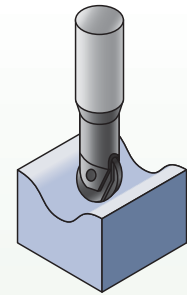
NOTE: Use "Light Machining" value as starting feed rate.

Copy Mills

Selecting the Correct Insert and Cutting Conditions for Your Application

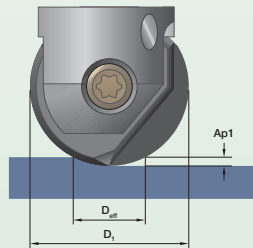
1. Insert Style: Considerations for Selecting the Correct Insert

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)	●	○	

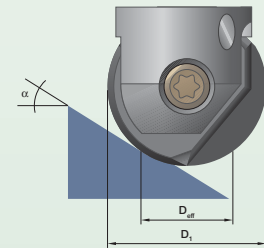


2. Calculating effective diameter and resulting surface speed

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.



$$Deff = \sqrt{D1^2 - (D1 - 2Ap1)^2}$$

$$k = \frac{1}{\sin [\alpha + \arccos (1 - (2 (Ap1/D1)))]}$$

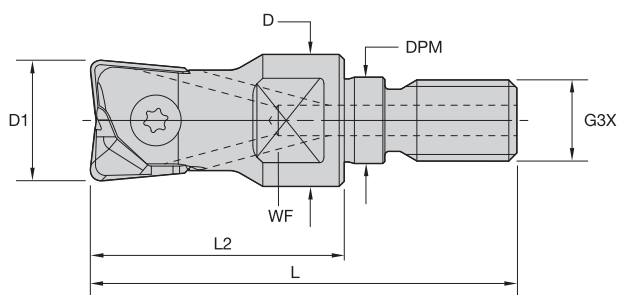
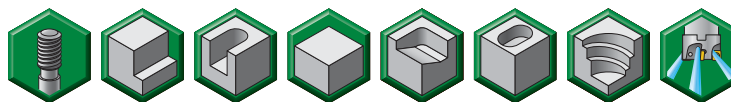
$$v_{c\text{eff}} = v_c \times k$$

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)			
	Ap1	ae	Ap1	ae	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.

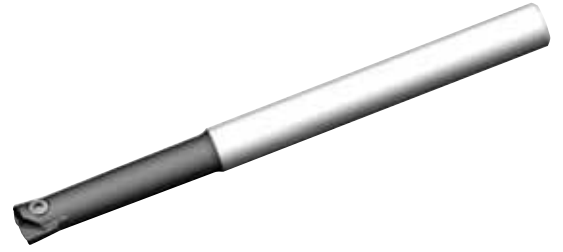
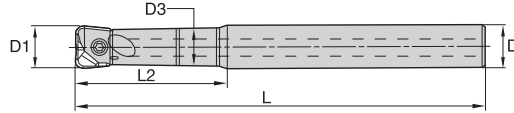
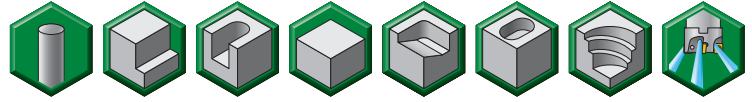
Spare Parts



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**



insert screw



Nm

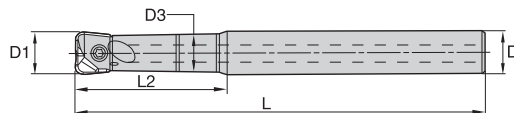
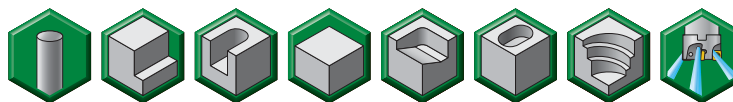


Torx driver

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



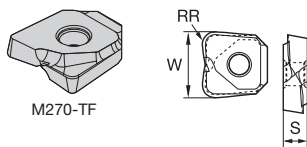
D1	insert screw	Nm	Torx driver
10	12748610500	2,0	12148788900
12	12748610600	2,0	12148788900
16	12748610700	5,0	12148099300
20	12748610800	5,0	12148099300

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	-	-





- first choice
- alternate choice

- Precision insert for finishing and semi-finishing applications.
- Back draft design to minimise vibration and improve surface finishes.

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

■ M270 Toroidal

catalogue number	W	S	RR	hm	TN2505	TN2510	TN2525
M270TF10R05	10,00	2,38	0,50	0,08	●	○	○
M270TF10R1	10,00	2,38	1,00	0,08	○	○	○
M270TF12R05	12,00	3,18	0,50	0,08	●	○	○
M270TF12R1	12,00	3,18	1,01	0,08	○	○	○
M270TF12R2	12,00	3,18	2,01	0,08	○	○	○
M270TF16R03	16,00	4,76	0,30	0,08	○	○	○
M270TF16R05	16,00	4,76	0,50	0,08	○	○	○
M270TF16R1	16,00	4,76	1,01	0,08	○	○	○
M270TF16R2	16,00	4,76	2,02	0,08	○	○	○
M270TF16R3	16,00	4,76	3,04	0,08	○	○	○
M270TF20R03	20,00	4,76	0,30	0,08	○	○	○
M270TF20R05	20,00	4,76	0,50	0,08	○	○	○
M270TF20R1	20,00	4,76	1,01	0,08	○	○	○
M270TF20R2	20,00	4,76	2,01	0,08	○	○	○
M270TF20R4	20,00	4,76	4,02	0,08	○	○	○

NOTE: Ap1 max is equal to RR.

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■ 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.

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Recommended Starting Feeds

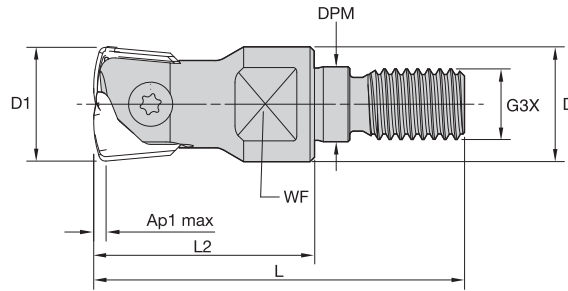
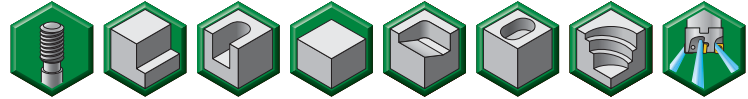
■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
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Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
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.

- 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	Z U	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



insert screw



Nm

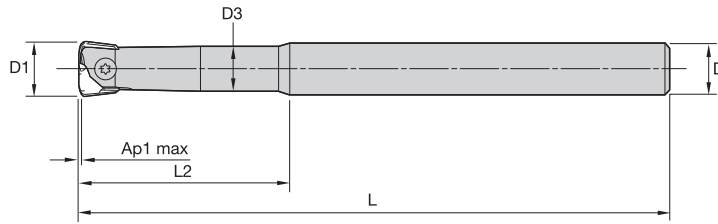
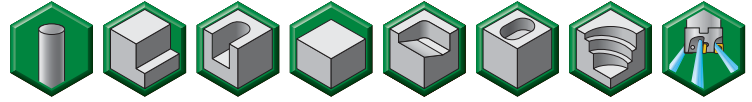


Torx driver

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.

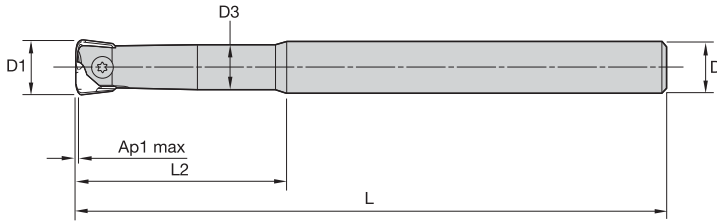
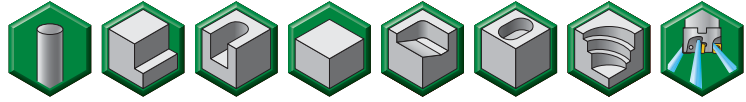
■ Spare Parts



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

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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

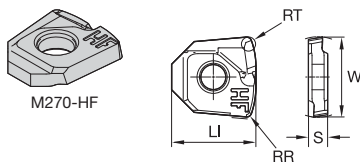
NOTE: All spare parts except the insert screws must be ordered separately.

■ 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

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High-Feed Inserts



- 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

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

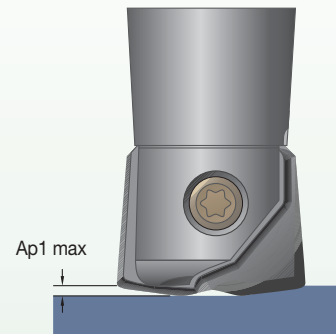
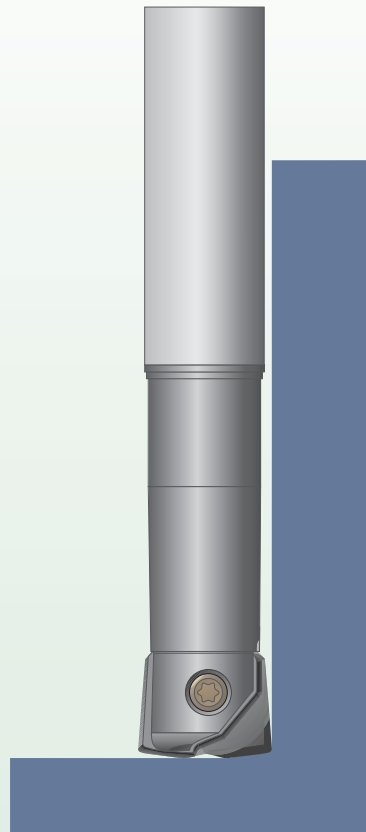
NOTE: Use "Light Machining" value as starting feed rate.

Copy Mills

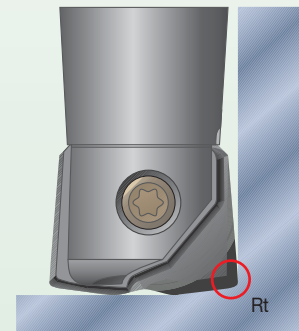
Applying High-Feed Tools

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.



ToolBOSS™



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

Shared Rewards

Free use of ToolBOSS vending machine combined with a comprehensive maintenance and service package based on agreed sales targets for specified contract terms.

Direct Purchase of Equipment

ToolBOSS vending machines are available for purchase. Maintenance and service packages available with annual agreements.

For more information, please contact us at:
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Solid End Milling

Solid End Milling Introduction	K2-K17
High-Performance Solid Carbide End Mills	L1-L150
General Purpose Solid Carbide End Mills	M1-M43



End Mills									
Z = number of teeth		Fine Finishing	Finishing	Roughing	Slot Milling	Plunging	Contour Milling	Peel Milling	Trochoidal Milling
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™/VariMil™ GP Only

- first choice
- suitable with limitations
- not recommended

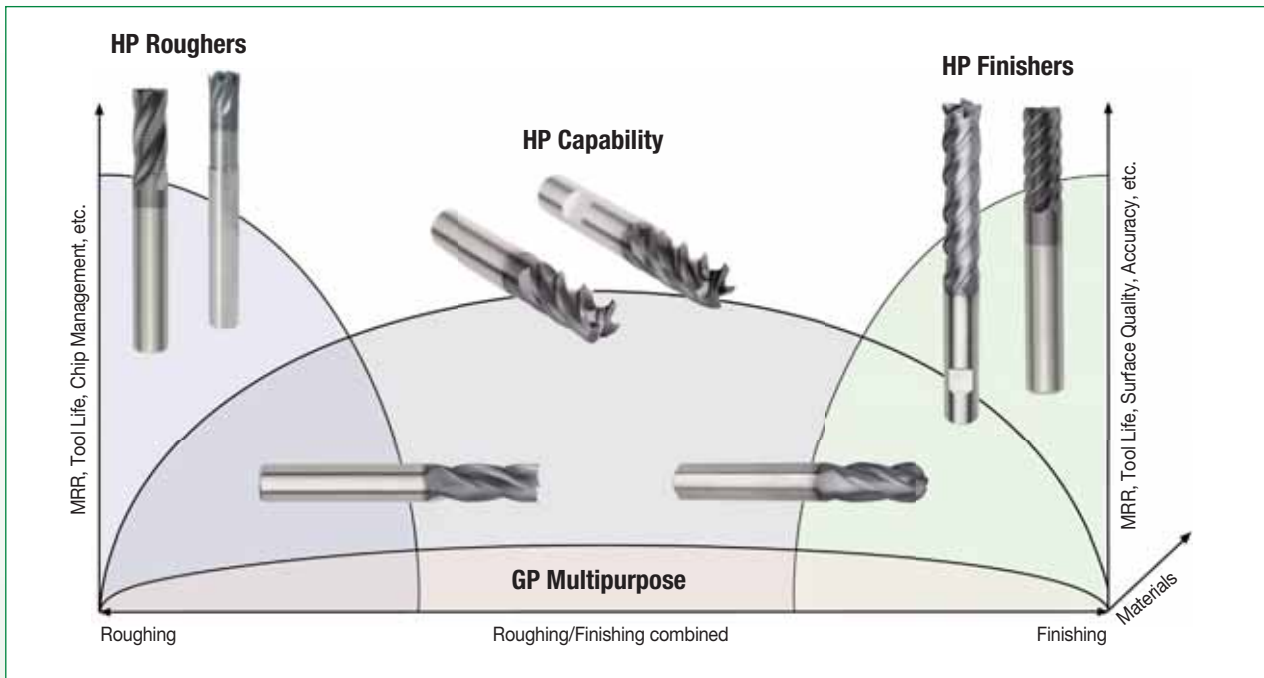
Always select a tool with the shortest possible flute length whenever possible. This will increase the stability of the tool and give the best results.

When selecting an end mill, the following machining factors will affect your selection of the correct end mill for your application:

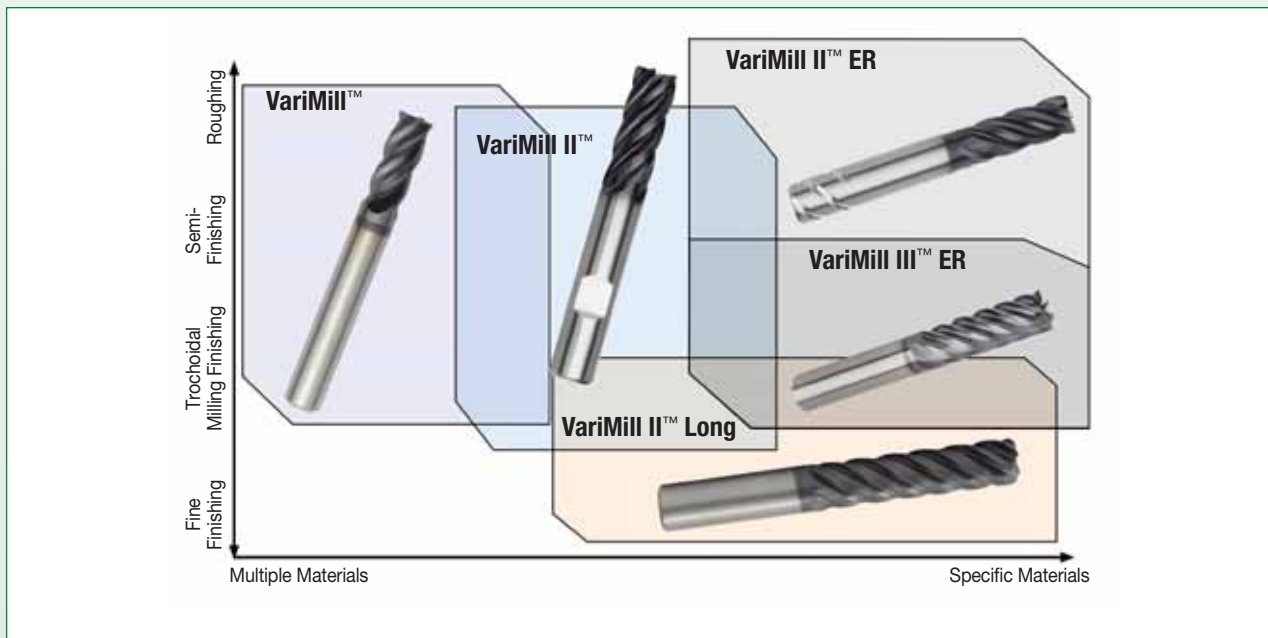
1. Tool overhang.
2. Coolant flow.
3. Machine and setup stability.
4. Machine power and torque.
5. Material to be machined.
6. Machine adaptor size (CV40, CV50, HSK63, etc.).
7. See Tool Reference Guides on pages K6-K11.

	Materials	Recommended Series																								Page Reference		
		P						M			K			N						S				H				
		Steels & Alloyed Steels						Stainless Steel			Cast Iron			Non-Ferrous						High-Temp Alloys & Titanium				Hardened Materials				
	0	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	
Type of Cut	Roughing																											
	DQ13																											L54
	4U40, 4U70																											L58-L59
	X-Feed™ 70N6																											L140
	X-Feed 70N7																											L141
	4909, 4979																											L131-L132
	Semi-Finishing																											
	VariMill I™ – 4777																											L4-L5
	VariMill II™ – 577C																											L24
	VariMill II ER – 577E																											L32
	VariMill III™ ER – 771E, 772E																											L45
	AluSurf™ 5102, 5103																											L124-L125
	Finishing																											
	D507, D517																											L90
	VariMill III ER – 77NE, 771E, 772E																											L44-L45
	AluSurf 5102, 5103																											L124-L125
	Finishing Pockets																											
	VariMill I – 4777																											L4-L5
	VariMill II – 57NC																											L25-L26
	VariMill II ER – 57NE																											L33
	VariMill III ER – 77NE																											L44
	AluSurf 51N3																											L126
	Long Wall Milling																											
	VariMill II Long – 5718																											L38-L39
VariMill III ER – 772E																											L45	
3D Ball Nose																												
VariMill I – 47N0																											L12	
HPC/Peel Milling																												
VariMill I – 4777, 4778																											L4-L6	
VariMill II – 577C																											L24	
VariMill II ER – 577E																											L32	
VariMill II Long – 5718																											L38-L39	
VariMill III ER – 77NE, 771E, 772E																											L44-L45	
AluSurf 5102, 5103																											L124-L125	
Trochoidal Milling																												
VariMill I – 4777, 4778																											L4-L6	
VariMill II – 577C																											L24	
VariMill II ER – 577E																											L32	
VariMill III ER – 771E, 772E																											L45	
AluSurf 5102, 5103																											L124-L125	

■ 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™/Aluminium Tools	HydroForce	Shrink Fit
VisionPlus™/VisionPlus X-Feed™	HydroForce	Shrink Fit
VariMill GP	Shrink Fit	Weldon Adaptor

■ Select Adaptor per Technical Data/Characteristics























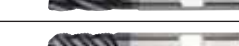
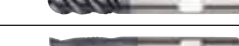

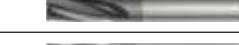


Technical data/characteristics	Toolholders				
	HydroForce high torque	Shrink Fit	Milling chuck	ER collet chuck	Weldon® adaptor
torque transmission	★★★★★	★★★★	★★★★★	★★	★★★★★
radial runout (T.I.R.) ¹	★★★★★	★★★★★	★★★★	★★★	★
radial rigidity ²	★★★★	★★★★★	★★★	★★★	★★★
tool length adjustment	★★★★★	★★★★	★	★★★★	★★
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.






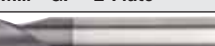



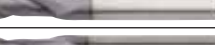







⁴ Collet chucks and milling chucks may require the use of a torque or special wrench; Shrink Fit adaptor requires a shrinking unit.

	Series	Range of Diameter Ø min- Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB ₂	Diamond	PCD	<input checked="" type="radio"/> first choice <input type="radio"/> alternate choice
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				
	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				

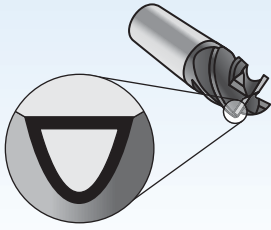
	P				M	K	N				S				H		Page References	
	1 2 3	4	5	6	1 2 3	1 2 3	1 2 3 4 5	6	1	2	3	4	1 2	3 4				
	Steel <35 HRC	Steel >36-48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron	Non-Ferrous	Graphite	Iron Based	Nickel Based	Pure Titanium	Titanium Alloys	Hardened Steels H1 = <48 HRC H2 = 48-55	H3 = 56-60 HRC H4 = >60 HRC	Product Information	Cutting Data		
High-Performance Solid Carbide End Mills • VariMill™ (continued)																		
VariMill I™ (continued)																		
	●	●	○	○	●	●			○	○	○	○	○		L4-L5	L13		
	●	●	●	●	●	○			○	●	●	●	●		L6	L14		
	●	●	●	●	●	○			●	●	●	●	●		L7	L15		
	●	●	●	●	●	○			●	●	●	●	●		L8	L16		
	●	●	●	●	●	○			●	●	●	●	●		L9-L10	L17		
	●	●	○	○	●	○			○	○	○	○	○		L9-L10	L18		
	●	●	○	○	●	○			○	○	○	○	○		L11	L19		
	●	●	○	○	●	●			○	○	○	○	○		L12	L20		
VariMill II™ (continued)																		
	●	●	○	○	●	●			○	○	○	○	○		L24	L27		
	○	●	●	●	●	○			○	●	●	●	●		L25-L26	L28		
VariMill II™ ER (continued)																		
	○	○	●	●	●	○			●	●	●	●	●		L32	L34		
	○	○	●	●	●	○			●	●	●	●	●		L33	L35		
VariMill II™ Long (continued)																		
	●	●	●	●	●	○			○	●	●	●	●		L38-L39	L40		
VariMill III™ ER (continued)																		
			○	○	○					●	●	●	○		L44	L46		
			○	○	○					●	●	●	○		L45	L47-L48		
High-Performance Solid Carbide End Mills • Roughing (continued)																		
	●	●	●	○	○	○			○	○	○	○	○		L54	L67		
	●	●	●	○	●	●			●	●	●	●	○		L55	L68		
	●	●	○	○	●	●			○	○	○	○	○		L56	L69		
	●	●	○	○	●	●			○	○	○	○	○		L57	L70		
	○	●	●	●	●	○			○	○	○	○	○		L58	L71		
	○	●	●	●	●	○			○	○	○	○	○		L59	L72		
	●	●	○	○	○	●			○	○	○	○	○		L60	L73		
	●	●	○	○	○	●			○	○	○	○	○		L61	L74		
	●	●			●	●									L62	L75		
	●	●			●	●									L63	L76		
	●	●			●	●									L64	L77		
	●	●	●	●	●	●	○		○	○	○	○	○		L65	L78		
	●	●	●	●	●	●	●		○	○	○	○	○		L66	L79		

	Series	Range of Diameter Ø min- Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB ₂	Diamond	PCD	<input checked="" type="radio"/> first choice <input type="radio"/> alternate choice
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			
	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					

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	Product Information	Cutting Data		
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				
High-Performance Solid Carbide End Mills • Finishing (continued)																	
●	●			●		○								L82	L97		
●	●	○	○	●	●			●	●	●	●	○		L83	L98-L99		
●	●	○	○	○	○			●	●	●	●	○		L84	L100		
●	●	○	○	●	○			○	○	○	○	○		L85	L101		
●	●	●	●	●	●			●	●	●	●	○		L86-L88	L102		
●	●	○	○	●	●			●	●	●	●	○		L89	L103		
●	●	○	○	●	●			○	○	○	○	○		L90	L104-L105		
●	●			●	●									L91	L106		
●	●	●	●	●	●			●	●	●	●	○		L92	L107		
●	●	●	●	●	○			○	○	○	○			L93	L108		
●	●	○	○		●									L94	L109		
						●								L95	L110		
						●								L96	L111		
High-Performance Solid Carbide End Mills • Micro End Mills (continued)																	
●	●	●	●	●	●	●	●	○	○	○				L114	L118		
●	●	●	●	●	●	●								L115	L119		
●	●	●	●	●	●	●								L116	L120		
●	●	●	●	●	●	●								L117	L121		
High-Performance Solid Carbide End Mills • Aluminium (continued)																	
AluSurf™ (continued)																	
						●	○							L124	L127		
						●	○							L125	L127		
						●	○							L126	L127		
High-Performance Aluminium (continued)																	
						●	●							L130	L135		
						●	○							L131	L135		
						●	○							L132	L136		
						●	○							L133	L136		
						●	○							L134	L137		
High-Performance Solid Carbide End Mills • Hard Materials (continued)																	
VisionPlus™ X-Feed™ (continued)																	
		○										●	●	L140	L142		
		○										●	●	L141	L143		

	Series	Range of Diameter Ø min- Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB ₂	Diamond	PCD
<p>● first choice ○ alternate choice</p>											
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	Product Information	Cutting Data					
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							
General Purpose Solid Carbide End Mills • Roughing/Finishing (continued)																				
NINA™ (continued)																				
●	●	●	●	●	●	●	●							M4	M9					
●	●	●	●	●	●	●								M5	M9					
●	●	●	●	●	●	●								M6	M10					
●	●	●	●	●	●	●								M7	M10					
●	●	●	●	●	●	●	●	●	●	●	●	●		M8	M11					
VariMill™ GP • 2-Flute (continued)																				
●	●	●	●	●	●	●								M14-M15	M23					
●	●	●	●	●	●	●								M16	M23					
●	●	●	●	●	●	●								M17-M18	M23-M24					
●	●	●	●	●	●	●								M19	M25					
●	●	●	●	●	●	●								M20	M25					
●	●	●	●	●	●	●								M21-M22	M25-M26					
VariMill GP • 4-Flute (continued)																				
●	●	●	●	●	●	●								M32-M33	M40-M41					
●	●	●	●	●	●	●								M34	M41					
●	●	●	●	●	●	●								M35-M36	M40-M41					
●	●	●	●	●	●	●								M37	M42					
●	●	●	●	●	●	●								M38	M42					
●	●	●	●	●	●	●								M39	M42-M43					

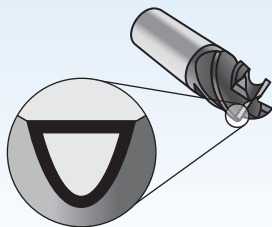


Coatings provide high-speed capability and are engineered for roughing to finishing.

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	Performance Matrix																	
				05	10	15	20	25	30	35	40	45								
Uncoated, Uncoated -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																	
			H																	
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																	
			N																	
			S																	
			H																	
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.	P																	
			M																	
			K																	
			N																	
			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																	
			H																	
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																	
			M																	
			K																	
			N																	
			S																	
			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																	
			M																	
			K																	
			N																	
			S																	
			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																	
			S																	
			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	Material Group																									
			P	M	K	N	S	H	05	10	15	20	25	30	35	40	45											
TIAIN-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																									
			N																									
			S																									
			H																									
TIAIN-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																									
			N																									
			S																									
			H																									
AITIN-MT1, -MW1, -MJ1		AITIN 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).	P																									
			M																									
			K																									
			N																									
			S																									
			H																									
AITIN-MT, -MW		Coated fine-grain grade with AITIN 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																									
			N																									
			S																									
			H																									
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.	P																									
			M																									
			K																									
			N																									
			S																									
			H																									
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																									
			N																									
			S																									
			H																									
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																									
			S																									
			H																									

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



Surface Conventional End Mill		Surface Victory™ End Mill		View: 1st and 2nd relief
				Eliminates sharp corner for superior coating adhesion
				Eliminates grinding damage

<p>WP15PE™</p> <p>W = WIDIA™</p> <p>P = Steels</p> <p>15 = Application Range (Medium to Roughing)</p> <p>P = Carbide + PVD</p> <p>E = Solid End Mills</p>	<p>WS15PE™</p> <p>W = WIDIA</p> <p>S = High-Temp Alloys</p> <p>15 = Application Range (Medium to Roughing)</p> <p>P = Carbide + PVD</p> <p>E = Solid End Mills</p>
Primary Materials	Primary Materials
P0 through P4 Steels M1 through M3 Austenitic Stainless Steels K1 through K3 Cast Irons H1 Hardened Steels	S1 through S4 High-Temp Alloys P5 through P6 Ferritic and Martensitic Stainless Steels H1 Hardened Steels
Secondary Materials	Secondary Materials
S1 through S4 High-Temp Alloys H2 Hardened Steels	M1 through M3 Austenitic Stainless 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.



Metric	series	Victory Grade		● first choice ○ alternate choice					
		WP15PE	WS15PE	P	M	K	N	S	H
				●	●	●	●	●	●
VariMill I™	4777, 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			250
5	77	7	
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	8	W
Series	Special Designation	Cutting Diameter	Corner Condition	Shank Diameter	Shank Style
5 = 5-Flute Carbide 4 = 4-Flute Carbide	C = Centre Cutting	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	0 & Z = Sharp 1 = 0,75 2 = 0,50 3 = 1,00 4 = 1,50 5 = 2,00 6 = 2,50 7 = 3,00 8 = 4,00	2 = 6mm 3 = 8mm 4 = 10mm 5 = 12mm 6 = 16mm 7 = 20mm 8 = 25mm 9 = 32mm	T = Plain W = Weldon® V = SAFE-LOCK®

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
<p>0 = Sharp 1 = Radius</p>	<p>2 = 6mm 3 = 8mm 4 = 10mm 5 = 12mm 6 = 16mm 7 = 20mm 8 = 25mm 9 = 32mm</p>	<p>L = TiAlN M = AlTiN C = TiCN R = TiAlN J = Uncoated</p>	<p>T = Plain W = Weldon® J = JIS</p>

NEW Victory Nomenclature • Metric

W	P	15	P	E
Brand	ISO Material Code	Wear Range	Coating Type	Product Family
WIDIA™	<p>P = Steel S = High-Temperature Alloys</p>	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.





Solid End Milling • High-Performance Solid Carbide End Mills

VariMill.....	L2-L48
Roughing.....	L50-L79
Finishing.....	L80-L111
Micro Solid Carbide End Mills.....	L112-L121
Aluminium.....	L122-L137
Hard Materials.....	L138-L143
Trochoidal Milling.....	L144-L150



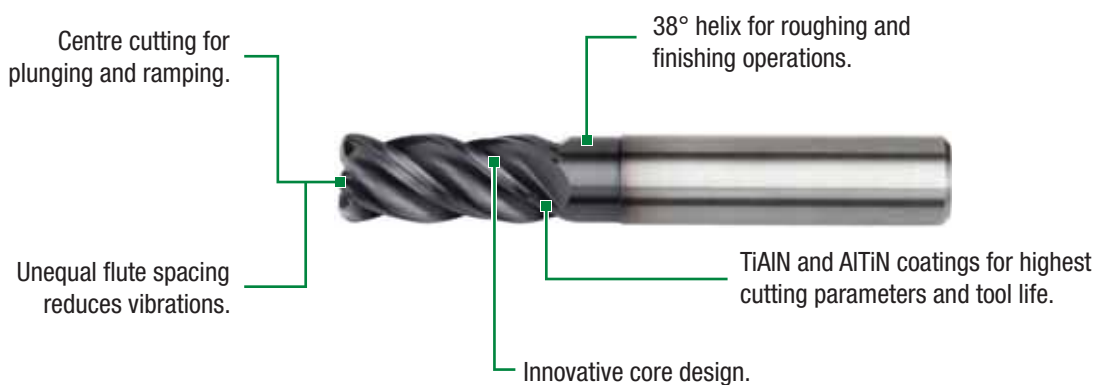
High-Performance Solid Carbide End Mills •
VariMill I™

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 AiTiN 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 AiTiN 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.

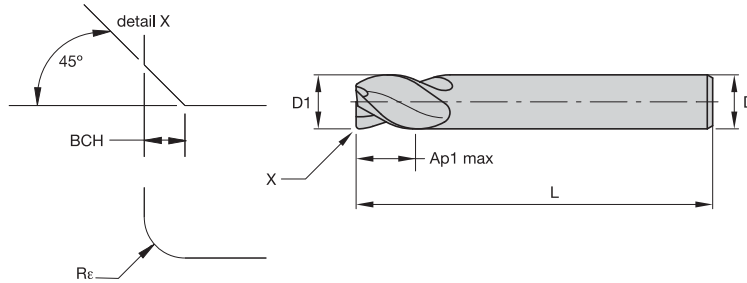


47N0 Series

- 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.

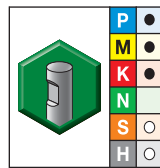
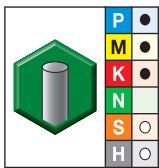


End Mill Tolerances

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



■ Series 4777 • VariMill • Victory Grades

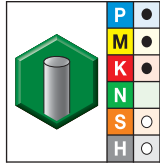
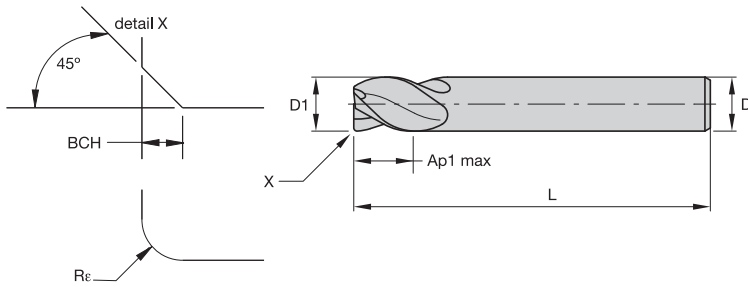


- first choice
- alternate choice

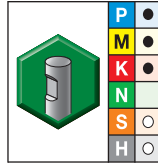
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Re	BCH
5576753	477704001T	-	-	4,0	6	12,00	55	0,20	-
5576751	477704002T	5576752	477704002W	4,0	6	12,00	55	-	0,40
5576754	477704022T	-	-	4,0	6	12,00	55	-	-
5576755	477705002T	5576756	477705002W	5,0	6	13,00	57	-	0,40
5576757	477705012T	-	-	5,0	6	13,00	57	0,20	-
5576758	477705022T	-	-	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	477706022T	-	-	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	477707023T	-	-	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	477708023T	-	-	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	477709024T	-	-	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)



grade WP15PE
AITiN

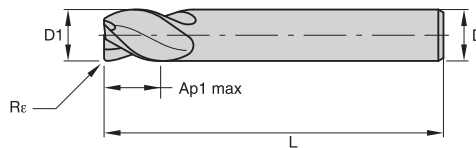
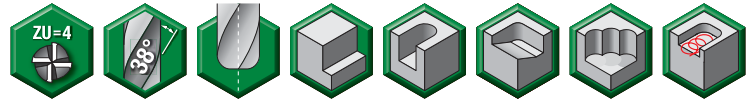


grade WP15PE
AITiN

● first choice
○ alternate choice

order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Re	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

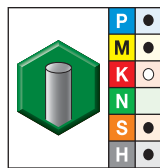
- Unequal flute spacing.
- Centre cutting.
- Optimised geometry for titanium machining.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



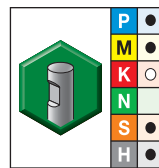
End Mill Tolerances

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



grade AITiN-MT
AITiN

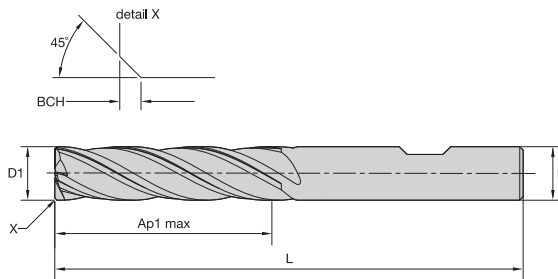
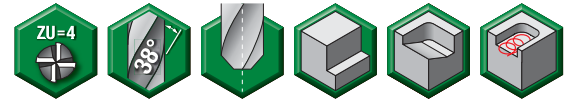


grade AITiN-MW
AITiN

- first choice
- alternate choice

order #	catalogue #	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

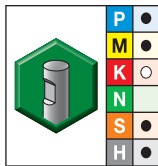
- Unequal flute spacing.
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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



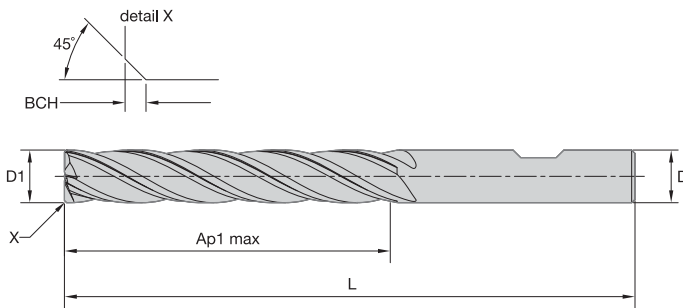
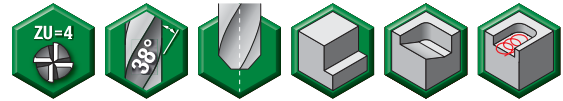
grade TiAlN-LW
TiAlN

- first choice
- alternate choice

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

High-Performance Solid Carbide End Mills

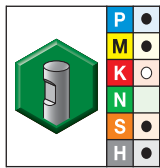
- Unequal flute spacing.
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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



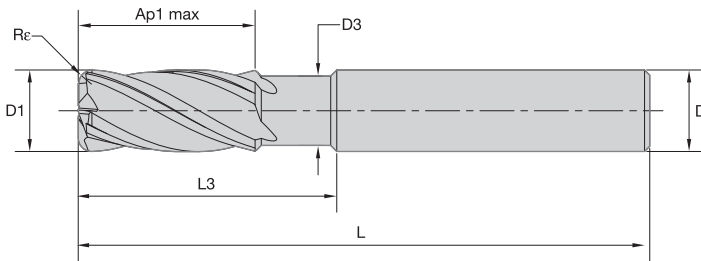
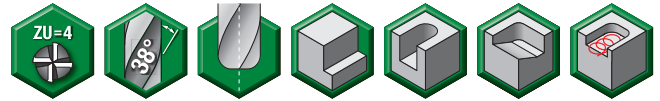
grade TiAlN-LW
TiAlN

- first choice
- alternate choice

order #	catalogue #	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

High-Performance Solid Carbide End Mills

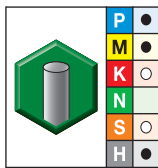
- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



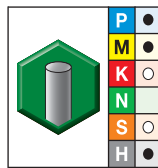
End Mill Tolerances

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



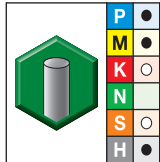
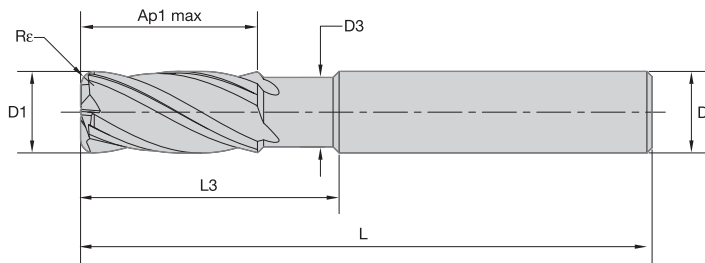
grade TiAlN-LT
TiAlN

- first choice
- alternate choice

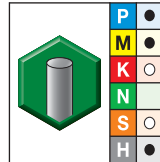
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Re
—	—	3462450	47N704002LT	4,0	6	3,60	12,00	16,00	55	0,40
3462452	47N704012MT	3462451	47N704012LT	4,0	6	3,60	12,00	16,00	55	0,50
—	—	3462453	47N704022LT	4,0	6	3,60	12,00	16,00	55	1,00
—	—	3462454	47N705002LT	5,0	6	4,60	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)

(Series 47N7 • VariMill • With Neck — continued)



grade AlTiN-MT
AlTiN

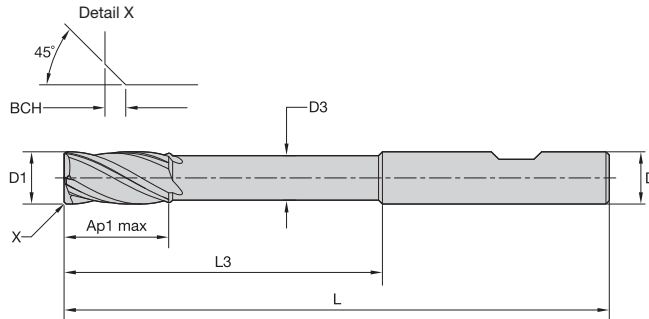
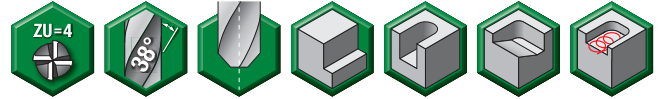


grade TiAlN-LT
TiAlN

● first choice
○ alternate choice

grade AlTiN-MT AlTiN		grade TiAlN-LT TiAlN		D1	D	D3	length of cut Ap1 max	L3	length L	Re
order #	catalogue #	order #	catalogue #							
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

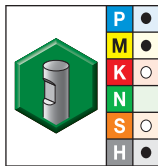
- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



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

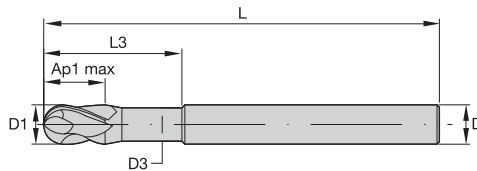
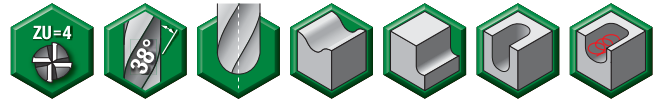


grade TiAlN-LW
TiAlN

- first choice
- alternate choice

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.

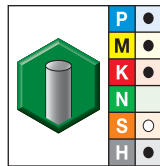


End Mill Tolerances

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



■ Series 47N0 • VariMill • Ball Nose • Victory Grades



grade WP15PE
AlTiN

- first choice
- alternate choice

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

High-Performance Solid Carbide End Mills

■ Series 4777 • 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	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	
	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	
	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	
	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	
	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	
	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	
M	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	
	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	
	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	
K	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	
	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	
	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	
S	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	
	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	
	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	
	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	
H	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	
	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.

High-Performance Solid Carbide End Mills

■ Series 4778 • VariMill

Material Group								Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
	Side Milling (A) and Slotting (B)		AITiN			D1 – Diameter										
	A		B	Cutting Speed – vc m/min												
	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.

High-Performance Solid Carbide End Mills

■ Series 4717 • VariMill

Material Group		Side Milling (A)										Recommended feed per tooth (fz = mm/th) for side milling (A).						
		Finishing					Roughing											
		A		TiAlN			A		TiAlN			D1 – Diameter						
				Cutting Speed – vc m/min					Cutting Speed – vc m/min									
		ap	ae	min	max	ap	ae	min	max	mm	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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		 										Recommended feed per tooth (fz = mm/th) for side milling (A).			
		Side Milling (A)													
		Finishing					Roughing					D1 – Diameter			
		A		TiAlN			A		TiAlN						
		ap	ae	Cutting Speed – vc m/min			ap	ae	Cutting Speed – vc m/min			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%.

High-Performance Solid Carbide End Mills

■ Series 47N7 AlTiN • VariMill • With Neck

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	
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

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)			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	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	

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 Solid Carbide End Mills

■ 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			mm	D1 – Diameter						
	ap	ae	ap	min		max		6,0	8,0	10,0	12,0	16,0	20,0	
	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
P	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
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.

High-Performance Solid Carbide End Mills

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.
- Advanced hydraulic clamping with lowest runout and superior vibration dampening.
- Balanced quality to lower vibration, especially at high speeds.
- Focused and flexible product offering.

To learn more about our innovations, contact your local
Authorised Distributor or visit widia.com.

WIDIA 

High-Performance Solid Carbide End Mills •

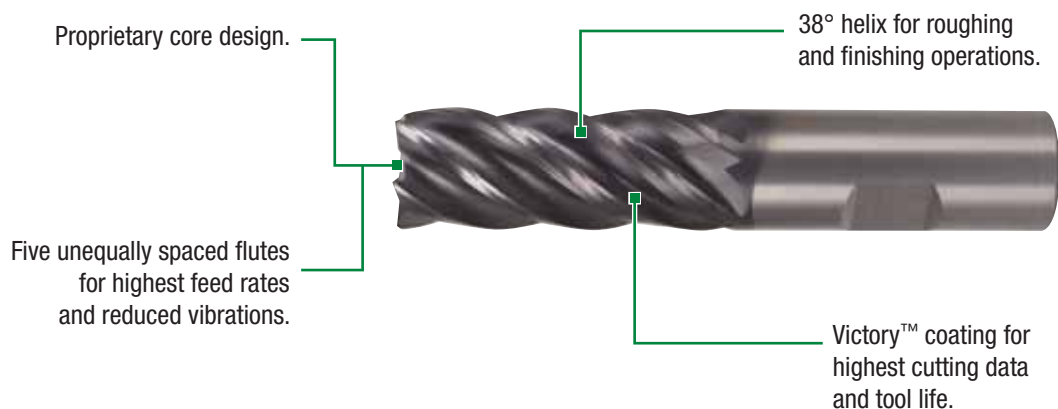
VariMill II™

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.

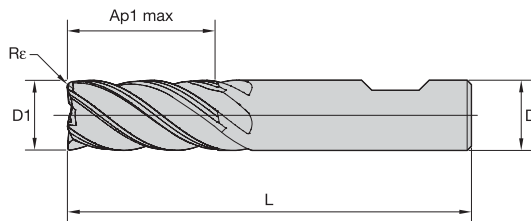
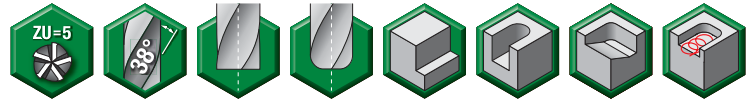


57NC Series

- Titanium and stainless steel geometry design.
- Radii corner and neck design for depths requiring additional passes.



- 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.

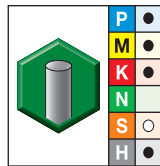


End Mill Tolerances

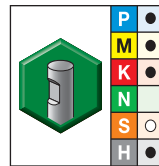
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3-6	0/-0,008
> 6-10	-0,025/-0,047	> 6-10	0/-0,009
> 10-18	-0,032/-0,059	> 10-18	0/-0,011
> 18-30	-0,040/-0,073	> 18-30	0/-0,013



Series 577C • VariMill II • With Centre Cut • Victory Grades



grade WP15PE
AITiN

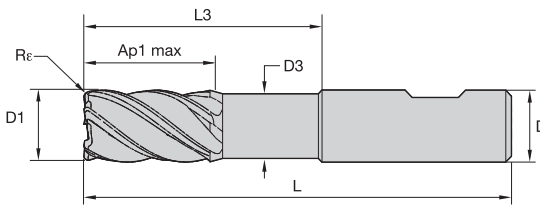


grade WP15PE
AITiN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Re
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.

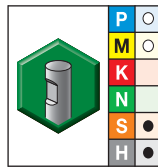
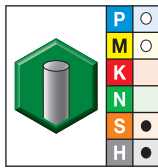


End Mill Tolerances

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



■ Series 57NC • VariMill II • With Neck • With Centre Cut • Victory Grades

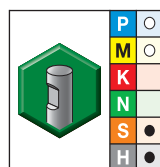
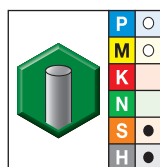
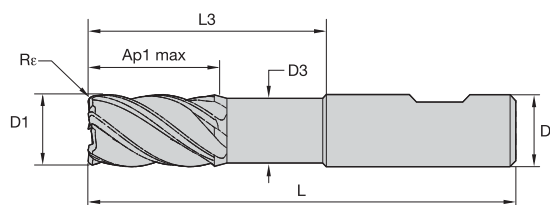


- first choice
- alternate choice

WS15PE AITiN		WS15PE AITiN		D1	D	D3	length of cut Ap1 max	L3	length L	Re
order #	catalogue #	order #	catalogue #							
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 AITiN		WS15PE AITiN		D1	D	D3	length of cut Ap1 max	L3	length L	Re
order #	catalogue #	order #	catalogue #							
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

High-Performance Solid Carbide End Mills

■ Series 577C • VariMill II • 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	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
	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
	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
	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
	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
M	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
	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
K	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
	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
S	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
	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	0,3 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
H	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
	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.

■ Series 57NC • VariMill II • With Neck • Victory Grades



Material Group								Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
	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 

High-Performance Solid Carbide End Mills •

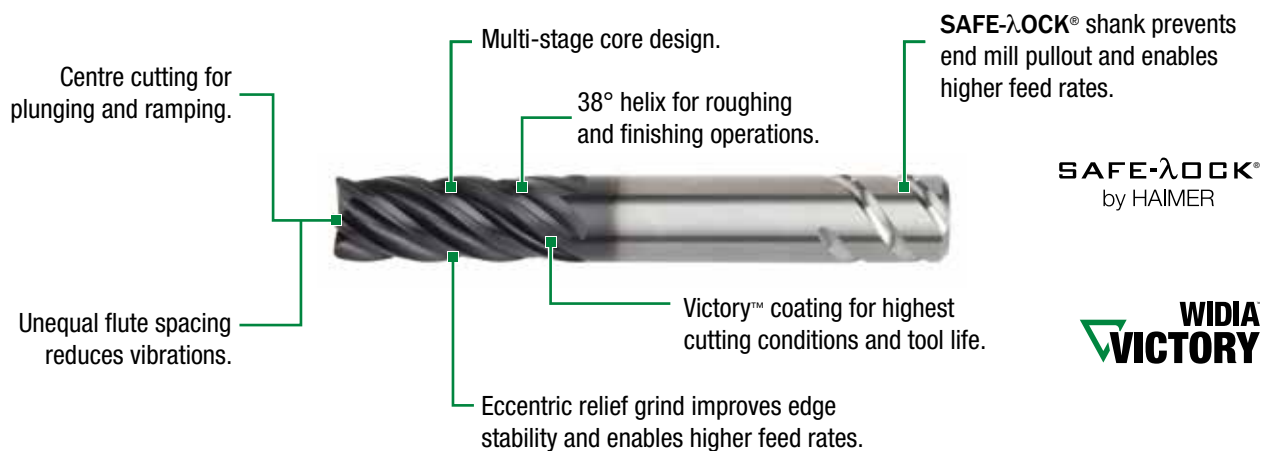
VariMill II™ ER

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.



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.

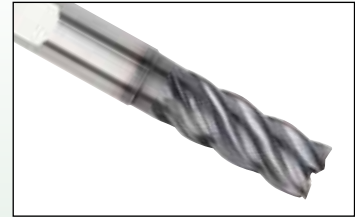
577E Series

- Eccentric relief for edge stability and strength.
- Extensive radii corner offering.



57NE 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: $a_p = 27,43\text{mm}$

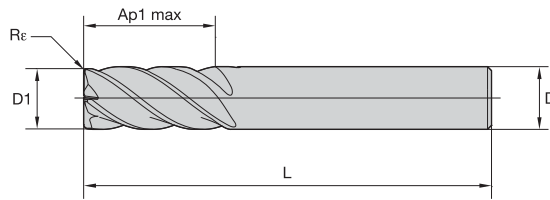
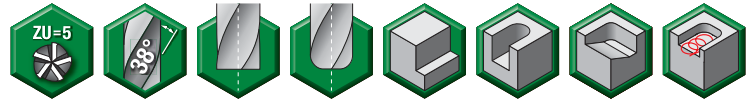
$a_e = 1,3\text{mm}$

$vc = 19,8\text{ m/min}$

$f_z = 0,05\text{ mm/th}$

Result: Increased tool life from 2 workpieces 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.

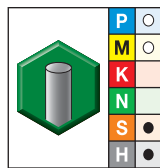


End Mill Tolerances

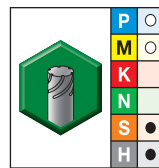
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3-6	0/-0,008
> 6-10	-0,025/-0,047	> 6-10	0/-0,009
> 10-18	-0,032/-0,059	> 10-18	0/-0,011
> 18-30	-0,040/-0,073	> 18-30	0/-0,013



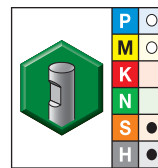
Series 577E • VariMill II ER • Victory Grades



WS15PE
AITiN



WS15PE
AITiN

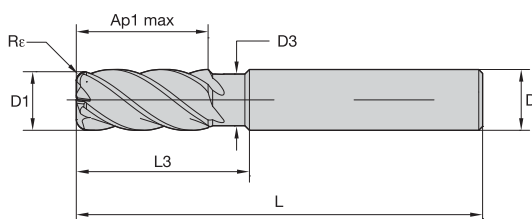
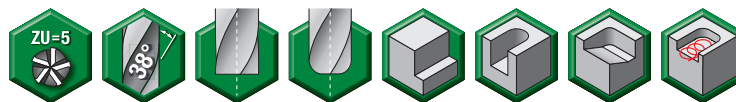


WS15PE
AITiN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Re
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.

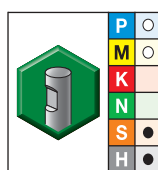
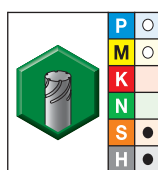
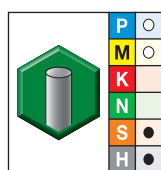


End Mill Tolerances

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



■ Series 57NE • VariMill II ER • With Neck • Victory Grades



- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Re
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



Material Group								Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		Side Milling (A) and Slotting (B)		WS15PE										
		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



Material Group								Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		Side Milling (A) and Slotting (B)		WS15PE										
		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.

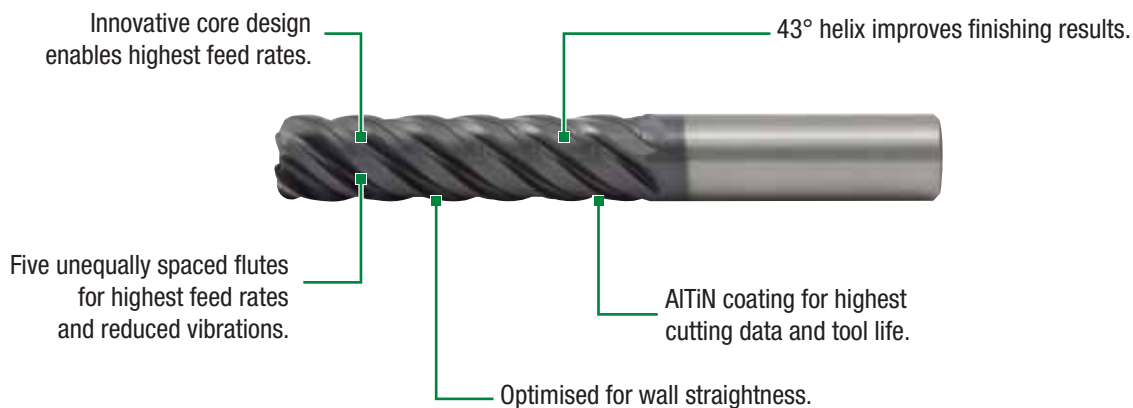
High-Performance Solid Carbide End Mills •
VariMill II™ Long

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.

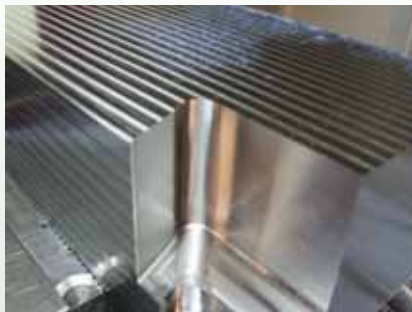
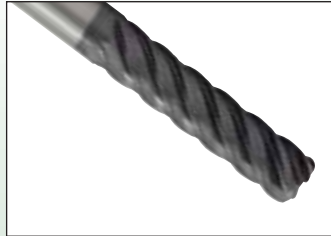


VariMill II™ Long Series

- 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

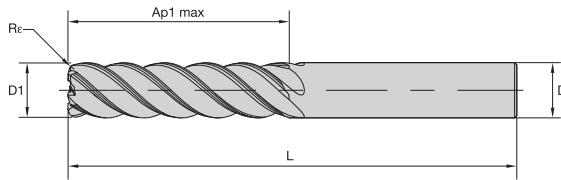
ae = 0,5mm

vc = 100 m/min

fz = 0,06 mm/z

Result: Surface finish Ra 0,4 µm

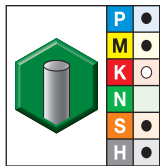
- Unequal flute spacing.
- Non-centre cutting.
- For finishing and semi-finishing applications.
- Standard items listed. Additional styles and coatings made-to-order.



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



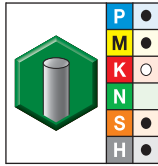
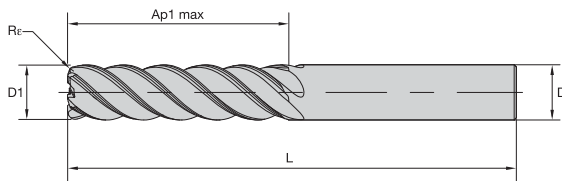
grade AlTiN-MT
AlTiN

- first choice
- alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L	Re
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		D1	D	length of cut Ap1 max	length L	Rε
order #	catalogue #					
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
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 machining centres, please adjust parameters accordingly on >12mm diameters.

High-Performance Solid Carbide End Mills

Designed to significantly reduce machining time in aluminium!



EXTREME CHALLENGES.
EXTREME RESULTS.

AluSurf™ Carbide End Mills for High Metal Removal Rates and Superior Surface Finishes

- Use only one tool for roughing and finishing operations.
- Slotting is effective up to full, 1 x D axial depth; side milling (profiling) is effective up to 0.5 x D, radial by 1.5 x D axial depth.
- Three-flute series uses unequal flute spacing for chatter-free performance.
- Effective in a full range of machine speeds.
- Multiple corner radii and extended neck configurations are available as standard.

To learn more about our innovations, contact your local Authorised Distributor or visit widia.com.

WIDIA 

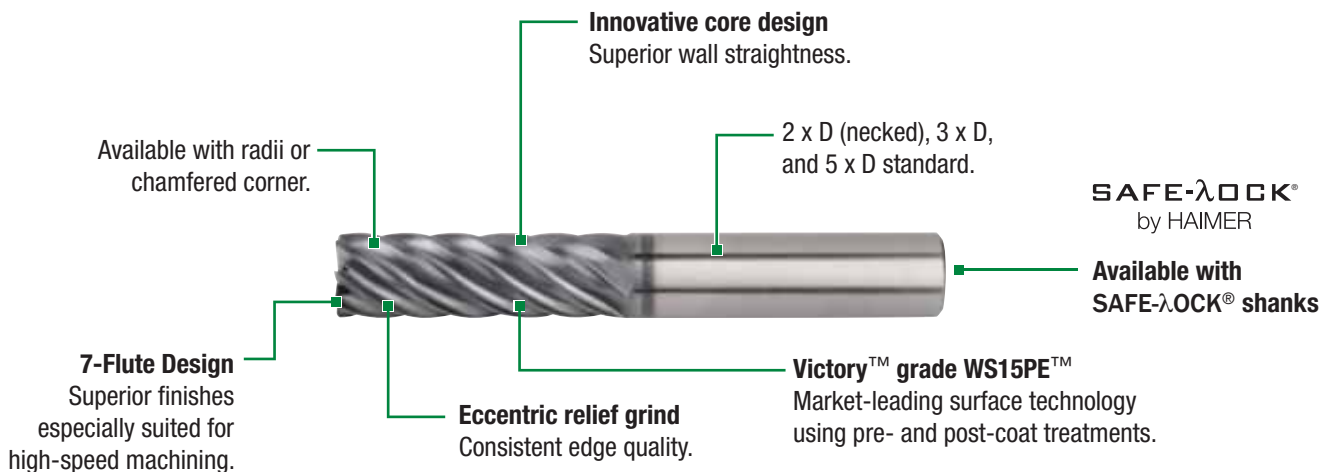
High-Performance Solid Carbide End Mills •
VariMill III™ ER

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.

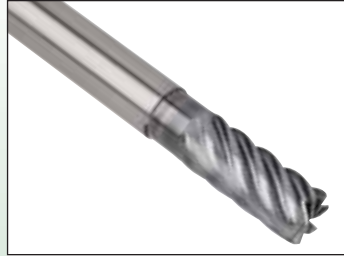


VariMill III™ ER Series

- 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-LOCK®.

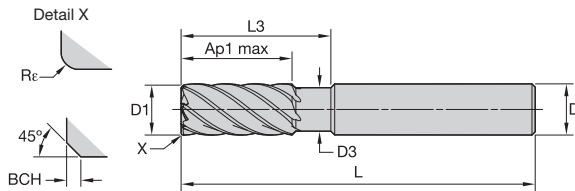


771E Series

- 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.

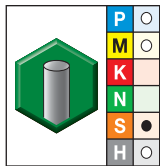


End Mill Tolerances

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



■ Series 77NE • VariMill III ER • With Neck • Victory Grades

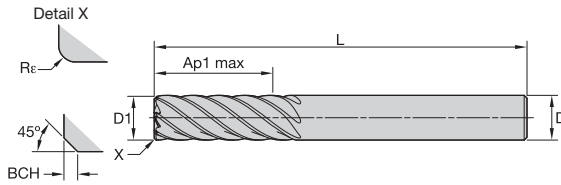


WS15PE
 AlTiN

- first choice
- alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Re	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.

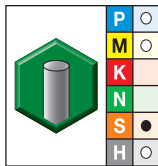


End Mill Tolerances

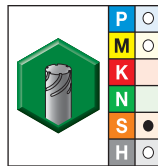
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3-6	0/-0,008
> 6-10	-0,025/-0,047	> 6-10	0/-0,009
> 10-18	-0,032/-0,059	> 10-18	0/-0,011
> 18-30	-0,040/-0,073	> 18-30	0/-0,013



■ Series 771E 772E • VariMill III ER • Victory Grades



WS15PE
AITiN



WS15PE
AITiN

- first choice
- alternate choice

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



Material Group	Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).						
	A		Cutting Speed – vc m/min			mm	D1 – Diameter					
	ap	ae	min		max		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
	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
	2	Ap1 max	0,3 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081
	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
	2	Ap1 max	0,3 x D	25	–	40	fz	0,032	0,037	0,046	0,050	0,054
	3	Ap1 max	0,3 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081
	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
	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



Material Group	Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).						
	A		Cutting Speed – vc m/min			mm	D1 – Diameter					
	ap	ae	min		max		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
	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
	2	Ap1 max	0,06 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	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
	2	Ap1 max	0,06 x D	50	–	80	fz	0,038	0,045	0,056	0,060	0,065
	3	Ap1 max	0,06 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	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
	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.

High-Performance Solid Carbide End Mills

■ Series 771E • VariMill III ER • Semi-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	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



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			mm	D1 – Diameter					
	ap	ae	min		max		10,0	12,0	16,0	18,0	20,0	
	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
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	5 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.

High-Performance Solid Carbide End Mills

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-LOCK®** 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 

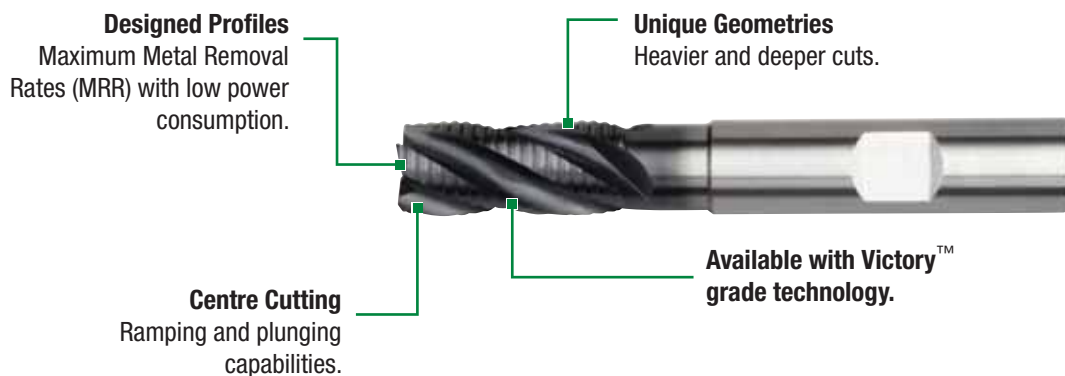
High-Performance Solid Carbide •
Roughers

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.



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.
- 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**

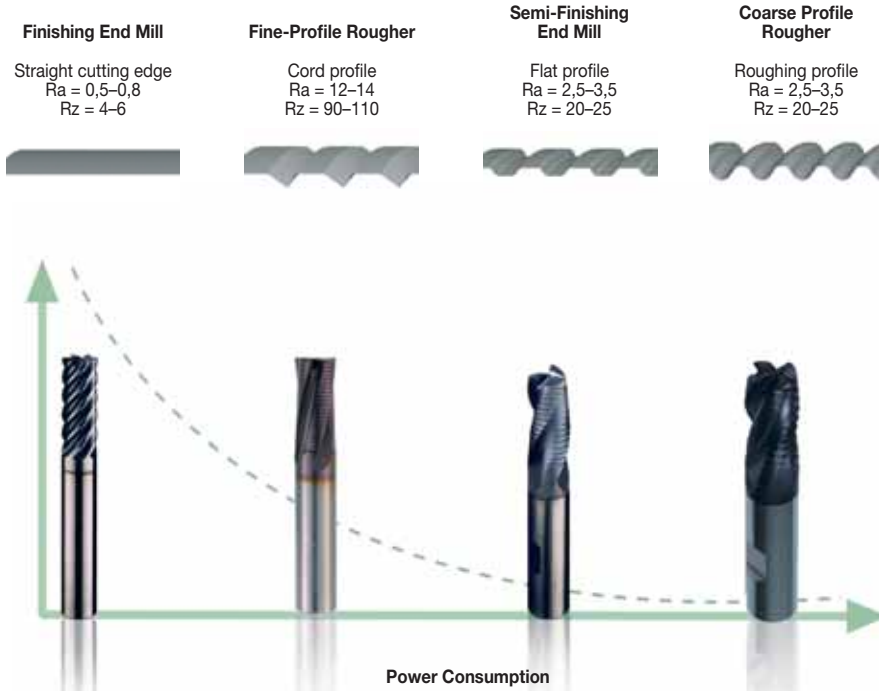
- Centre cutting.
- 4-flute.
- 30° helix.
- Flat shallow pitch.
- Steels and cast irons.
- DIN 6527.

**4966 Series**

- Centre cutting.
- 3- and 4-flutes.
- 20° helix.
- Fine pitch.
- Ball nose.
- Universal applications.



Rougher Profiles



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

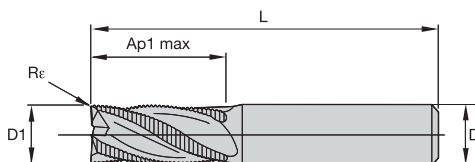
For machining alloyed steels, stainless steels, high-temp alloys, titanium, and hard materials.



Chipbreaker profile

For roughing and semi-finishing.

- Centre cutting.
- Chipbreaker pitch.
- Standard items listed. Additional styles and coatings made-to-order.

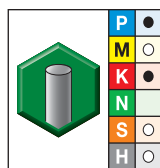


End Mill Tolerances

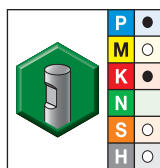
D1	tolerance h11 + / -	D	tolerance h6 + / -
≤ 3	0/-0,060	≤ 3	0/-0,006
> 3-6	0/-0,075	> 3-6	0/-0,008
> 6-10	0/-0,09	> 6-10	0/-0,009
> 10-18	0/-0,11	> 10-18	0/-0,011
> 18-30	0/-0,13	> 18-30	0/-0,013



Series DQ13 • Victory Grades



grade WP15PE
AITiN

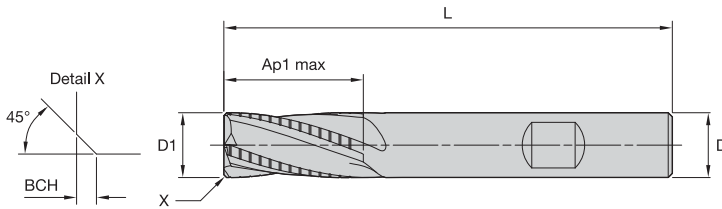


grade WP15PE
AITiN

- first choice
- alternate choice

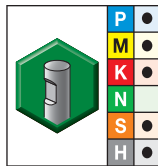
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Re
5560534	DQ1303002T	5560536	DQ1303002W	3,0	6	7,00	54	0,25
5560535	DQ1304002T	5560537	DQ1304002W	4,0	6	8,00	57	0,25
-		5560538	DQ1305002W	5,0	6	10,00	57	0,25
-		5560539	DQ1306002W	6,0	6	10,00	57	0,45
-		5560700	DQ1307003W	7,0	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.

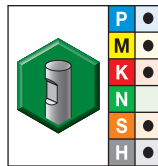


End Mill Tolerances			
D1	tolerance h11 + / -	D	tolerance h6 + / -
≤ 3	0/-0,060	≤ 3	0/-0,006
> 3-6	0/-0,075	> 3-6	0/-0,008
> 6-10	0/-0,09	> 6-10	0/-0,009
> 10-18	0/-0,11	> 10-18	0/-0,011
> 18-30	0/-0,13	> 18-30	0/-0,013

■ Series 49H6



grade TiAlN-LW
TiAlN

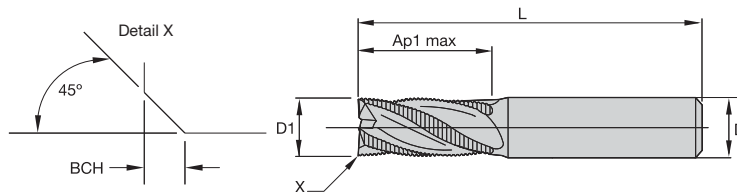
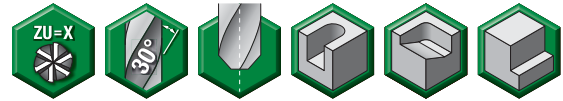


grade TiAlN-RW
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	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.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.

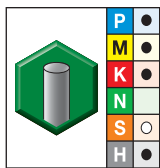


End Mill Tolerances

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



Series 4976 • Victory Grades

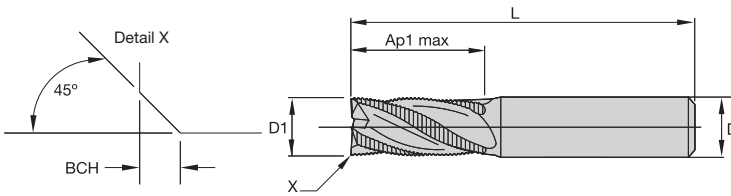
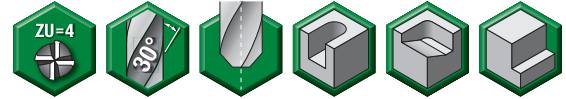


grade WP15PE
AlTiN

- first choice
- alternate choice

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

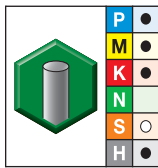
- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.



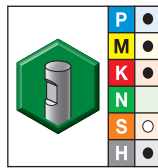
End Mill Tolerances

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



grade K30F-DCHP
TiAlN

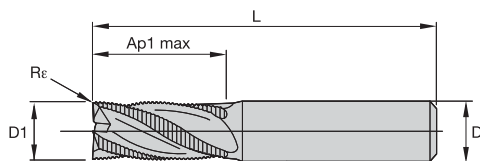


grade K30F-DCHP
TiAlN

- first choice
- alternate choice

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.

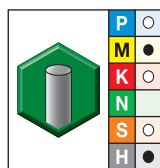


End Mill Tolerances

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



Series 4U40 • Victory Grades

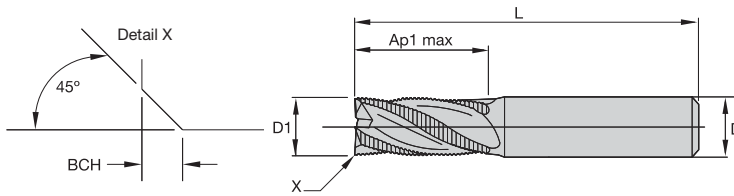
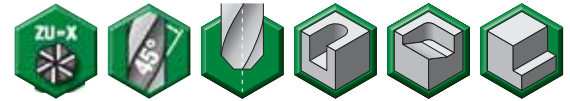


grade WP15PE
AlTiN

- first choice
- alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L	Re	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.

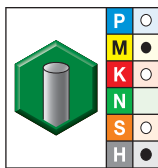


End Mill Tolerances

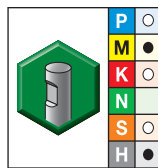
D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3-6	-0,030/-0,105	> 3-6	0/-0,008
> 6-10	-0,040/-0,130	> 6-10	0/-0,009
> 10-18	-0,050/-0,160	> 10-18	0/-0,011
> 18-30	-0,065/-0,195	> 18-30	0/-0,013



■ Series 4U70 • Victory Grades



grade WP15PE
AITiN



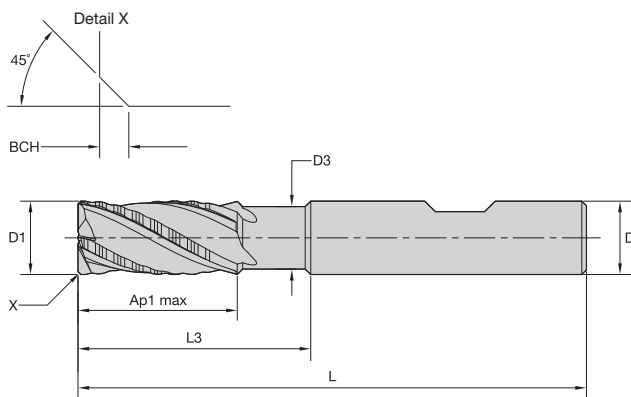
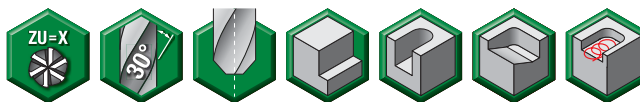
grade WP15PE
AITiN

- first choice
- alternate choice

order #	catalogue #	order #	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

High-Performance Solid Carbide End Mills

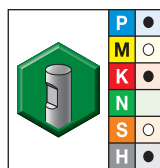
- Centre cutting.
- Flat shallow profile.
- Standard items listed. Additional styles and coatings made-to-order.



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

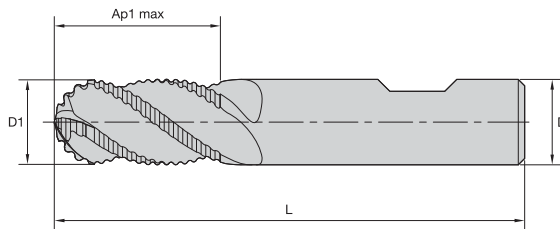


grade AlTiN-MW
AlTiN

- first choice
- alternate choice

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

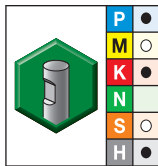
- Centre cutting.
- Flat shallow profile.
- Standard items listed. Additional styles and coatings made-to-order.
- Roughing profile also on radii portion of end mill.



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



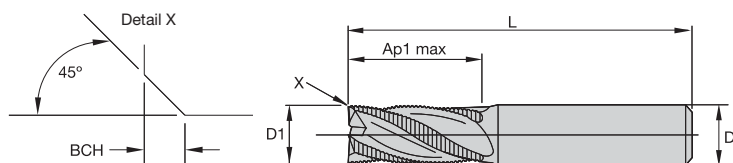
grade TiAlN-LW
TiAlN

- first choice
- alternate choice

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

High-Performance Solid Carbide End Mills

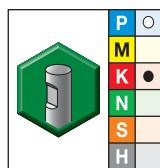
- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.



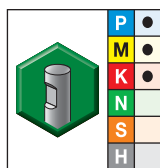
End Mill Tolerances

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



grade K30F
uncoated

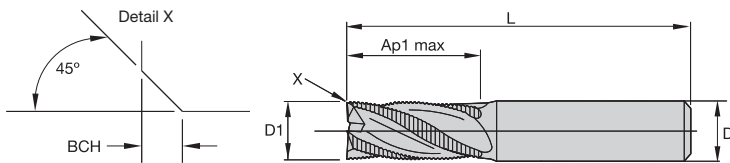


grade K30F-DCF
TiAlN

- first choice
- alternate choice

order #	catalogue #	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

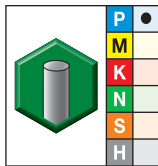
- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.



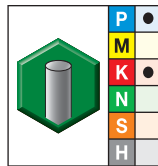
End Mill Tolerances

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



grade K30F
uncoated



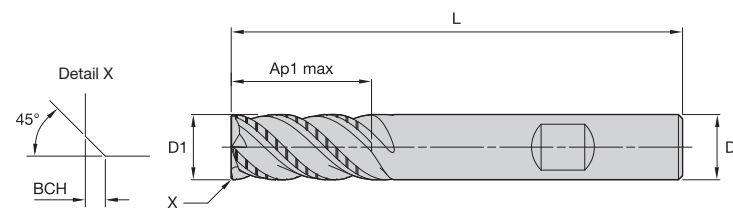
grade K30F-DCF
TiAlN

- first choice
- alternate choice

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

High-Performance Solid Carbide End Mills

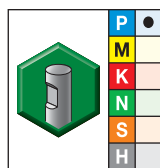
- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.



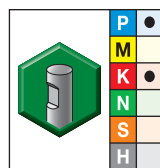
End Mill Tolerances

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



grade K30F uncoated

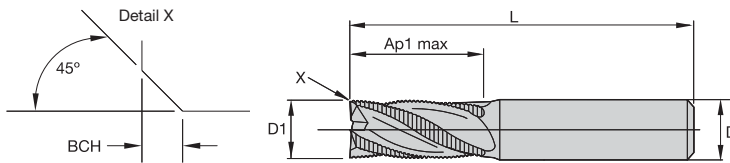
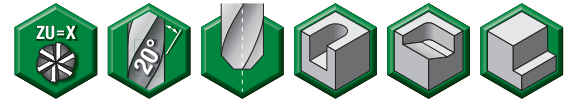


grade K30F-DCF TiAlN

- first choice
- alternate choice

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

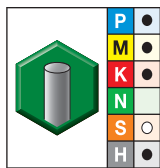
- Centre cutting.
- Fine pitch.
- LW = Multilayer.
- RW = Monolayer.
- Standard items listed. Additional styles and coatings made-to-order.



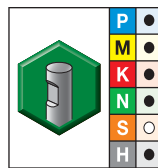
End Mill Tolerances

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

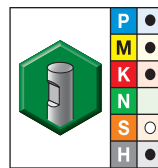
■ Series 4906



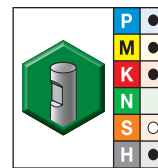
grade TiAlN-RT
TiAlN



grade TiCN-CW
TiCN



grade TiAlN-LW
TiAlN

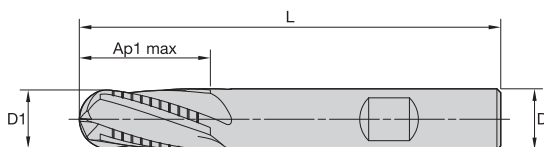


grade TiAlN-RW
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	order #	catalogue #	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

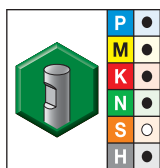
- Centre cutting.
- Fine pitch.
- LW = Multilayer.
- RW = Monolayer.
- Standard items listed. Additional styles and coatings made-to-order.



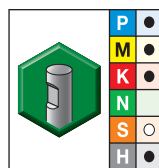
End Mill Tolerances

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

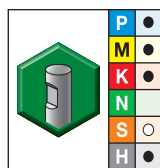
Series 4966



grade TiCN-CW
TiCN



grade TiAlN-LW
TiAlN






grade TiAlN-RW
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	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



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
	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
	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
	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
	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
	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
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
	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
	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
	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
	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
	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
	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
	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.

High-Performance Solid Carbide End Mills

■ Series 49H6

Material Group								Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
	Side Milling (A) and Slotting (B)		TiAlN												
	A		B	Cutting Speed – vc m/min			D1 – Diameter								
	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
	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
	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
	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
	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
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
	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
	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
	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
	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
	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.

High-Performance Solid Carbide End Mills

■ Series 4976 • 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	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	
	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	
	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	
	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	
	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	
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	
	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	
	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	
	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	
	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	
	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	
	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	
	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.

High-Performance Solid Carbide End Mills

■ Series 422820 422824

Material Group								Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
	Side Milling (A) and Slotting (B)				K30F-DCHP			D1 – Diameter							
	A		B		AITiN										
	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
	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
	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
	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
	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
	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
	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
	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
	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.

High-Performance Solid Carbide End Mills

■ Series 4U40 • 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	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

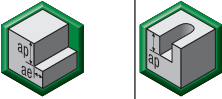



Material Group								Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
	Side Milling (A) and Slotting (B)		WP15PE			Cutting Speed – vc m/min		D1 – Diameter							
	A		B		min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
	ap	ae	ap												
P	3	1 x 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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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.

High-Performance Solid Carbide End Mills

■ Series 49N6

Material Group																				
		Side Milling (A) and Slotting (B)			AITiN		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	
M	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	
	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	
K	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	
	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	
S	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	
	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	
H	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)			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	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
	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
	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
	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
	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
	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
M	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
	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
	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
K	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
	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
	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
S	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
	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
	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
	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
H	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
	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
	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
	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.

High-Performance Solid Carbide End Mills

■ 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			TiAlN			D1 – Diameter							
		Cutting Speed – vc m/min		Cutting Speed – vc m/min			Cutting Speed – vc m/min			mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0	
		ap	ae	ap	min		max	min		max								
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
	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
	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
	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
	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
	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
	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											Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		Side Milling (A) and Slotting (B)		K30F			K30F-DCF										
		A		B		Uncoated			TiAlN								
		ap	ae	ap	Cutting Speed – vc m/min		Cutting Speed – vc m/min		D1 – Diameter								
			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
	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
	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
	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
	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
	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%.								
	A		B	Uncoated			TiAlN			mm	D1 – Diameter							
	ap	ae	ap	Cutting Speed – vc m/min			Cutting Speed – vc m/min				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
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
M	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
	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
K	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
	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
S	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
	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
H	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
	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.
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 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		mm	D1 – Diameter											
	ap	ae	ap	min	max	min	max		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
	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
	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
	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
	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
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
	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
	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
	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
	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
	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.

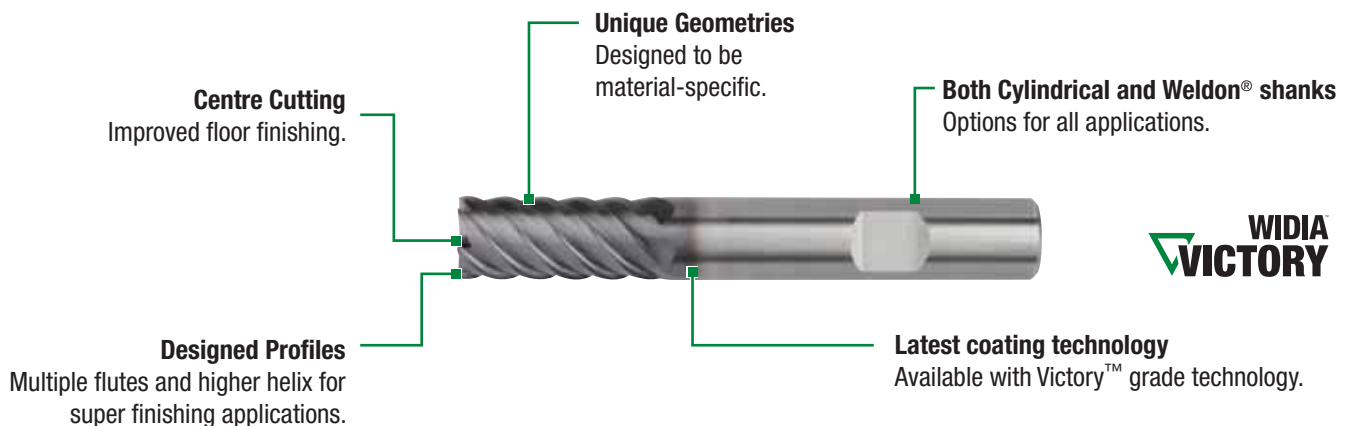
High-Performance Finishing Solid Carbide End Mills

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.



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.
- Tours style.
- Diamond coating.
- Non-ferrous applications.

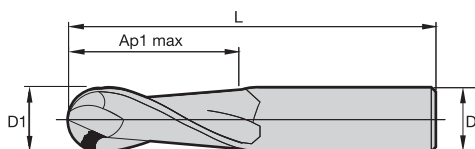


024111 Series

- 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.

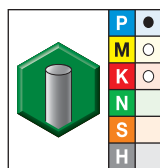


End Mill Tolerances

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



Series 4001 JJ • Victory Grades

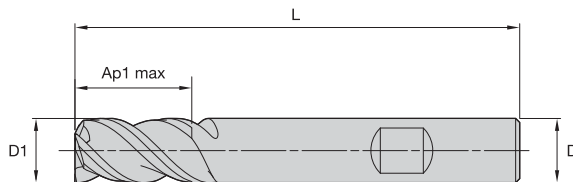


grade WP15PE
AlTiN

- first choice
- alternate choice

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

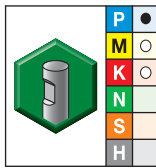
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



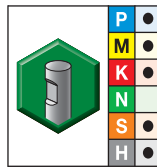
End Mill Tolerances

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

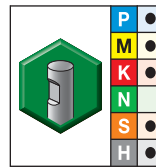
■ Series D503 D513



grade UNCOATED-WW



grade TiCN-CW TiCN

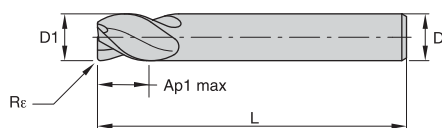


grade TiAlN-RW TiAlN

- first choice
- alternate choice

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

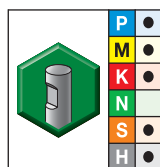
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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

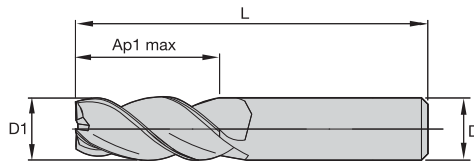


grade TiAlN-LW
TiAlN

- first choice
- alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L	Re
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.

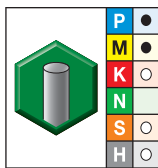


End Mill Tolerances

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



■ Series 4503 JJ • Victory Grades



grade WP15PE
AlTiN

- first choice
- alternate choice

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

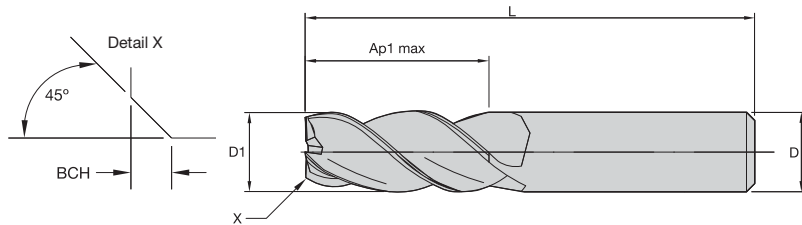
High-Performance Solid Carbide End Mills

High-Performance Solid Carbide End Mills • Finishing

Series 022801 022804 022802 322806 322801 322804 322802
422806 422801 422804 422802 422806



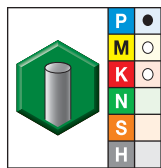
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



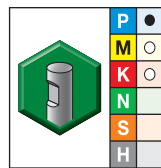
End Mill Tolerances

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

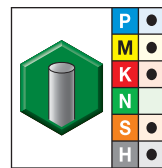
Series 022801 022804 022802 322806 322801 322804 322802 422806



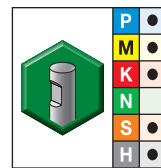
grade K30F uncoated



grade K30F uncoated



grade K30F-TiCN TiCN



grade K30F-TiCN TiCN

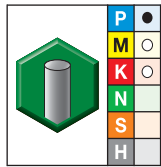
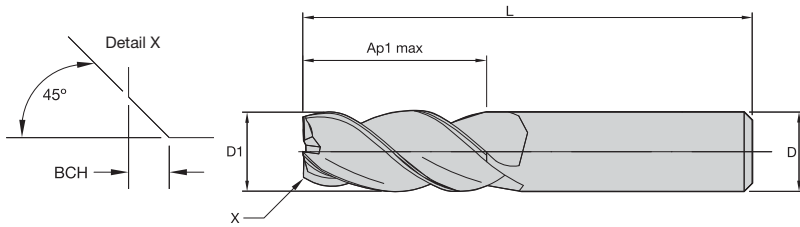
- first choice
- alternate choice

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

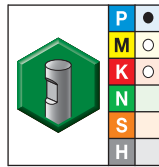
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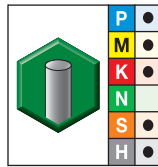
(Series 022801 022804 022802 322806 322801 322804 322802 422806 — continued)



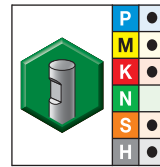
grade K30F uncoated



grade K30F uncoated



grade K30F-TiCN TiCN

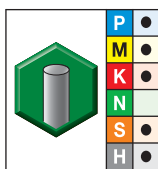


grade K30F-TiCN TiCN

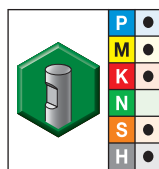
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2332125	022801-000090	2332143	022802-000090	2335357	322801-000090	2335379	322802-000090	9,0	10	10,00	66	0,20
2332161	022804-000090	2332177	022806-000090	2335396	322804-000090	2335412	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

High-Performance Solid Carbide End Mills

■ Series 422801 422804 422802 422806



grade K30F-DCF TiAlN



grade K30F-DCF TiAlN

- first choice
- alternate choice

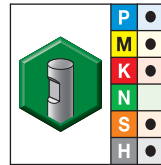
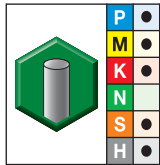
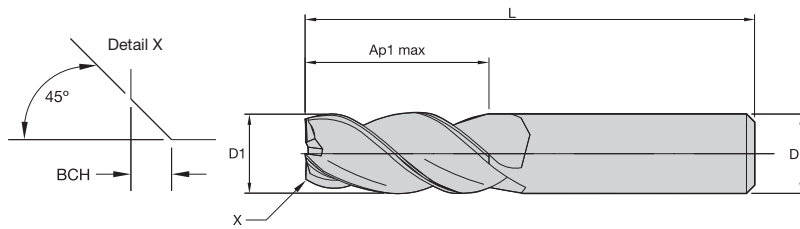
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2341532	422801-000020	2341566	422802-000020	2,0	6	3,00	50	0,10
3048490	422804-000020	3048492	422806-000020	2,0	6	6,00	57	0,10
2341534	422801-000025	2341568	422802-000025	2,5	6	3,00	50	0,10
3048491	422804-000025	3048503	422806-000025	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

(continued)

High-Performance Solid Carbide End Mills • Finishing

Series 022801 022804 022802 322806 322801 322804 322802
422806 422801 422804 422802 422806

(Series 422801 422804 422802 422806 — continued)



● first choice
○ alternate choice

grade K30F-DCF
TiAlN

grade K30F-DCF
TiAlN

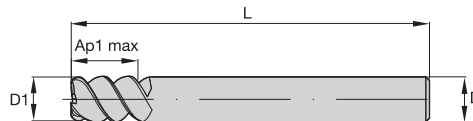
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2341540	422801-000040	2341575	422802-000040	4,0	6	5,00	54	0,10
2341608	422804-000040	2341638	422806-000040	4,0	6	8,00	57	0,10
2341542	422801-000045	2341577	422802-000045	4,5	6	5,00	54	0,10
2341610	422804-000045	2341640	422806-000045	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

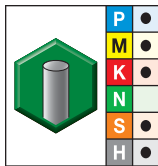
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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

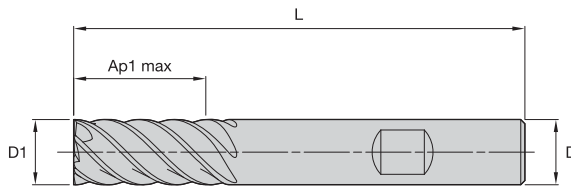


grade TiAlN-RT
TiAlN

- first choice
- alternate choice

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.

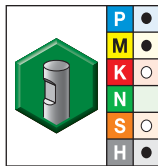


End Mill Tolerances

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



Series D507 D517 • Victory Grades

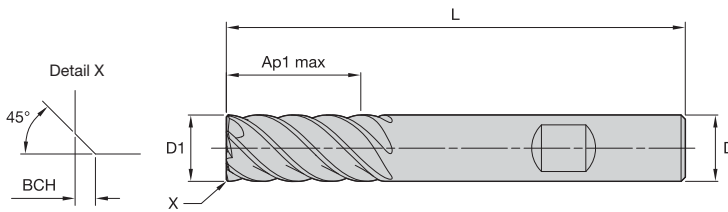


grade WP15PE
AlTiN

- first choice
- alternate choice

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

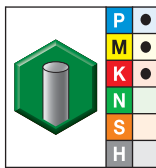
- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



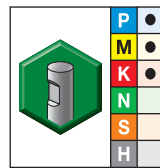
End Mill Tolerances

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



grade K30F-DCHP
AITiN



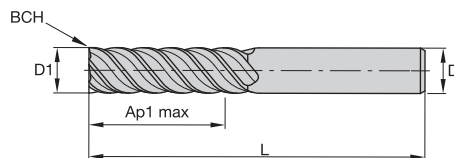
grade K30F-DCHP
AITiN

- first choice
- alternate choice

order #	catalogue #	order #	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

High-Performance Solid Carbide End Mills

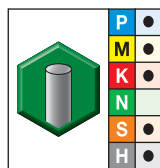
- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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

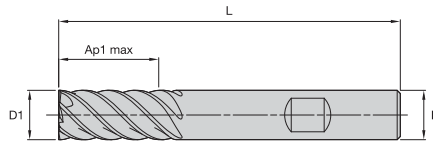


grade K30F-DCHP
AlTiN

- first choice
- alternate choice

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.

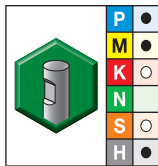


End Mill Tolerances

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



■ Series D518 • Vision Plus • Victory Grades

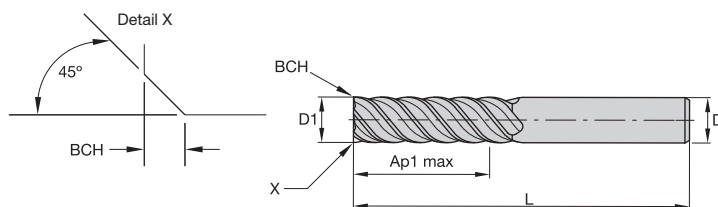


grade WP15PE
AlTiN

- first choice
- alternate choice

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

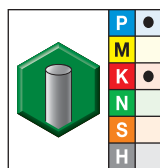
- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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



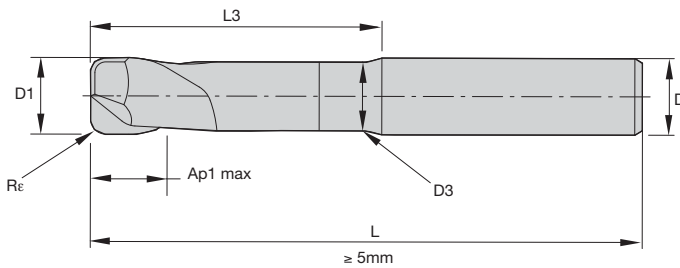
grade UNCOATED

- 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

High-Performance Solid Carbide End Mills

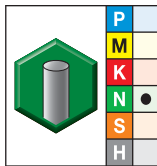
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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



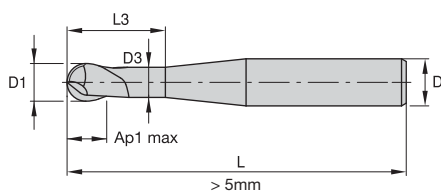
grade K10F-DIA
DIAMOND

- first choice
- alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Re
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

High-Performance Solid Carbide End Mills

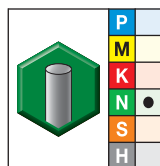
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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



grade K10F-DIA
DIAMOND

- first choice
- alternate choice

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



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
	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
	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
	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
	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
	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
	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
	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
	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
	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.

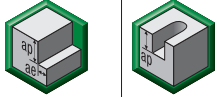

■ Series D503

		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%.														
Material Group		A		B	Cutting Speed – vc m/min		Cutting Speed – vc m/min		mm	D1 – Diameter													
		ap	ae	ap	min	max	min	max		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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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.

High-Performance Solid Carbide End Mills

■ 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
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	
	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	
	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	
	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	
	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	
	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	
M	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	
	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	
	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	
K	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	
	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	
	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	
S	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	
	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	
	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	
	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	
H	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	
	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.

High-Performance Solid Carbide End Mills

■ Series 4503 JJ • 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	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	
	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	
	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	
	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	
	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	
	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	
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	
	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	
	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	
	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	
	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	
	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	
	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	
	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.

High-Performance Solid Carbide End Mills

High-Performance Solid Carbide End Mills • Finishing

Application Data • Series 022801 022804 322801 322804 422801 022806 022802
322806 322802 422802



Series 022801 022804 322801 322804 422801 022806 022802 322806 322802 422802

High-Performance Solid Carbide End Mills

Material Group		Side Milling (A) and Slotting (B)		K30F		K30F-TiCN		K30F-DCF		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		Cutting Speed – vc m/min		D1 – Diameter														
		ap	ae	ap	ap	min	max	min	max	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	
		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
			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
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		
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		
4	0,75 x D		0,4 x D	0,3 x D	-	-	-	72	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		
5	0,75 x D		0,4 x D	0,5 x D	-	-	-	48	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		
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		
	2	0,75 x D	0,4 x D	0,5 x D	-	-	-	48	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		
	3	0,75 x D	0,4 x D	0,5 x D	-	-	-	48	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		
	2	0,75 x D	0,4 x D	0,5 x D	-	-	-	88	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		
	3	0,75 x D	0,4 x D	0,5 x D	-	-	-	88	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	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		
	2	0,75 x D	0,4 x D	0,3 x D	-	-	-	20	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		
	3	0,75 x D	0,4 x D	0,3 x D	-	-	-	48	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		
	4	0,75 x D	0,4 x D	0,5 x D	-	-	-	40	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	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)		K30F		K30F-TiCN		K30F-DCF		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		Cutting Speed – vc m/min		D1 – Diameter												
		ap	ae	ap	ap	min	max	min	max	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	
		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
			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
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		
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		
4	1,5 x D		0,3 x D	0,3 x D	-	-	-	72	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		
5	1,5 x D		0,3 x D	0,5 x D	-	-	-	48	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		
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		
	2	1,5 x D	0,3 x D	0,5 x D	-	-	-	48	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		
	3	1,5 x D	0,3 x D	0,5 x D	-	-	-	48	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		
	2	1,5 x D	0,3 x D	0,5 x D	-	-	-	88	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		
	3	1,5 x D	0,3 x D	0,5 x D	-	-	-	88	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	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		
	2	1,5 x D	0,3 x D	0,3 x D	-	-	-	20	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		
	3	1,5 x D	0,3 x D	0,3 x D	-	-	-	48	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		
	4	1,5 x D	0,3 x D	0,5 x D	-	-	-	40	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	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		mm	D1 – Diameter											
	ap	ae	ap	min	max		3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0		
	ap	ae	ap	min	max	fz	fz	fz	fz	fz	fz	fz	fz	fz	fz	fz	fz	
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
	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
	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
	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
	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
	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
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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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.

High-Performance Solid Carbide End Mills

■ Series D517 • 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	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
	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
	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
	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
	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
	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
M	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
	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
	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
K	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
	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
	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
S	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
	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
	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
	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
H	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
	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			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
			AlTiN			mm	D1 – Diameter									
	A		Cutting Speed – vc m/min													
	ap	ae	min		max		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
	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
	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
	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
	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
	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
M	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
	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
	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
K	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
	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
	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
N	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
	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
	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
	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
	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.

High-Performance Solid Carbide End Mills

■ Series 422827 • Vision Plus



Material Group														
				K30F-DCHP			Recommended feed per tooth (fz = mm/th) for side milling (A).							
		Side Milling (A)		AlTiN										
		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	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





Material Group																					
				Side Milling (A)		WP15PE		Recommended feed per tooth (fz = mm/th) for side milling (A).													
		A		Cutting Speed – vc m/min		mm	D1 – Diameter														
		ap	ae	min	max		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	
	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	
	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	
	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	
	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	
	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	
M	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	
	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	
	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	
K	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	
	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	
	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	
S	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	
	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	
	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	
	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	
H	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	
	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	
	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	

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.




High-Performance Solid Carbide End Mills

■ 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
	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
	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
	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
	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
	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
M	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
	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
	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
K	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
	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
	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
N	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
	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
	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
	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
	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
	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
	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
H	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
	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
	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

Material Group												
	Side Milling (A) and Slotting (B)				K10F-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				
	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

																		
		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%.										
Material Group		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.

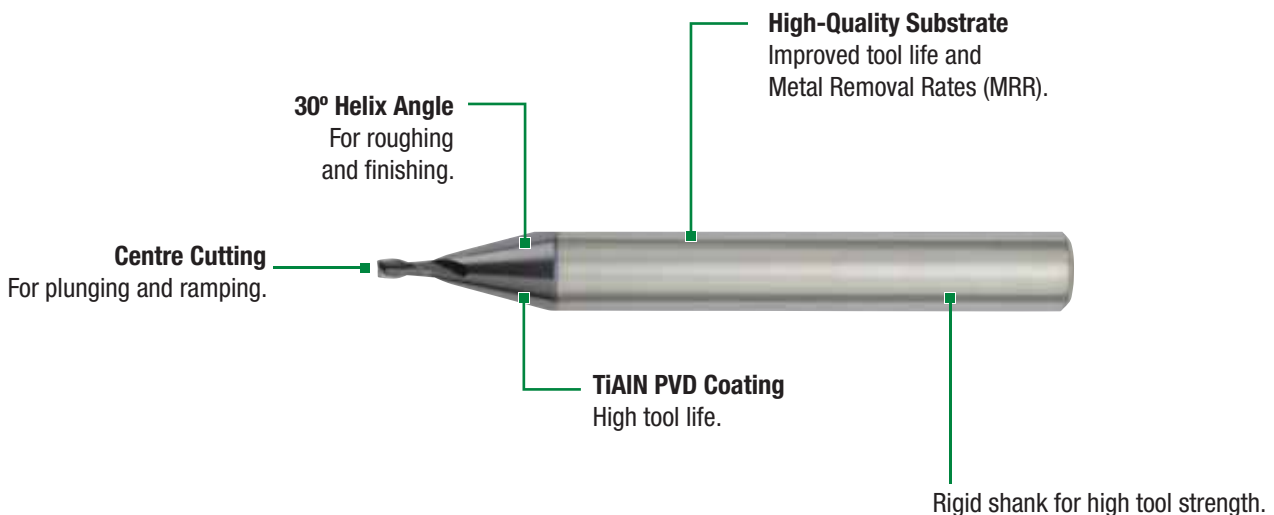
Micro Solid Carbide End Mills

Micro Solid Carbide End Mills



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.

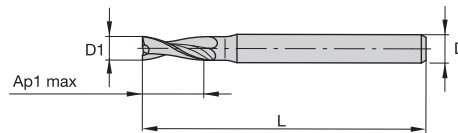


4651 Series

- 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.



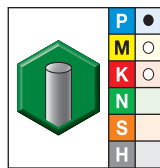
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



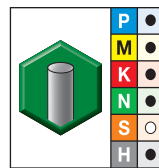
End Mill Tolerances

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

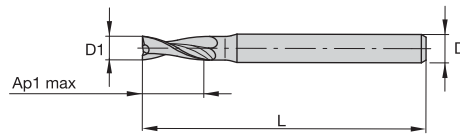


grade K30F-DCHP
AlTiN

- first choice
- alternate choice

order #	catalogue #	order #	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

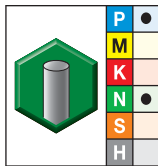
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



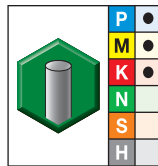
End Mill Tolerances

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



grade UNCOATED



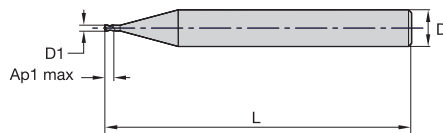
grade TiAlN-RT
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	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

High-Performance Solid Carbide End Mills

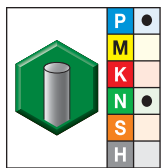
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



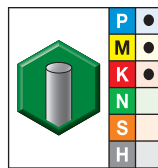
End Mill Tolerances

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



grade UNCOATED

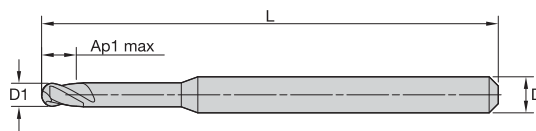


grade TiAlN-RT
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	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

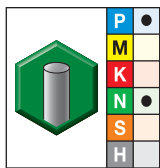
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



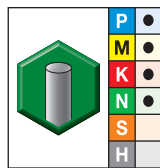
End Mill Tolerances

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

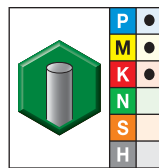
■ Series 4651



grade UNCOATED



grade TiCN-CT
TiCN



grade TiAlN-RT
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	order #	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

High-Performance Solid Carbide End Mills

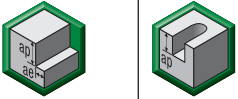

■ Series 023007 423007

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
	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
	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
	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
	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
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
	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
	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
	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
	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
	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
	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
	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.

High-Performance Solid Carbide End Mills

■ 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
	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
	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
	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
	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
	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
	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
	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
	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.

■ 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.

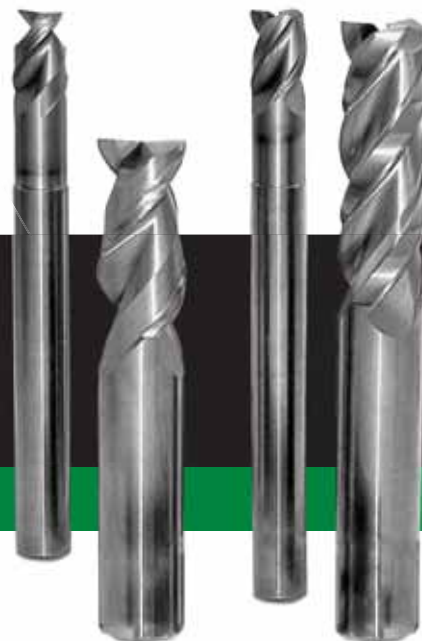
■ Series 4651

Material Group		Side Milling (A) and Slotting (B)		uncoated		TiAlN		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		Cutting Speed – vc m/min		mm	D1 – Diameter						
		ap	ae	ap	ap	min	max	min	max	min	max		1,0	1,2	1,5	1,8	2,0		
		0	1	2	3	4	1	2	1	2	1	2	1	2	3	4	5		
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
	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
	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
	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
	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
	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
	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
	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
	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.

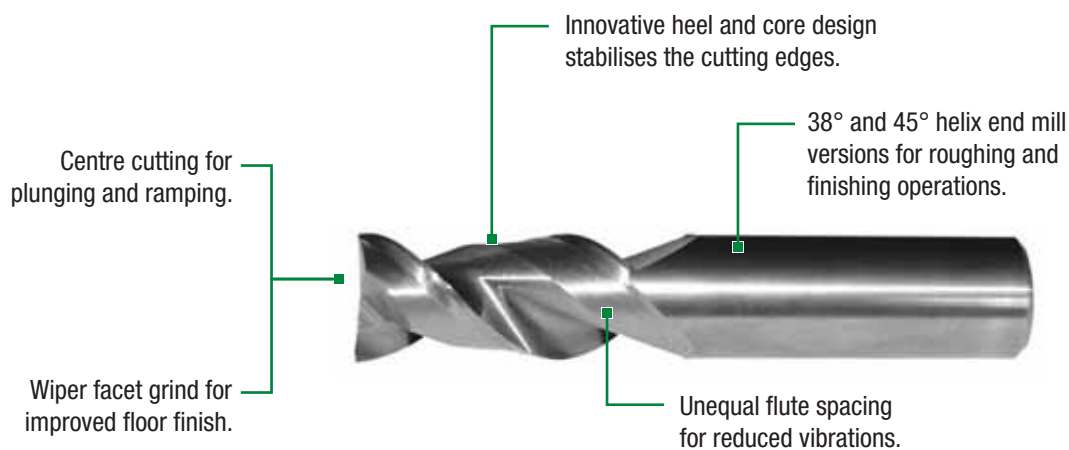
High-Performance Solid Carbide End Mills •
AluSurf™

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.

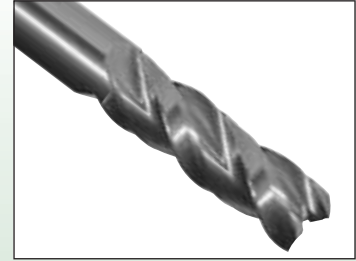
5102 Series

- 2-flute, 45° helix.
- Radii and sharp corner configuration.



5103 Series

- 3-flute, 38° helix.
- Unequal flute spacing.
- Radii and sharp corner configuration.



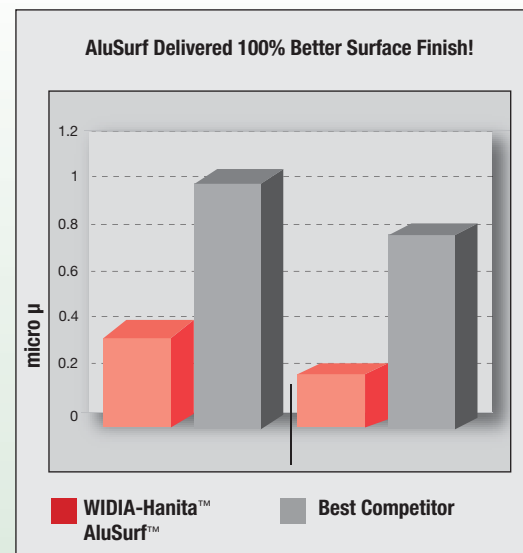
51N3 Series

- 3-flute, 38° helix.
- Unequal flute spacing.
- Extended neck for long-reach applications.
- Radii and sharp corner configuration.

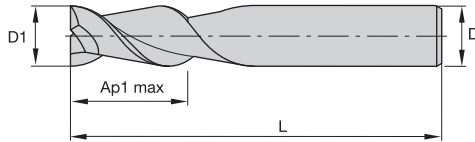


Operation	Slotting	
Customer:	Aluminium Block	
Material:	6061 Aluminium	
Workpiece:	AluSurf solid carbide end mill.	
Results:	100% better surface finish on walls and floor.	

	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



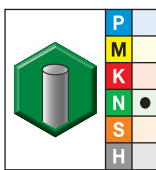
- Centre cutting.
- Wiper facet design for improved floor finishes.
- Standard items listed. Additional styles and coatings made-to-order.



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

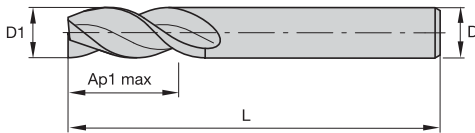


grade UNCOATED

- first choice
- alternate choice

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

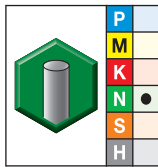
- Centre cutting.
- Unequal flute spacing.
- Wiper facet design for improved floor finishes.
- Standard items listed. Additional styles and coatings made-to-order.



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



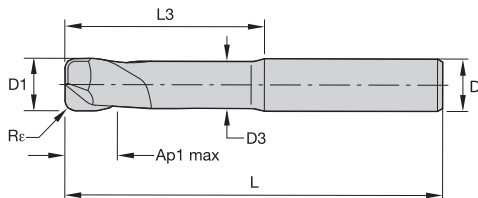
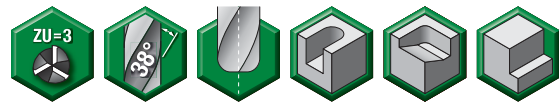
grade UNCOATED

- first choice
- alternate choice

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

High-Performance Solid Carbide End Mills

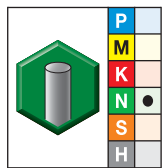
- Centre cutting.
- Unequal flute spacing.
- Wiper facet design for improved floor finishes.
- Standard items listed. Additional styles and coatings made-to-order.



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	Re
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

High-Performance Solid Carbide End Mills

■ Series 5102 • AluSurf

		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%.									
Material Group	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

		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%.									
Material Group	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

		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%.									
Material Group	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.

High-Performance Aluminium Solid Carbide End Mills

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 Series

- 1-flute, 30° helix.
- DLC coated option for abrasive aluminium and carbon.
- Uncoated for aluminium.
- 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

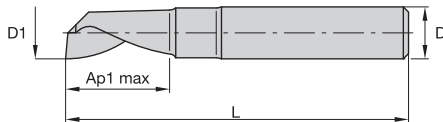
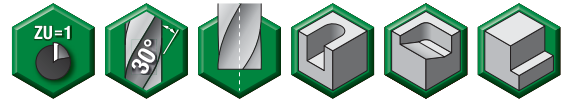


49G9 Series

- 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.



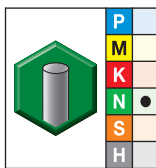
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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

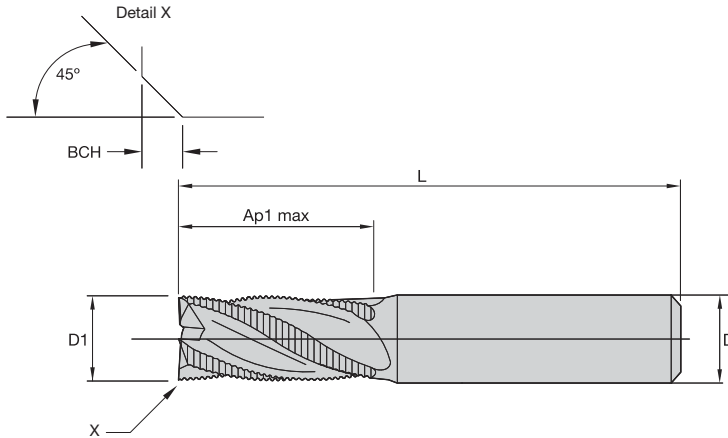
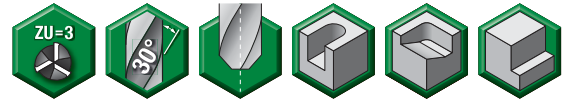


grade K10F-DCL
DLC

- first choice
- alternate choice

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

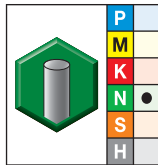
- Centre cutting.
- Coarse pitch.
- Standard items listed. Additional styles and coatings made-to-order.



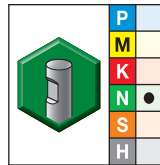
End Mill Tolerances

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



grade UNCOATED

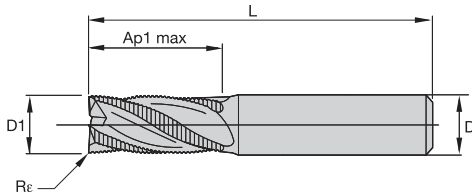
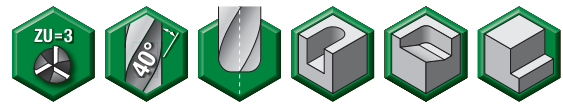


grade UNCOATED-WW

- first choice
- alternate choice

order #	catalogue #	order #	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

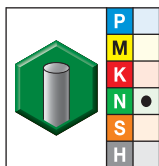
- Centre cutting.
- Chamfered pitch.
- Standard items listed. Additional styles and coatings made-to-order.



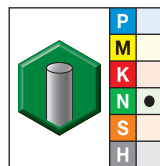
End Mill Tolerances

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



grade UNCOATED

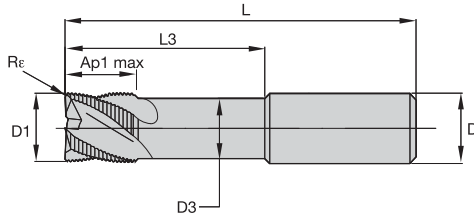


grade TiCN-CT
TiCN

- first choice
- alternate choice

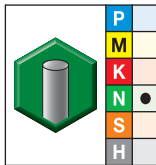
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
1858322	497906002..	1858423	497906002CT	6,0	6	13,00	57	0,25
1858424	497908003..	1858425	497908003CT	8,0	8	16,00	63	0,25
1858426	497910004..	1858427	497910004CT	10,0	10	22,00	72	0,50
1858428	497912005..	1858430	497912005CT	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.



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



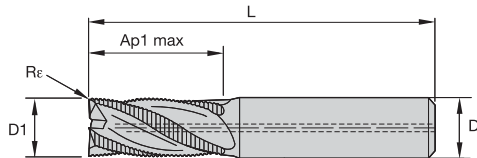
grade UNCOATED

- first choice
- alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Re
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

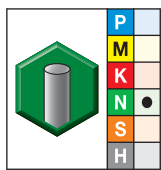
High-Performance Solid Carbide End Mills

- Centre cutting.
- Chamfered pitch.
- Through coolant.
- Standard items listed. Additional styles and coatings made-to-order.

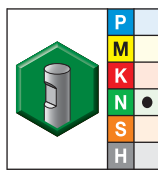


End Mill Tolerances			
D1	tolerance d11	D	tolerance h6 +/-
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3-6	-0,030/-0,105	> 3-6	0/0,008
> 6-10	-0,040/-0,130	> 6-10	0/0,009
> 10-18	-0,050/-0,160	> 10-18	0/0,011
> 18-30	-0,065/-0,195	> 18-30	0/0,013

Series 49G9



grade TiCN-CT
TiCN



grade TiCN-CW
TiCN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Re
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

High-Performance Solid Carbide End Mills

■ Series 524149

Material Group																
	Side Milling (A) and Slotting (B)				K10F-DCL			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 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	mm	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)			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	18,0	20,0	
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)			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	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: 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

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	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.

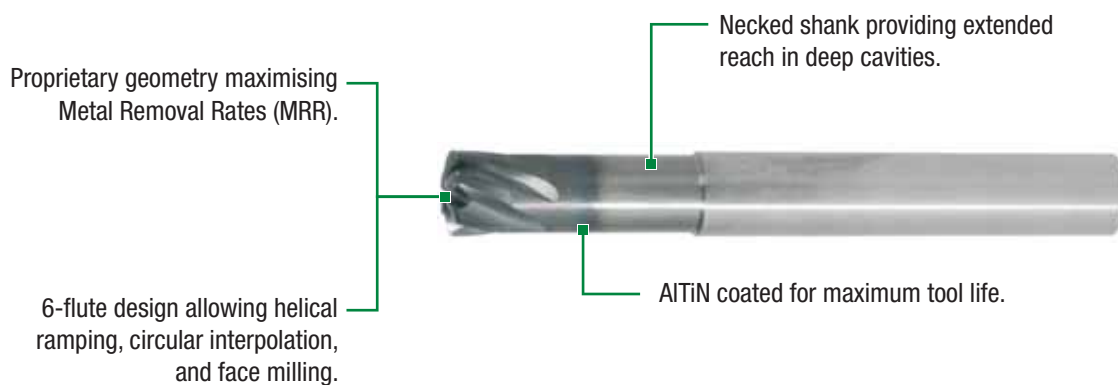
X-Feed™ End Mills for High-Feed Milling

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.

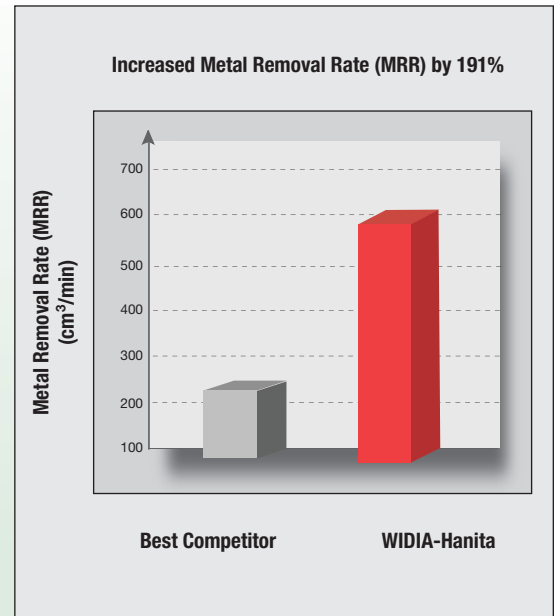


Operation: Pocket Milling
Customer: Die and Mould Manufacturer
Material: AISI 4340 hardened steel (52 HRC)
Workpiece: Mould
Results:

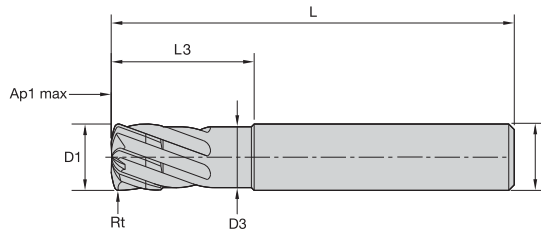
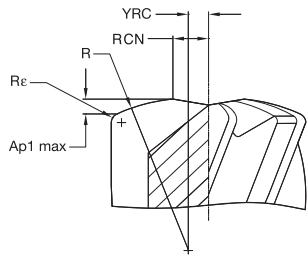
- 3x better Metal Removal Rate (MRR) than competitive tool!
- Machined at more than 3x faster feed!

	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.



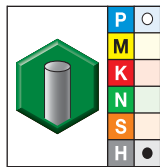
- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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 AITiN-MT1
AITiN

- first choice
- alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Re	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.

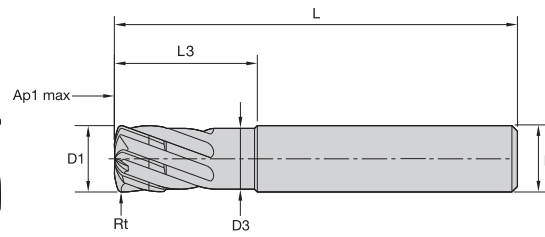
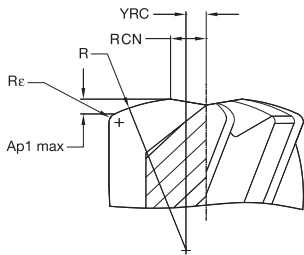
R = the head radius size.

Re = 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%

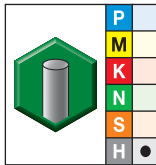
- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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**



grade **AlTiN-MT1**
AlTiN

- first choice
- alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Re	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.
 Re = 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.

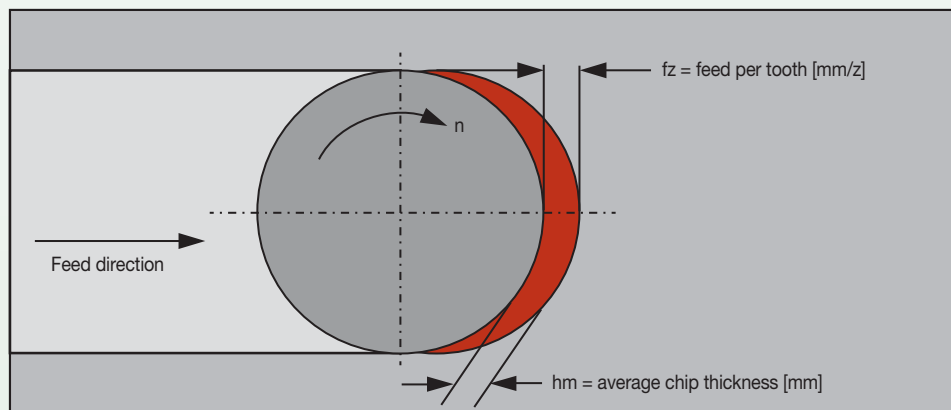
■ Series 70N7 • Vision Plus X-Feed

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
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

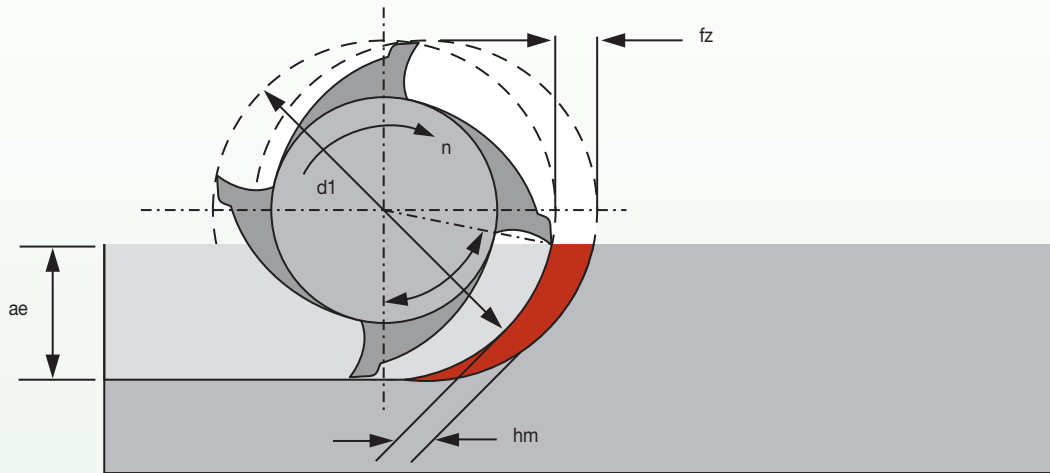
NOTE: Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on diameters >12mm.

■ Conventional Slotting

- Full slotting limitations:
 - Usually not more than $a_p = 1 \times D$.
 - 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:

$$hm = fz \cdot \left(\sqrt{\frac{ae}{d_1}} \right)$$

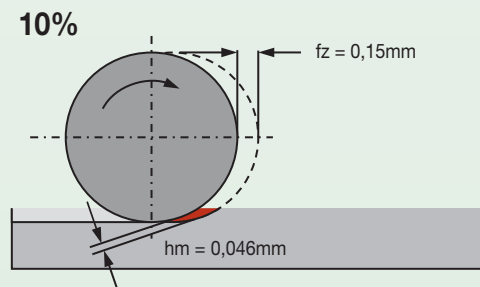
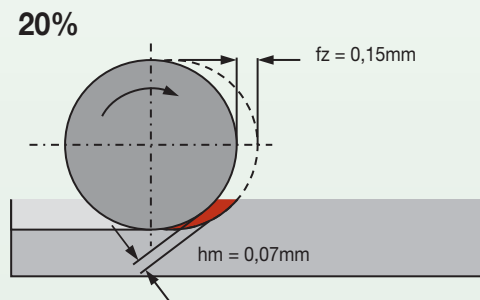
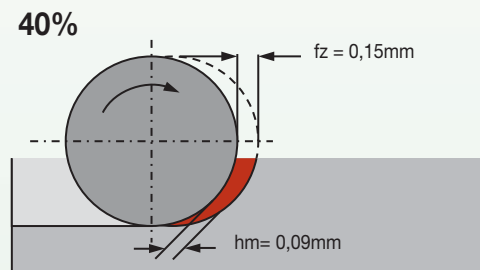
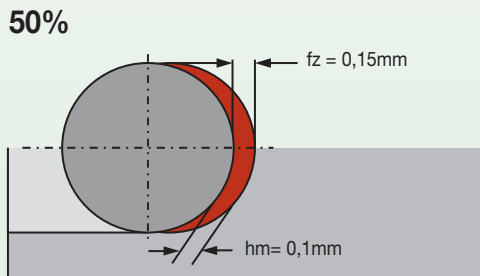
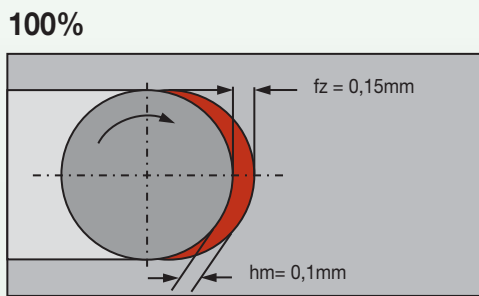
Simplified formula for shown application and 90° angles on the tool.

The chip thickness defines the load on the cutting edge.

■ ae and Chip Thickness

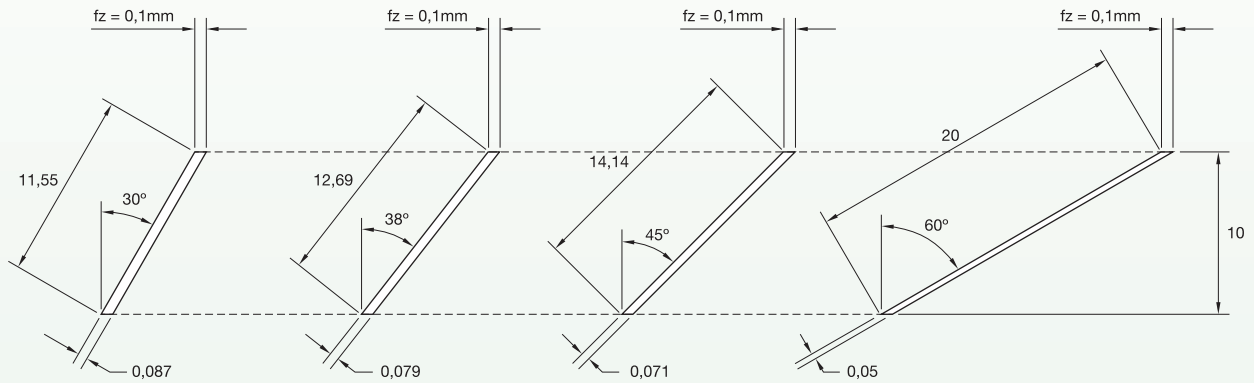
chip thinning effect		
ae	programmed feed (fz)	chip thickness (hm)
100%	0,15mm	0,1mm
50%	0,15mm	0,1mm
40%	0,15mm	0,09mm
20%	0,15mm	0,07mm
10%	0,15mm	0,046mm

The chip thickness needs to be compensated by feed.



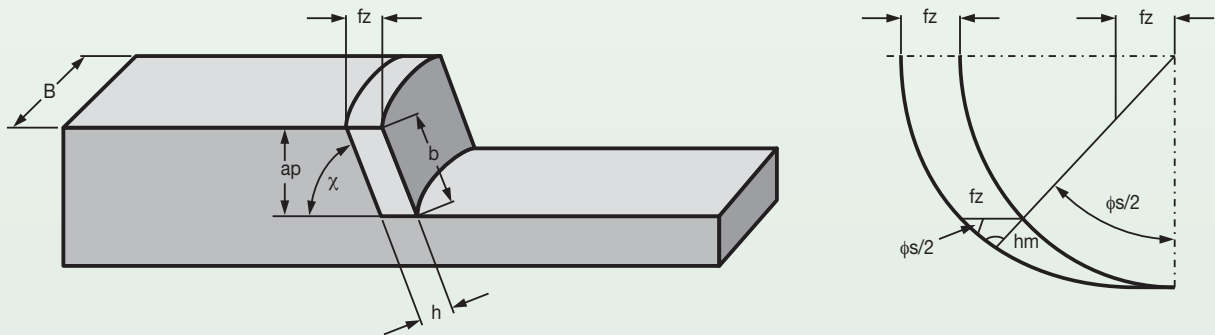
■ **Helix Angle and Chip Thickness**

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.



$$h_m = \frac{360^\circ}{\pi \cdot \phi_s} \cdot \frac{a_e}{D} \cdot f_z \cdot \sin \chi$$

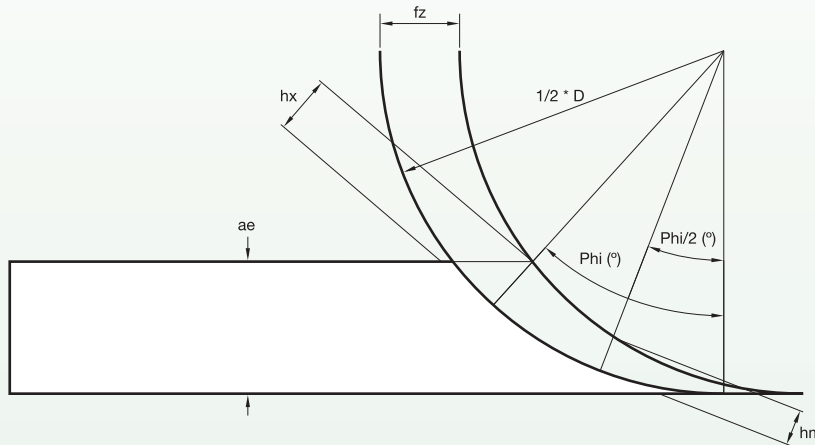
- hm [mm] = average chip thickness
- φs [°] = engagement angle
- ae [mm] = width of engagement
- D1 [mm] = outer diameter tool
- fz [mm] = feed per tooth
- χ [°] = lead angle
- λ [°] = helix angle *

* 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

$$h_m = 360^\circ / \pi \cdot \phi_s \cdot a_e / D \cdot f_z \cdot \sin \chi$$

- 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

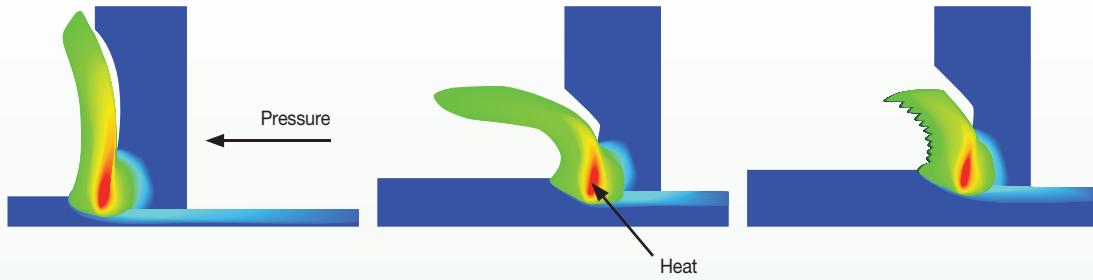
$$h_x = 360^\circ / \pi \cdot \phi_s \cdot 2 \cdot a_e / D \cdot f_z \cdot \sin \chi$$

- 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: $\chi = 90^\circ - \lambda$

Trochoidal Milling can be performed with solid or indexable milling tools.

■ Cutting Speed

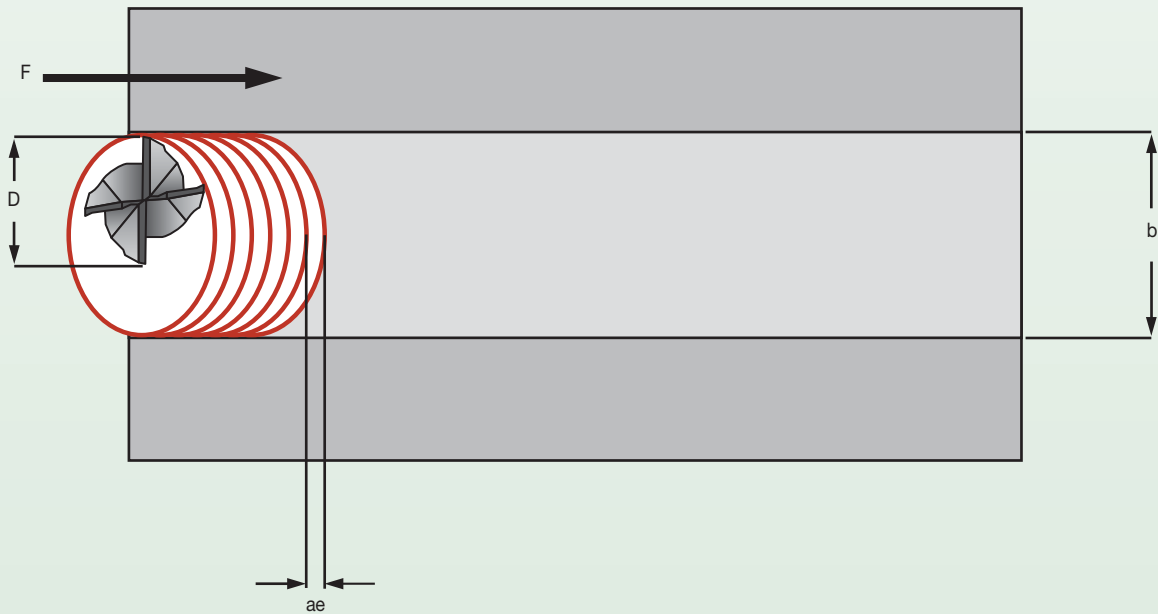


Reduced radial engagement influences the cutting speed, because the heat produced through the cutting process limits the cutting speed.

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

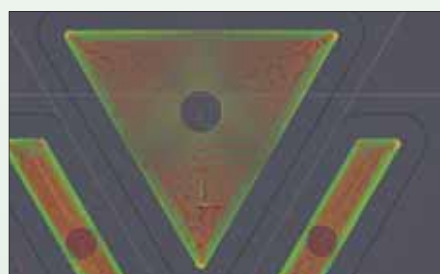
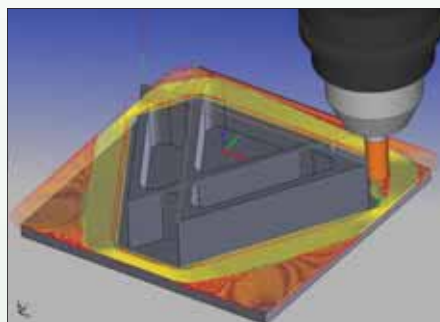
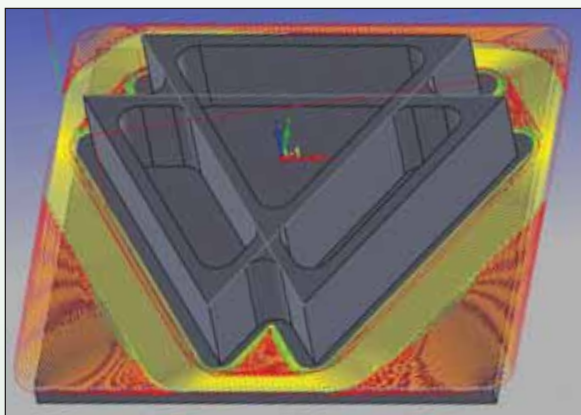
- Use a tool in which $D < b$.
- Programme circles in the CNC programme (as a cycle).
- After one circle, repeat the same with an offset.
- Optimise by shortening the lane "in the air" to a form like a "D".



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 optimization 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.

VariMill III™ ER



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

VariMill III ER provides the highest metal removal rates and superior surface finish in the most demanding workpiece materials in the aerospace industry. WIDIA-Hanita™ combines its unmatched tooling technology with state-of-the-art surface treatments to deliver the highest quality and productivity you can rely on when it comes down to critical semi-finishing and finishing operations.

- 7-Flute design maximises Metal Removal Rates (MRR) and surface quality.
- Up to 30% radial engagement allowing for increased productivity.
- Perfectly suited for high-speed machining techniques such as trochoidal and peel milling.
- Central coolant hole on 2 x D tools; chip evacuation during pocketing.
- Available with SAFE-λOCK® as standard for increased tool life and anti-pullout.
- Available with all common aerospace radii.

To learn more about our innovations, contact your local Authorised Distributor or visit widia.com.

WIDIA 

High-Performance Solid Carbide End Mills • **SAFE-λOCK®**

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 a shank diameter 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 a quote.

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.



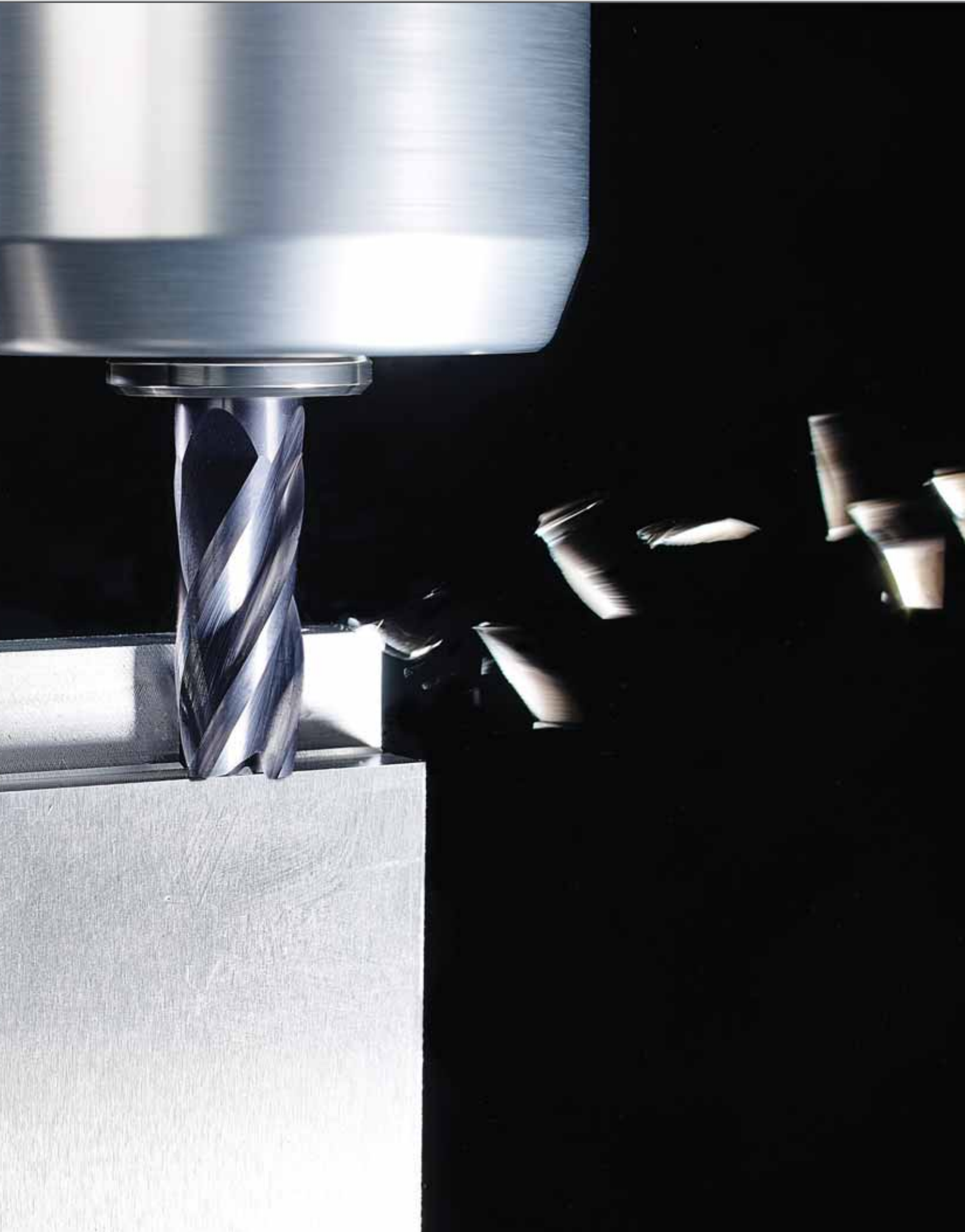


Example for Highest Metal Removal Rates (MRR)

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.



Solid End Milling • General Purpose Solid Carbide End Mills

NINA Solid Carbide Roughers and Finishers	M2-M11
VariMill General Purpose 2-Flute End Mills	M12-M26
VariMill General Purpose 3-Flute End Mills	M28
VariMill General Purpose 4-Flute End Mills	M30-M43



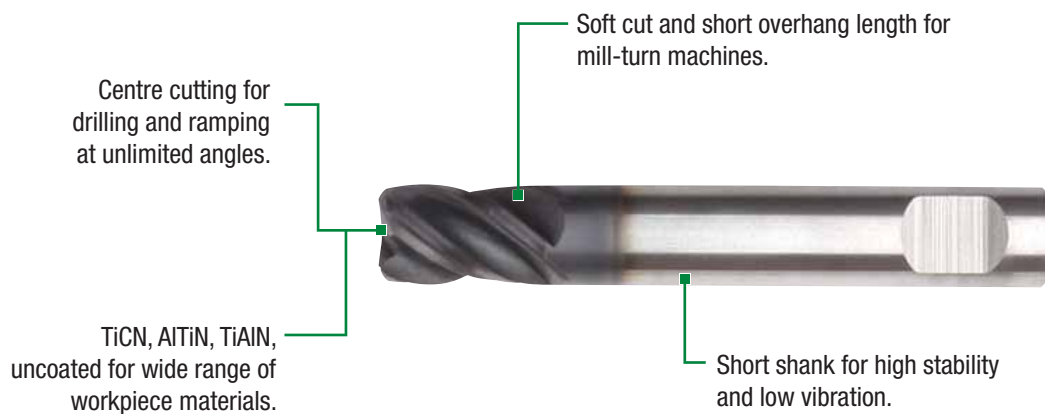
NINA™ Solid Carbide Roughers/Finishers

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.



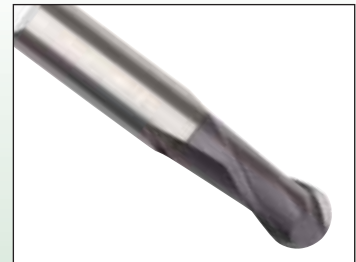
423048/423047 Series

- 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.

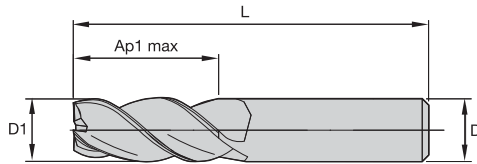


423036/423037 Series

- 4-flute.
- 90° point angle.
- AlTiN/TiAlN coating.
- For widest range of materials.



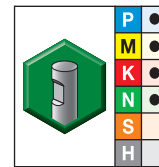
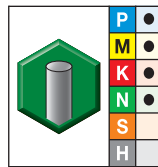
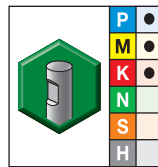
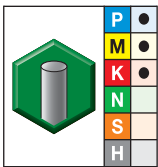
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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

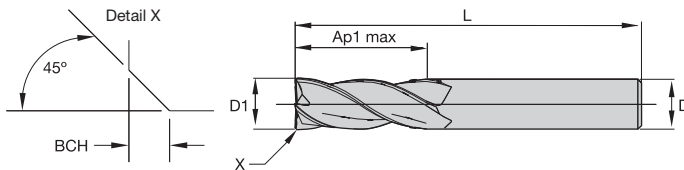
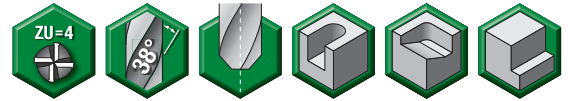


- first choice
- alternate choice

grade K30F-DCF TiAlN		grade K30F-DCF TiAlN		grade K30F-TiCN TiCN		grade K30F-TiCN TiCN		D1	D	length of cut Ap1 max	length L
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #				
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 M9.

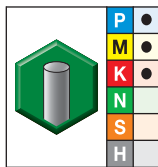
- Centre cutting.
- HPC.
- Standard items listed. Additional styles and coatings made-to-order.



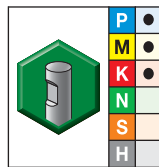
End Mill Tolerances

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



grade K30F-DCHP
AITiN



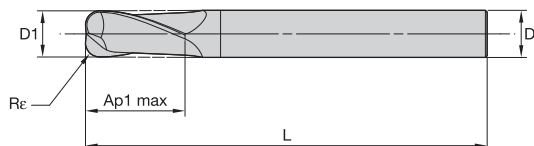
grade K30F-DCHP
AITiN

- first choice
- alternate choice

order #	catalogue #	order #	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 M9.

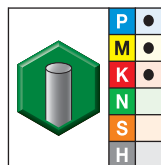
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



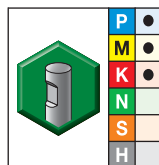
End Mill Tolerances

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



grade K30F-DCHP
TiAlN



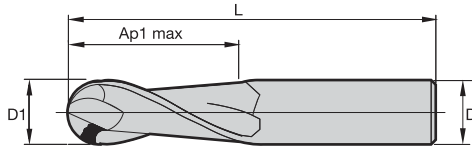
grade K30F-DCHP
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	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 M10.

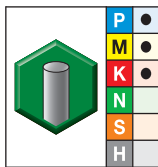
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



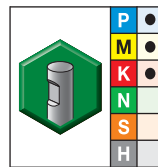
End Mill Tolerances

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



grade K30F-DCHP
TiAlN



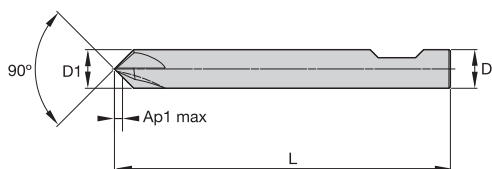
grade K30F-DCHP
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	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 M10.

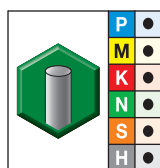
- Non-centre cutting.
- Chamfering.
- Standard items listed. Additional styles and coatings made-to-order.



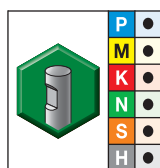
End Mill Tolerances

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



grade K30F-DCF
TiAlN






grade K30F-DCHP
AlTiN

- first choice
- alternate choice

order #	catalogue #	order #	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 M11.

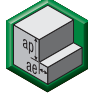
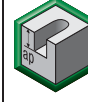

■ Series 423002 323002 423001 323001 • NINA

Material Group																			
	Side Milling (A) and Slotting (B)			K30F-TiCN			K30F-DCF			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
				TiCN			TiAlN												
	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			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
				AlTiN										
	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								Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
	Side Milling (A) and Slotting (B)			K30F-DCHP			D1 – Diameter							
				AITiN										
	A		B	Cutting Speed – vc m/min										
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
	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
	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
	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
	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
	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
	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
	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
	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								Recommended Feed Per Tooth (fz = mm/th) for 3D milling/profiling						
	Side Milling (A) and Slotting (B)			K30F-DCHP			D1 – Diameter							
				AITiN										
	A		B	Cutting Speed – vc m/min										
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
	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
	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
	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
	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
	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
	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
	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
	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			K30F-DCHP			Recommended feed per tooth (fz = mm/th) for chamfering (A)				
	A		TiAlN			AlTiN			mm	D1 – Diameter			
	ap	ae	Cutting Speed – vc m/min			Cutting Speed – vc m/min				6,0	8,0	10,0	
		min	–	max	min	–	max						
P	0	0,35 x D	0,35 x D	150	–	200	150	–	200	fz	0,035	0,048	0,058
	1	0,35 x D	0,35 x D	150	–	200	150	–	200	fz	0,035	0,048	0,058
	2	0,35 x D	0,35 x D	140	–	190	140	–	190	fz	0,035	0,048	0,058
	3	0,35 x D	0,35 x D	120	–	160	120	–	160	fz	0,029	0,040	0,048
	4	0,35 x D	0,35 x D	90	–	150	90	–	150	fz	0,026	0,036	0,043
	5	0,35 x D	0,35 x D	60	–	100	60	–	100	fz	0,024	0,032	0,039
M	1	0,35 x D	0,35 x D	90	–	115	90	–	115	fz	0,029	0,040	0,048
	2	0,35 x D	0,35 x D	60	–	80	60	–	80	fz	0,024	0,032	0,039
	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
	2	0,35 x D	0,35 x D	110	–	140	110	–	140	fz	0,029	0,040	0,048
	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
	2	0,35 x D	0,35 x D	500	–	1500	500	–	1500	fz	0,043	0,058	0,072
	3	0,35 x D	0,35 x D	500	–	1500	500	–	1500	fz	0,034	0,045	0,056
	4	0,35 x D	0,35 x D	400	–	750	400	–	750	fz	0,038	0,051	0,064
	5	0,35 x D	0,35 x D	250	–	1000	250	–	1000	fz	0,043	0,058	0,072
	6	0,35 x D	0,35 x D	100	–	750	100	–	750	fz	0,048	0,064	0,080
	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
	2	0,35 x D	0,35 x D	25	–	40	25	–	40	fz	0,016	0,021	0,026
	3	0,35 x D	0,35 x D	60	–	80	60	–	80	fz	0,024	0,032	0,039
	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

General Purpose Solid Carbide End Mills

General Purpose 2-Flute End Mills •

VariMill™ GP

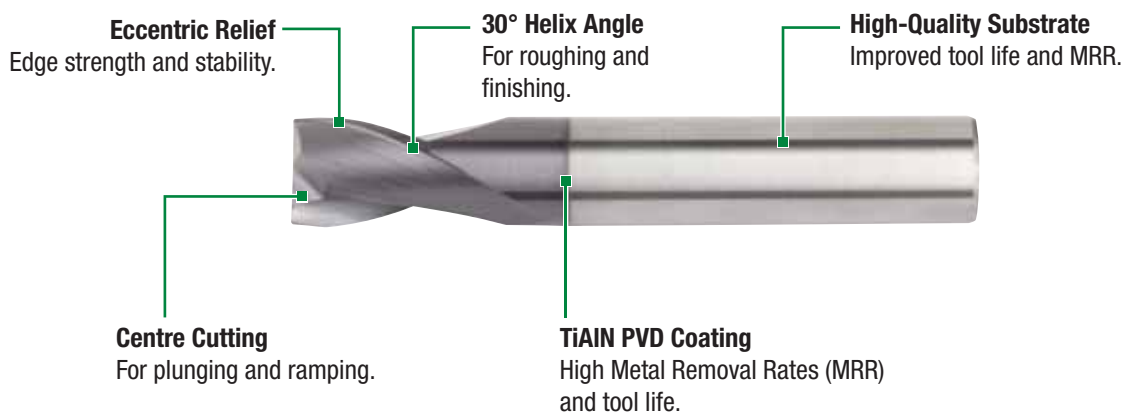
VariMill GP



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.

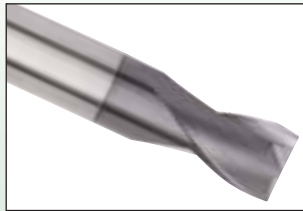


VariMill™ GP

- 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.



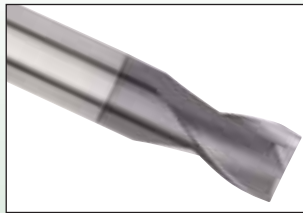
2819 Series

- 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.

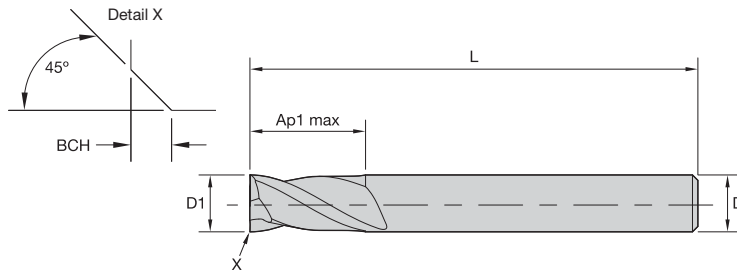


4001/4011/4021 Series

- Wide range of lengths-of-cut — regular, long, and extra long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



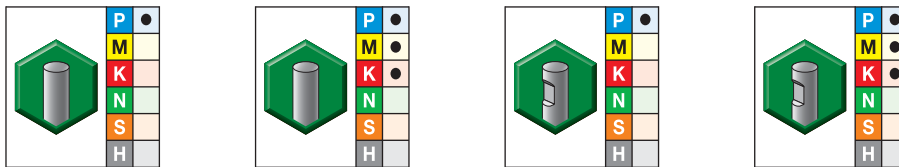
- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



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

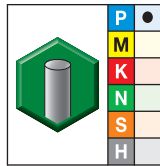
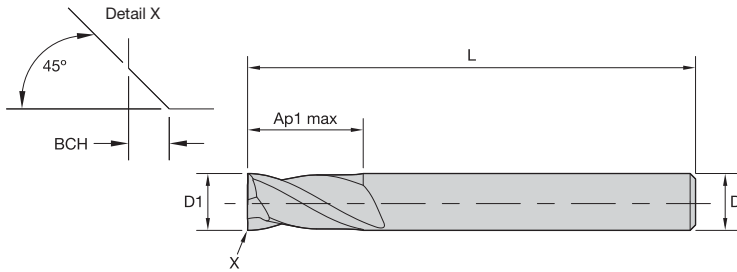


- first choice
- alternate choice

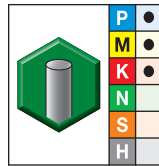
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #					
5877567	D0020200T003	5877330	D0020200T003	—	—	—	—	2,0	6	3,00	50	—
5877568	D0020250T003	5877501	D0020250T003	—	—	—	—	2,5	6	3,00	50	—
5877569	D0120250T007	5877502	D0120250T007	—	—	—	—	2,5	6	7,00	57	—
5877571	D0020300T004	5877503	D0020300T004	—	—	—	—	3,0	6	4,00	50	—
5877572	D0120300T007	5877504	D0120300T007	—	—	—	—	3,0	6	7,00	57	—
5877573	D0020350T004	5877505	D0020350T004	—	—	—	—	3,5	6	4,00	50	—
5877574	D0020400T005	5877506	D0020400T005	—	—	—	—	4,0	6	5,00	54	0,10
6092391	D0020400T005S	6092298	D0020400T005S	—	—	—	—	4,0	6	5,00	54	—
6092392	D0120400T008S	6092299	D0120400T008S	—	—	—	—	4,0	6	8,00	57	—
5877575	D0120400T008	5877507	D0120400T008	—	—	—	—	4,0	6	8,00	57	0,10
6092394	D0020450T005S	6092300	D0020450T005S	—	—	—	—	4,5	6	5,00	54	—
5877576	D0020450T005	5877509	D0020450T005	—	—	—	—	4,5	6	5,00	54	0,10
6092395	D0120450T008S	6092301	D0120450T008S	—	—	—	—	4,5	6	8,00	57	—
5877577	D0120450T008	5877510	D0120450T008	—	—	—	—	4,5	6	8,00	57	0,10
6092397	D0020500T006S	6092302	D0020500T006S	—	—	—	—	5,0	6	6,00	54	—
5877578	D0020500T006	5877511	D0020500T006	—	—	—	—	5,0	6	6,00	54	0,10
6092398	D0120500T010S	6092303	D0120500T010S	—	—	—	—	5,0	6	10,00	57	—
5877579	D0120500T010	5877512	D0120500T010	—	—	—	—	5,0	6	10,00	57	0,10
6092399	D0020600T007S	6092304	D0020600T007S	—	—	—	—	6,0	6	7,00	54	—
5877581	D0020600T007	5877513	D0020600T007	—	—	—	—	6,0	6	7,00	54	0,10
6092411	D0120600T010S	6092305	D0120600T010S	—	—	—	—	6,0	6	10,00	57	—
5877582	D0120600T010	5877514	D0120600T010	—	—	—	—	6,0	6	10,00	57	0,10
6092412	D0020700T008S	6092306	D0020700T008S	—	—	—	—	7,0	8	8,00	58	—
5877583	D0020700T008	5877515	D0020700T008	—	—	—	—	7,0	8	8,00	58	0,10
6092414	D0120700T013S	6092307	D0120700T013S	—	—	—	—	7,0	8	13,00	63	—
5877584	D0120700T013	5877516	D0120700T013	—	—	—	—	7,0	8	13,00	63	0,10
6092415	D0020800T009S	6092308	D0020800T009S	—	—	—	—	8,0	8	9,00	58	—
5877585	D0020800T009	5877517	D0020800T009	—	—	—	—	8,0	8	9,00	58	0,20

(continued)

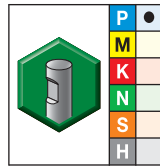
(Series D002 D012 • VariMill GP — continued)



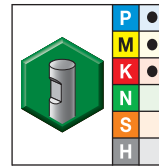
grade UNCOATED



grade TiAlN
TiAlN



grade UNCOATED



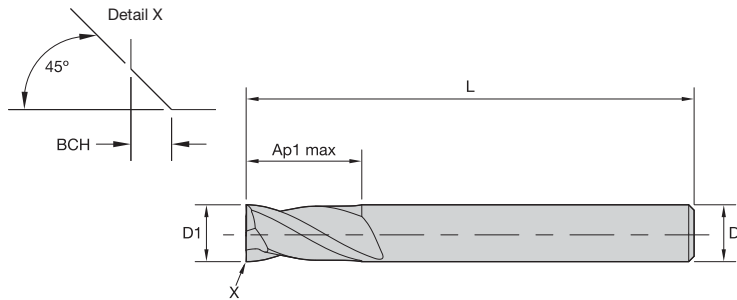
grade TiAlN
TiAlN

- first choice
- alternate choice

grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #					
6092416	D0120800T016S	6092309	D0120800T016S	—	—	—	—	8,0	8	16,00	63	—
5877586	D0120800T016	5877518	D0120800T016	—	—	—	—	8,0	8	16,00	63	0,20
6092418	D0020900T010S	6092310	D0020900T010S	—	—	—	—	9,0	10	10,00	66	—
5877588	D0020900T010	5877520	D0020900T010	—	—	—	—	9,0	10	10,00	66	0,20
6092419	D0120900T016S	6092321	D0120900T016S	—	—	—	—	9,0	10	16,00	72	—
5877589	D0120900T016	5877521	D0120900T016	—	—	—	—	9,0	10	16,00	72	0,20
6092421	D0021000T011S	6092322	D0021000T011S	—	—	—	—	10,0	10	11,00	66	—
5877590	D0021000T011	5877522	D0021000T011	—	—	—	—	10,0	10	11,00	66	0,20
6092422	D0121000T019S	6092323	D0121000T019S	—	—	—	—	10,0	10	19,00	72	—
5877591	D0121000T019	5877523	D0121000T019	—	—	—	—	10,0	10	19,00	72	0,20
6092423	D0021200T012S	6092324	D0021200T012S	6092345	D0021200W012S	6092334	D0021200W012S	12,0	12	12,00	73	—
5877592	D0021200T012	5877524	D0021200T012	5877556	D0021200W012	5877535	D0021200W012	12,0	12	12,00	73	0,30
6092424	D0121200T022S	6092325	D0121200T022S	6092346	D0121200W022S	6092335	D0121200W022S	12,0	12	22,00	83	—
5877593	D0121200T022	5877525	D0121200T022	5877557	D0121200W022	5877537	D0121200W022	12,0	12	22,00	83	0,30
6092426	D0021400T014S	6092326	D0021400T014S	6092347	D0021400W014S	6092336	D0021400W014S	14,0	14	14,00	75	—
5877594	D0021400T014	5877526	D0021400T014	5877558	D0021400W014	5877538	D0021400W014	14,0	14	14,00	75	0,30
6092427	D0121400T022S	6092327	D0121400T022S	6092348	D0121400W022S	6092337	D0121400W022S	14,0	14	22,00	83	—
5877595	D0121400T022	5877527	D0121400T022	5877559	D0121400W022	5877539	D0121400W022	14,0	14	22,00	83	0,30
6092429	D0021600T016S	6092328	D0021600T016S	6092349	D0021600W016S	6092338	D0021600W016S	16,0	16	16,00	82	—
5877596	D0021600T016	5877529	D0021600T016	5877560	D0021600W016	5877540	D0021600W016	16,0	16	16,00	82	0,30
6092431	D0121600T026S	6092329	D0121600T026S	6092350	D0121600W026S	6092339	D0121600W026S	16,0	16	26,00	92	—
5877597	D0121600T026	5877530	D0121600T026	5877561	D0121600W026	5877551	D0121600W026	16,0	16	26,00	92	0,30
6092432	D0021800T018S	6092330	D0021800T018S	6092381	D0021800W018S	6092340	D0021800W018S	18,0	18	18,00	84	—
5877598	D0021800T018	5877531	D0021800T018	5877563	D0021800W018	5877552	D0021800W018	18,0	18	18,00	84	0,30
6092435	D0121800T026S	6092331	D0121800T026S	6092382	D0121800W026S	6092341	D0121800W026S	18,0	18	26,00	92	—
5877599	D0121800T026	5877532	D0121800T026	5877564	D0121800W026	5877553	D0121800W026	18,0	18	26,00	92	0,30
6092436	D0022000T020S	6092332	D0022000T020S	6092383	D0022000W020S	6092342	D0022000W020S	20,0	20	20,00	92	—
5877601	D0022000T020	5877533	D0022000T020	5877565	D0022000W020	5877554	D0022000W020	20,0	20	20,00	92	0,30
6092438	D0122000T032S	6092333	D0122000T032S	6092384	D0122000W032S	6092344	D0122000W032S	20,0	20	32,00	104	—
5877602	D0122000T032	5877534	D0122000T032	5877566	D0122000W032	5877555	D0122000W032	20,0	20	32,00	104	0,30

NOTE: For application data, please see page M23.

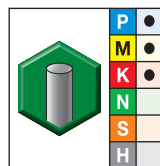
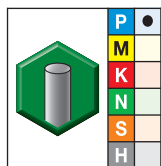
- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



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

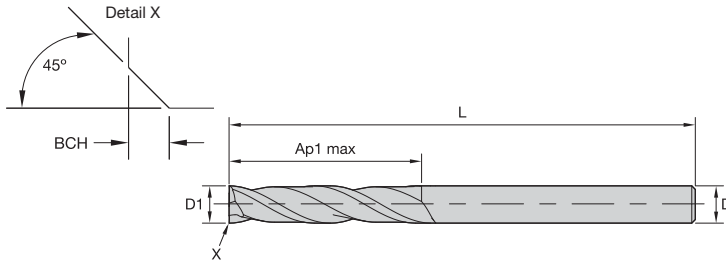
grade UNCOATED

grade TiAlN
TiAlN

order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5877617	28190300T007	5877603	28190300T007	3,0	3	8,00	50	—
6092573	28190400T008S	6092528	28190400T008S	4,0	4	8,00	50	—
5877618	28190400T008	5877604	28190400T008	4,0	4	8,00	50	0,10
6092574	28190500T010S	6092529	28190500T010S	5,0	5	10,00	50	—
5877619	28190500T010	5877605	28190500T010	5,0	5	10,00	50	0,10
6092576	28190600T010S	6092530	28190600T010S	6,0	6	10,00	57	—
5877620	28190600T010	5877606	28190600T010	6,0	6	10,00	57	0,10
6092577	28190700T013S	6092561	28190700T013S	7,0	7	13,00	60	—
5877621	28190700T013	5877607	28190700T013	7,0	7	13,00	60	0,10
6092578	28190800T016S	6092562	28190800T016S	8,0	8	16,00	63	—
5877622	28190800T016	5877608	28190800T016	8,0	8	16,00	63	0,20
6092579	28190900T016S	6092563	28190900T016S	9,0	9	16,00	67	—
5877623	28190900T016	5877609	28190900T016	9,0	9	16,00	67	0,20
6092580	28191000T019S	6092565	28191000T019S	10,0	10	19,00	72	—
5877624	28191000T019	5877610	28191000T019	10,0	10	19,00	72	0,20
6092581	28191200T022S	6092566	28191200T022S	12,0	12	22,00	83	—
5877625	28191200T022	5877611	28191200T022	12,0	12	22,00	83	0,30
6092582	28191400T022S	6092567	28191400T022S	14,0	14	22,00	83	—
5877626	28191400T022	5877612	28191400T022	14,0	14	22,00	83	0,30
6092583	28191500T026S	6092568	28191500T026S	15,0	15	26,00	92	—
5877627	28191500T026	5877613	28191500T026	15,0	15	26,00	92	0,30
6092584	28191600T026S	6092569	28191600T026S	16,0	16	26,00	92	—
5877628	28191600T026	5877614	28191600T026	16,0	16	26,00	92	0,30
6092585	28191800T026S	6092570	28191800T026S	18,0	18	26,00	92	—
5877629	28191800T026	5877615	28191800T026	18,0	18	26,00	92	0,30
6092586	28192000T032S	6092571	28192000T032S	20,0	20	32,00	104	—
5877630	28192000T032	5877616	28192000T032	20,0	20	32,00	104	0,30

NOTE: For application data, please see page M23.

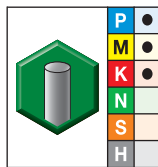
- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



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

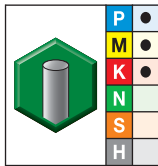
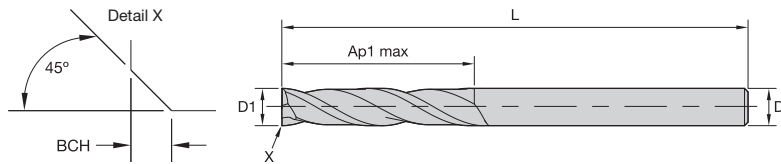


- first choice
- alternate choice

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
6092621	40020400T012S		4,0	4	12,00	50	—
5873494	40020400T019		4,0	4	19,00	63	0,10
6092622	40020400T019S		4,0	4	19,00	63	—
6092623	40120400T031S		4,0	4	31,00	75	—
5873495	40120400T031		4,0	4	31,00	75	0,10
6092624	40020450T014S		4,5	6	14,00	50	—
5873496	40020450T014		4,5	6	14,00	50	0,10
5873497	40020480T014		4,8	6	14,00	50	0,10
6092626	40020480T014S		4,8	6	14,00	50	—
5873498	40020500T014		5,0	5	14,00	50	0,10
6092627	40020500T014S		5,0	5	14,00	50	—
5873499	40020500T020		5,0	5	20,00	63	0,10
6092628	40020500T020S		5,0	5	20,00	63	—
6092631	40120500T031S		5,0	5	31,00	100	—
5873500	40120500T031		5,0	5	31,00	100	0,10
5873501	40020550T014		5,5	6	14,00	50	0,10
6092632	40020550T014S		5,5	6	14,00	50	—
6092633	40020600T016S		6,0	6	16,00	50	—
5873502	40020600T016		6,0	6	16,00	50	0,10
5873503	40020600T028		6,0	6	28,00	76	0,10
6092634	40020600T028S		6,0	6	28,00	76	—
6092636	40120600T038S		6,0	6	38,00	100	—
5873504	40120600T038		6,0	6	38,00	100	0,10
6092637	40020700T020S		7,0	7	20,00	63	—
5873505	40020700T020		7,0	7	20,00	63	0,10
5873506	40020800T020		8,0	8	20,00	63	0,20

(continued)
M17

(Series 4002 4012 • VariMill GP — continued)



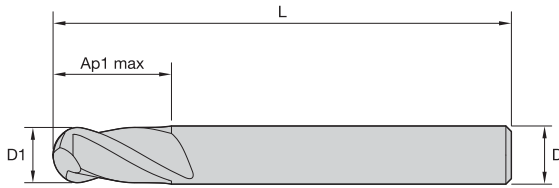
● first choice
○ alternate choice

grade TiAlN
TiAlN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
6092638	40020800T020S	8,0	8	20,00	63	—
6092639	40020800T028S	8,0	8	28,00	76	—
5873507	40020800T028	8,0	8	28,00	76	0,20
6092640	40120800T041S	8,0	8	41,00	100	—
5873508	40120800T041	8,0	8	41,00	100	0,20
5873509	40020900T020	9,0	9	20,00	63	0,20
6092641	40020900T020S	9,0	9	20,00	63	—
5873510	40021000T022	10,0	10	22,00	72	0,20
6092643	40021000T022S	10,0	10	22,00	72	—
6092644	40021000T032S	10,0	10	32,00	89	—
5873511	40021000T032	10,0	10	32,00	89	0,20
6092645	40121000T045S	10,0	10	45,00	100	—
5873512	40121000T045	10,0	10	45,00	100	0,20
6092646	40021100T025S	11,0	11	25,00	76	—
5873513	40021100T025	11,0	11	25,00	76	0,30
5873514	40021200T025	12,0	12	25,00	76	0,30
6092647	40021200T025S	12,0	12	25,00	76	—
5873515	40021200T045	12,0	12	45,00	100	0,30
6092648	40021200T045S	12,0	12	45,00	100	—
6092650	40121200T075S	12,0	12	75,00	150	—
5873516	40121200T075	12,0	12	75,00	150	0,30
6092651	40021400T032S	14,0	14	32,00	83	—
5873517	40021400T032	14,0	14	32,00	83	0,30
6092653	40021400T050S	14,0	14	50,00	100	—
5873518	40021400T050	14,0	14	50,00	100	0,30
6092654	40121400T075S	14,0	14	75,00	150	—
5873519	40121400T075	14,0	14	75,00	150	0,30
5873520	40021600T032	16,0	16	32,00	89	0,30
6092657	40021600T032S	16,0	16	32,00	89	—
6092658	40021600T056S	16,0	16	56,00	110	—
5873531	40021600T056	16,0	16	56,00	110	0,30
6092659	40121600T075S	16,0	16	75,00	150	—
5873532	40121600T075	16,0	16	75,00	150	0,30
5873533	40021800T038	18,0	18	38,00	100	0,30
6092660	40021800T038S	18,0	18	38,00	100	—
5873534	40021800T060	18,0	18	60,00	125	0,30
6092681	40021800T060S	18,0	18	60,00	125	—
6092682	40121800T075S	18,0	18	75,00	150	—
5873535	40121800T075	18,0	18	75,00	150	0,30
6092683	40022000T038S	20,0	20	38,00	104	—
5873536	40022000T038	20,0	20	38,00	104	0,30
6092684	40022000T056S	20,0	20	56,00	125	—
5873537	40022000T056	20,0	20	56,00	125	0,30
6092685	40122000T075S	20,0	20	75,00	150	—
5873538	40122000T075	20,0	20	75,00	150	0,30

NOTE: For application data, please see pages M23–M24.

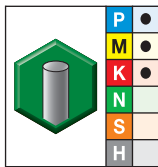
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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

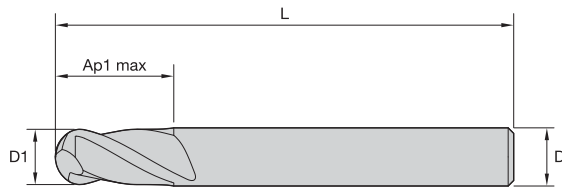


- first choice
- alternate choice

order #	catalogue #	grade TiAlN TiAlN	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 page M25.

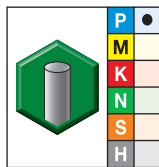
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



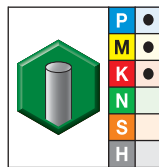
End Mill Tolerances

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



grade UNCOATED



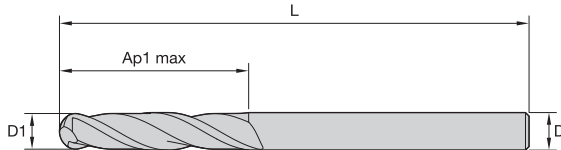
grade TiAlN
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	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 M25.

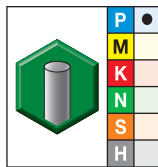
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



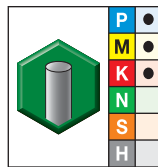
End Mill Tolerances

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



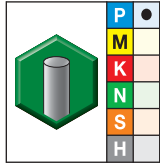
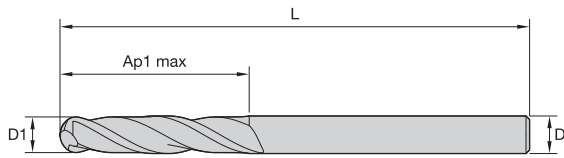
grade TiAlN
TiAlN

- first choice
- alternate choice

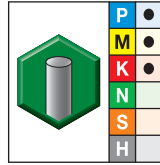
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5880425	40010100T004	5880387	40010100T004	1,0	3	4,00	38
5880426	40010150T005	5880388	40010150T005	1,5	3	5,00	38
5880427	40010200T006	5880389	40010200T006	2,0	3	6,30	38
5880428	40010250T007	5880390	40010250T007	2,5	3	7,00	38
5880429	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)



grade UNCOATED



grade TiAlN
TiAlN

- first choice
- alternate choice

grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L
order #	catalogue #	order #	catalogue #				
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 M25–M26.

■ 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.
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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

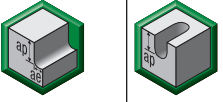

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For 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				

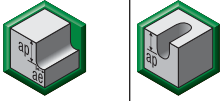

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For 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
	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 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			
	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.
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Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 4011 4021 • TiAlN • VariMill GP

		Side Milling (A)		TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A).												
Material Group	A		Cutting Speed – vc m/min			mm	D1 – Diameter												
	ap	ae	min		max		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
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.
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 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

		Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).												
Material Group	A		Cutting Speed – vc m/min			mm	D1 – Diameter												
	ap	ae	min		max		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.
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General Purpose Solid Carbide End Mills

Unmatched Versatility Meets Powerful Performance



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

Top Cut 4™

Specifically designed for versatility — Top Cut 4 offers outstanding flexibility, increased productivity, and is the one tool to apply to a variety of drilling applications and different workpiece materials.

- High tool life at accelerated speeds.
- Efficient chip evacuation.
- Increased coolant supply.
- Up to 5 x D.

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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

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WIDIA-Hanita™ Means Quality

WIDIA
HANITA

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.

WIDIA

General Purpose 4-Flute End Mills •
VariMill™ GP

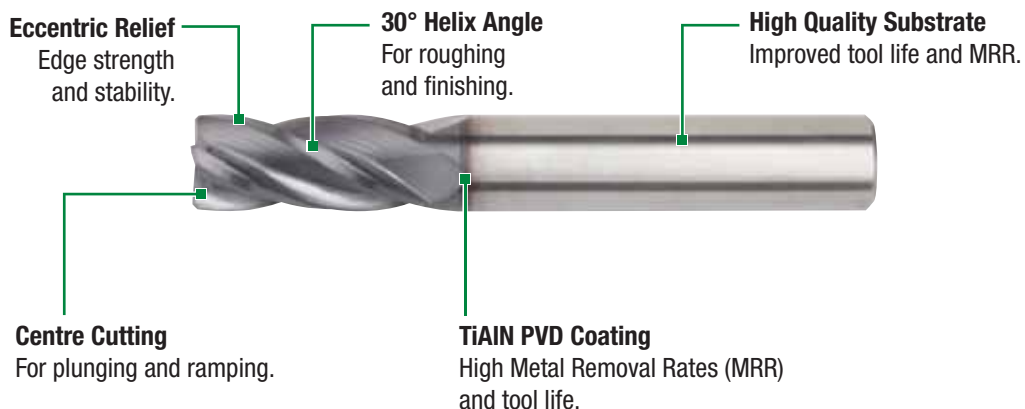
VariMill GP



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.



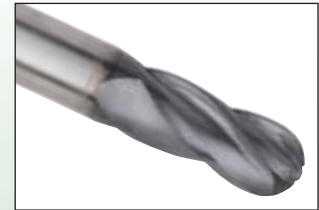
4004/4014/4024 Series

- 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.



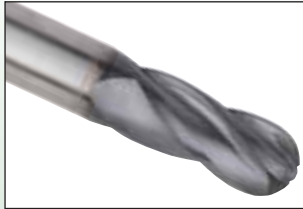
D010 Series

- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



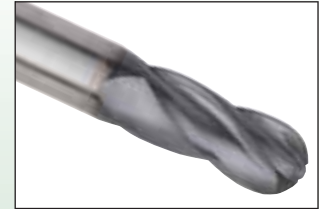
2848 Series

- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.

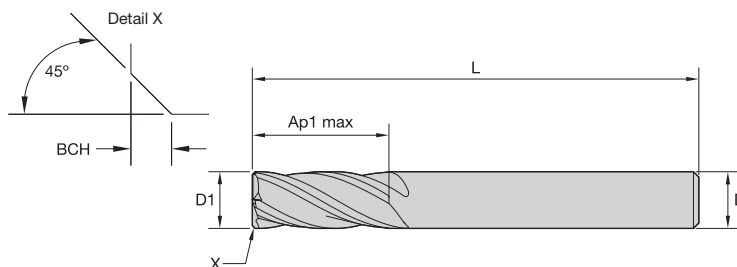


4000/4010 Series

- Wide range of lengths-of-cut — regular and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



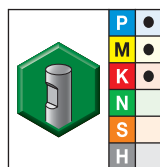
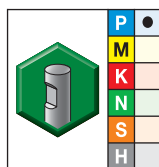
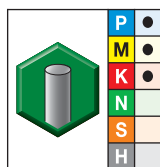
- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



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

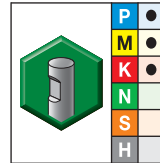
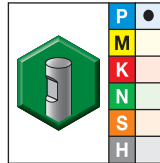
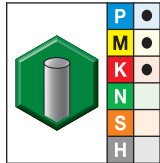
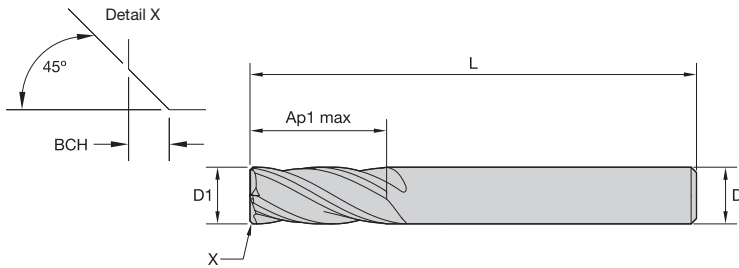


- first choice
- alternate choice

grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #					
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
6085348	D0040400T008S	—	—	—	—	4,0	6	8,00	54	—
6085349	D0140400T011S	—	—	—	—	4,0	6	11,00	57	—
5825931	D0140400T011	—	—	—	—	4,0	6	11,00	57	0,10
6085350	D0140450T011S	—	—	—	—	4,5	6	11,00	57	—
5825932	D0140450T011	—	—	—	—	4,5	6	11,00	57	0,10
6085361	D0040500T009S	—	—	—	—	5,0	6	9,00	54	—
5825933	D0040500T009	—	—	—	—	5,0	6	9,00	54	0,10
6085362	D0140500T013S	—	—	—	—	5,0	6	13,00	57	—
5825934	D0140500T013	—	—	—	—	5,0	6	13,00	57	0,10
6085363	D0140550T013S	—	—	—	—	5,5	6	13,00	57	—
5825935	D0140550T013	—	—	—	—	5,5	6	13,00	57	0,10
6085364	D0040600T010S	—	—	—	—	6,0	6	10,00	54	—
5825936	D0040600T010	—	—	—	—	6,0	6	10,00	54	0,10
6085365	D0140600T013S	—	—	—	—	6,0	6	13,00	57	—
5825937	D0140600T013	—	—	—	—	6,0	6	13,00	57	0,10
6085366	D0140650T016S	—	—	—	—	6,5	8	16,00	63	—
5825938	D0140650T016	—	—	—	—	6,5	8	16,00	63	0,10
6085367	D0040700T011S	—	—	—	—	7,0	8	11,00	58	—
5825939	D0040700T011	—	—	—	—	7,0	8	11,00	58	0,10
6085368	D0140700T016S	—	—	—	—	7,0	8	16,00	63	—
5825940	D0140700T016	—	—	—	—	7,0	8	16,00	63	0,10

(continued)

(Series D004 D014 • VariMill GP — continued)

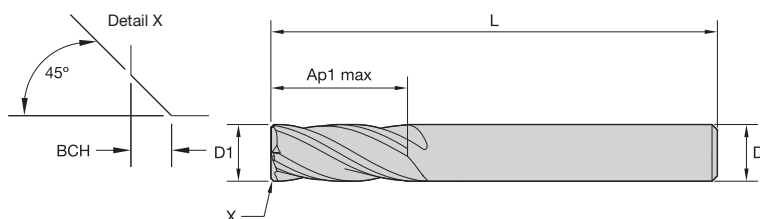


● first choice
○ alternate choice

grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #					
6085369	D0140750T019S	—	—	—	—	7,5	8	19,00	63	—
5825941	D0140750T019	—	—	—	—	7,5	8	19,00	63	0,10
6085370	D0040800T012S	—	—	—	—	8,0	8	12,00	58	—
5825942	D0040800T012	—	—	—	—	8,0	8	12,00	58	0,20
6085371	D0140800T019S	—	—	—	—	8,0	8	19,00	63	—
5825943	D0140800T019	—	—	—	—	8,0	8	19,00	63	0,20
6085372	D0040900T013S	—	—	—	—	9,0	10	13,00	66	—
5825944	D0040900T013	—	—	—	—	9,0	10	13,00	66	0,20
6085373	D0140900T019S	—	—	—	—	9,0	10	19,00	72	—
5825945	D0140900T019	—	—	—	—	9,0	10	19,00	72	0,20
6085374	D0041000T014S	—	—	—	—	10,0	10	14,00	66	—
5825946	D0041000T014	—	—	—	—	10,0	10	14,00	66	0,20
6085375	D0141000T022S	—	—	—	—	10,0	10	22,00	72	—
5825947	D0141000T022	—	—	—	—	10,0	10	22,00	72	0,20
6085376	D0041200T016S	6085406	D0041200W016S	6085396	D0041200W016S	12,0	12	16,00	73	—
5825948	D0041200T016	5825968	D0041200W016	5825958	D0041200W016	12,0	12	16,00	73	0,30
6085377	D0141200T026S	—	—	6085397	D0141200W026S	12,0	12	26,00	83	—
5825949	D0141200T026	5825969	D0141200W026	5825959	D0141200W026	12,0	12	26,00	83	0,30
—	—	—	—	6085407	D0141200W026S	12,0	12	26,00	83	—
6085378	D0041400T018S	6085408	D0041400W018S	6085398	D0041400W018S	14,0	14	18,00	75	—
5825950	D0041400T018	5825970	D0041400W018	5825960	D0041400W018	14,0	14	18,00	75	0,30
6085379	D0141400T026S	—	—	6085399	D0141400W026S	14,0	14	26,00	83	—
5825951	D0141400T026	5825971	D0141400W026	5825961	D0141400W026	14,0	14	26,00	83	0,30
—	—	—	—	6085409	D0141400W026S	14,0	14	26,00	83	—
6085380	D0041600T022S	6085410	D0041600W022S	6085400	D0041600W022S	16,0	16	22,00	82	—
5825952	D0041600T022	5825972	D0041600W022	5825962	D0041600W022	16,0	16	22,00	82	0,30
6085391	D0141600T032S	6085421	D0141600W032S	6085401	D0141600W032S	16,0	16	32,00	92	—
5825953	D0141600T032	5825973	D0141600W032	5825963	D0141600W032	16,0	16	32,00	92	0,30
6085392	D0041800T024S	6086478	D0041800W024S	6085402	D0041800W024S	18,0	18	24,00	84	—
5825954	D0041800T024	5825974	D0041800W024	5825964	D0041800W024	18,0	18	24,00	84	0,30
6085393	D0141800T032S	6086479	D0141800W032S	6085403	D0141800W032S	18,0	18	32,00	92	—
5825955	D0141800T032	5825975	D0141800W032	5825965	D0141800W032	18,0	18	32,00	92	0,30
6085394	D0042000T026S	6086480	D0042000W026S	6085404	D0042000W026S	20,0	20	26,00	92	—
5825956	D0042000T026	5825976	D0042000W026	5825966	D0042000W026	20,0	20	26,00	92	0,30
6085395	D0142000T038S	6086491	D0142000W038S	6085405	D0142000W038S	20,0	20	38,00	104	—
5825957	D0142000T038	5825977	D0142000W038	5825967	D0142000W038	20,0	20	38,00	104	0,30

NOTE: For application data, please see pages M40–M41.

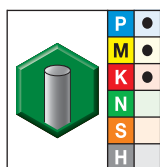
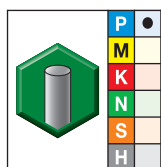
- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



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

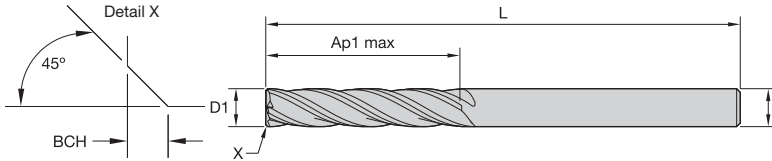
grade UNCOATED

grade TiAlN
TiAlN

order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
6086507	25280400T011S	6086492	25280400T011S	4,0	4	11,00	50	—
5825993	25280400T011	5825978	25280400T011	4,0	4	11,00	50	0,10
6086508	25280500T013S	6086493	25280500T013S	5,0	5	13,00	50	—
5825994	25280500T013	5825979	25280500T013	5,0	5	13,00	50	0,10
6086509	25280600T013S	6086494	25280600T013S	6,0	6	13,00	57	—
5825995	25280600T013	5825980	25280600T013	6,0	6	13,00	57	0,10
6086510	25280800T019S	6086495	25280800T019S	8,0	8	19,00	63	—
5825996	25280800T019	5825981	25280800T019	8,0	8	19,00	63	0,20
6086531	25281000T022S	6086496	25281000T022S	10,0	10	22,00	72	—
5825997	25281000T022	5825982	25281000T022	10,0	10	22,00	72	0,20
6086502	25281200T026S	6086497	25281200T026S	12,0	12	26,00	83	—
5825988	25281200T026	5825983	25281200T026	12,0	12	26,00	83	0,30
6086503	25281400T026S	6086498	25281400T026S	14,0	14	26,00	83	—
5825989	25281400T026	5825984	25281400T026	14,0	14	26,00	83	0,30
6086504	25281600T032S	6086499	25281600T032S	16,0	16	32,00	92	—
5825990	25281600T032	5825985	25281600T032	16,0	16	32,00	92	0,30
6086505	25281800T032S	6086500	25281800T032S	18,0	18	32,00	92	—
5825991	25281800T032	5825986	25281800T032	18,0	18	32,00	92	0,30
6086506	25282000T038S	6086501	25282000T038S	20,0	20	38,00	104	—
5825992	25282000T038	5825987	25282000T038	20,0	20	38,00	104	0,30

NOTE: For application data, please see page M41.

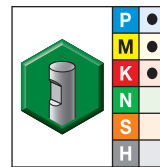
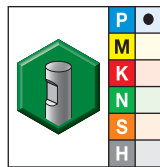
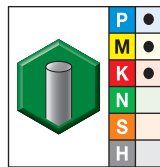
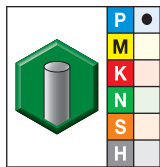
- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



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

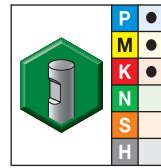
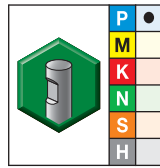
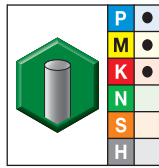
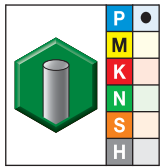
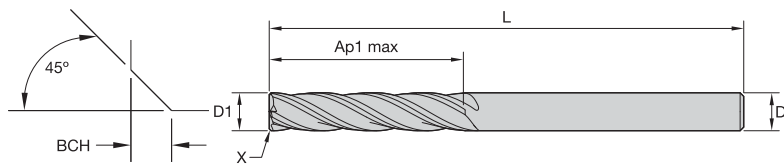


- first choice
- alternate choice

grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #					
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
6085522	40040400T011S	6085576	40040400T011S	—	—	—	—	4,0	4	11,00	50	—
—	—	6085577	40140400T019S	—	—	—	—	4,0	4	19,00	63	—
—	—	5826025	40140400T019	—	—	—	—	4,0	4	19,00	63	0,10
—	—	6085578	40240400T031S	—	—	—	—	4,0	4	31,00	75	—
—	—	5826026	40240400T031	—	—	—	—	4,0	4	31,00	75	0,10
6085523	40040450T014S	6085579	40040450T014S	—	—	—	—	4,5	5	14,00	50	—
5826104	40040450T014	5826027	40040450T014	—	—	—	—	4,5	5	14,00	50	0,10
—	—	6085580	40040500T013S	—	—	—	—	5,0	5	13,00	50	—
—	—	5826028	40040500T013	—	—	—	—	5,0	5	13,00	50	0,10
6085524	40040500T020S	6085581	40040500T020S	—	—	—	—	5,0	5	20,00	63	—
5826105	40040500T020	5826029	40040500T020	—	—	—	—	5,0	5	20,00	63	0,10
—	—	6085582	40140500T030S	—	—	—	—	5,0	5	30,00	75	—
—	—	5826030	40140500T030	—	—	—	—	5,0	5	30,00	75	0,10
—	—	6085583	40240500T031S	—	—	—	—	5,0	5	31,00	100	—
—	—	5826031	40240500T031	—	—	—	—	5,0	5	31,00	100	0,10
6085525	40040600T016S	6085584	40040600T016S	—	—	—	—	6,0	6	16,00	50	—
5826106	40040600T016	5826032	40040600T016	—	—	—	—	6,0	6	16,00	50	0,10
6085526	40140600T028S	6085585	40140600T028S	—	—	—	—	6,0	6	28,00	75	—
5826107	40140600T028	5826033	40140600T028	—	—	—	—	6,0	6	28,00	75	0,10
6085527	40240600T038S	6085586	40240600T038S	—	—	—	—	6,0	6	38,00	100	—
5826108	40240600T038	5826034	40240600T038	—	—	—	—	6,0	6	38,00	100	0,10
—	—	6085587	40040700T020S	—	—	—	—	7,0	8	20,00	63	—
—	—	5826035	40040700T020	—	—	—	—	7,0	8	20,00	63	0,10

(continued)

(Series 4004 4014 4024 • VariMill GP — continued)

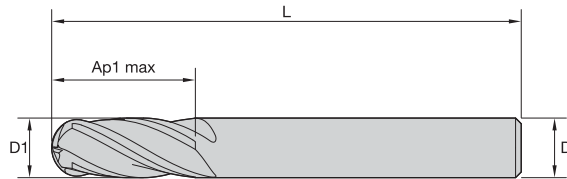


● first choice
○ alternate choice

grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #					
6085528	40040800T020S	6085588	40040800T020S	—	—	—	—	8,0	8	20,00	50	—
5826109	40040800T020	5826036	40040800T020	—	—	—	—	8,0	8	20,00	50	0,20
6085529	40140800T028S	6085589	40140800T028S	—	—	—	—	8,0	8	28,00	75	—
5826110	40140800T028	5826037	40140800T028	—	—	—	—	8,0	8	28,00	75	0,20
6085530	40240800T041S	6085590	40240800T041S	—	—	—	—	8,0	8	41,00	100	—
5826111	40240800T041	5826038	40240800T041	—	—	—	—	8,0	8	41,00	100	0,20
—	—	6085591	40040900T020S	—	—	—	—	9,0	9	20,00	63	—
—	—	5826039	40040900T020	—	—	—	—	9,0	9	20,00	63	0,20
6085531	40041000T022S	6085592	40041000T022S	—	—	—	—	10,0	10	22,00	72	—
5826113	40041000T022	5826040	40041000T022	—	—	—	—	10,0	10	22,00	72	0,20
6085532	40141000T032S	6085593	40141000T032S	—	—	—	—	10,0	10	32,00	89	—
5826114	40141000T032	5826041	40141000T032	—	—	—	—	10,0	10	32,00	89	0,20
6085533	40241000T045S	6085594	40241000T045S	—	—	—	—	10,0	10	45,00	100	—
5826115	40241000T045	5826042	40241000T045	—	—	—	—	10,0	10	45,00	100	0,20
6085534	40041200T025S	—	—	6085549	40041200W025S	6085610	40041200W025S	12,0	12	25,00	75	—
—	—	5826043	40041200T025	—	—	—	—	12,0	12	25,00	89	0,30
—	—	6085595	40041200T025S	—	—	—	—	12,0	12	25,00	89	—
5826116	40041200T025	—	—	5826141	40041200W025	5826070	40041200W025	12,0	12	25,00	75	0,30
6085535	40141200T045S	6085596	40141200T045S	6085550	40141200W045S	6085611	40141200W045S	12,0	12	45,00	100	—
5826117	40141200T045	5826044	40141200T045	5826142	40141200W045	5826071	40141200W045	12,0	12	45,00	100	0,30
6085536	40241200T075S	6085597	40241200T075S	6085551	40241200W075S	6085612	40241200W075S	12,0	12	75,00	150	—
5826118	40241200T075	5826045	40241200T075	5826143	40241200W075	5826072	40241200W075	12,0	12	75,00	150	0,30
6085537	40041400T032S	6085598	40041400T032S	6085552	40041400W032S	6085613	40041400W032S	14,0	14	32,00	83	—
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
6085538	40141400T050S	6085599	40141400T050S	6085553	40141400W050S	6085614	40141400W050S	14,0	14	50,00	100	—
6085539	40241400T075S	6085600	40241400T075S	6085554	40241400W075S	6085615	40241400W075S	14,0	14	75,00	150	—
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
6085540	40041600T032S	6085601	40041600T032S	6085555	40041600W032S	6085616	40041600W032S	16,0	16	32,00	92	—
6085541	40141600T056S	6085602	40141600T056S	6085556	40141600W056S	6102465	40141600W056S	16,0	16	56,00	110	—
5826123	40141600T056	5826062	40141600T056	5826149	40141600W056	5826077	40141600W056	16,0	16	56,00	110	0,30
6085542	40241600T075S	6085603	40241600T075S	6086532	40241600W075S	6085427	40241600W075S	16,0	16	75,00	150	—
5826124	40241600T075	5826063	40241600T075	5826150	40241600W075	5826078	40241600W075	16,0	16	75,00	150	0,30
6085543	40041800T038S	6085604	40041800T038S	6086533	40041800W038S	6085428	40041800W038S	18,0	18	38,00	100	—
5826125	40041800T038	5826064	40041800T038	5826151	40041800W038	5826079	40041800W038	18,0	18	38,00	100	0,30
6085544	40141800T060S	6085605	40141800T060S	6086534	40141800W060S	6085429	40141800W060S	18,0	18	60,00	125	—
5826126	40141800T060	5826065	40141800T060	5826152	40141800W060	5826080	40141800W060	18,0	18	60,00	125	0,30
6085545	40241800T075S	6085606	40241800T075S	6086535	40241800W075S	6085430	40241800W075S	18,0	18	75,00	150	—
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
6085546	40042000T038S	6085607	40042000T038S	6086536	40042000W038S	6085511	40042000W038S	20,0	20	38,00	104	—
6085547	40142000T056S	6085608	40142000T056S	6086537	40142000W056S	6085512	40142000W056S	20,0	20	56,00	125	—
5826129	40142000T056	5826068	40142000T056	5826155	40142000W056	5826083	40142000W056	20,0	20	56,00	125	0,30
6085548	40242000T075S	6085609	40242000T075S	6086538	40242000W075S	6085513	40242000W075S	20,0	20	75,00	150	—
5826130	40242000T075	5826069	40242000T075	5826156	40242000W075	5826084	40242000W075	20,0	20	75,00	150	0,30

NOTE: For application data, please see pages M40–M41.

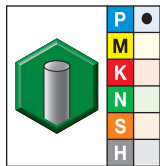
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



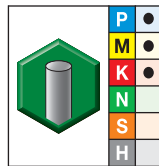
End Mill Tolerances

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

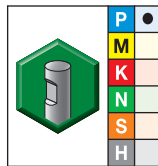
■ Series D010 • VariMill GP



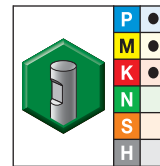
grade UNCOATED



grade TiAlN
TiAlN



grade UNCOATED



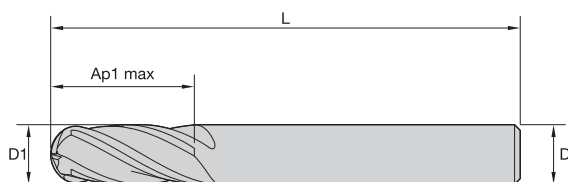
grade TiAlN
TiAlN

- first choice
- alternate choice

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 M42.

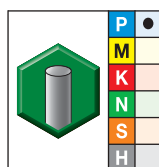
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



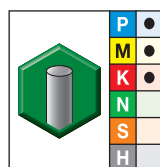
End Mill Tolerances

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 2848 • VariMill GP



grade UNCOATED



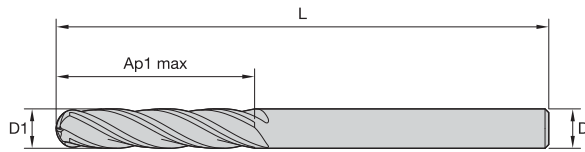
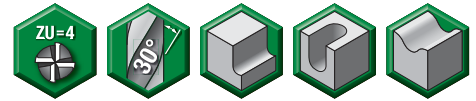
grade TiAlN
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	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 M42.

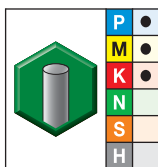
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



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

grade TiAlN 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 M42-M43.

■ 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	
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
	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 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	
	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 D010 2848 4000 • 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	mm	D1 – Diameter													
	ap	ae	ap	min			max	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0		
	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	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	
	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	
	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	
	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	
M	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	
	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	
K	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	
	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)		TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A).													
	A		Cutting Speed – vc m/min		mm	D1 – Diameter													
	ap	ae	min	max		3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0			
	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	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	
	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	
	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	
	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	
M	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	
	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	
K	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	
	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

															
	Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).									
Material Group	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.



Holemaking

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- TOP DRILL S+ 12 x D
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- Reaming Tools



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- Maximum metal removal rates and repeatability.
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- 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
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")						

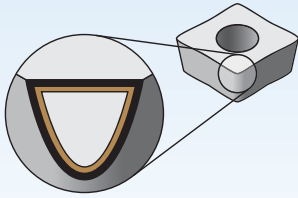
Determine the hole quality and diameter to show the available options and then decide the platform that will best fulfill your requirements.

- Solid Carbide Drills
- Modular Drills
- Indexable Drills
- Precision Hole Finishing
- Reaming

Select the Correct Holemaking Product Platform for Your Application

	hourly rate	low (rough)		normal (M/C)		high (fine)		
	hole quality	IT11	IT10	IT9	IT8	IT7	IT6	
Hole Finishing	diameter							
	3mm (0.118")							
	10mm (0.394")							
	20mm (0.787")							
	30mm (1.181")							
	40mm (1.575")							
	50mm (1.969")							
	60mm (2.362")							
	70mm (2.756")							
	80mm (3.150")							
	90mm (3.543")							
	100mm (3.937")							
	110mm (4.331")							
	120mm (4.724")							
	130mm (5.118")							
	140mm (5.512")							
	150mm (5.906")							
	160mm (6.299")							
	170mm (6.693")							
	180mm (7.087")							
	190mm (7.480")							
200mm (7.874")								
210mm (8.268")								
510mm (20.079")								
520mm (20.472")								

*IT6 is possible above 10mm (0.394") for both HSR SC-Reaming and HSR-Tipped Reamer in custom solutions.

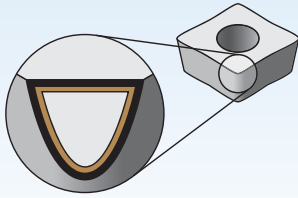


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

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

wear resistance ← → toughness

Coating		Grade Description		05	10	15	20	25	30	35	40	45		
Grade	WU25PD	<p>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.</p> <p>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>	P											
			M											
			K											
			N											
			S											
			H											
	WP20PD	<p>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.</p> <p>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>	P											
			M											
			K											
			N											
			S											
			H											
	WK15PD	<p>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.</p> <p>Application: This grade offers extraordinary wear resistance in drilling of cast iron materials. With its high hot hardness it allows for high speed machining.</p>	P											
			M											
			K											
			N											
			S											
			H											
	WU20PD	<p>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.</p> <p>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>	P											
			M											
			K											
			N											
			S											
			H											
	WN10HD	<p>Composition: This uncoated fine-grain carbide with high hardness offers excellent abrasive wear resistance.</p> <p>Application: First choice for precision drilling of non-ferrous materials.</p>	P											
			M											
			K											
			N											
			S											
			H											

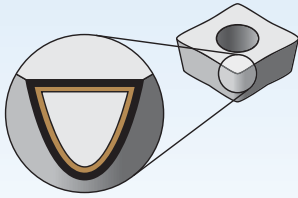


Coatings provide high-speed capability and are engineered for finishing to light roughing.

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

wear resistance ← → toughness

Coating		Grade Description		05	10	15	20	25	30	35	40	45		
Grade	WU25PD	<p>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.</p> <p>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.</p> <p>NOTE: Previously named K20FTiAlN.</p>	P											
			M											
			K											
Grade	WPK10CH	<p>Composition: With an advanced CVD TiCN-Al₂O₃ coating combined with a cobalt-enriched carbide substrate, this grade offers a balanced combination of deformation-resistance and edge toughness.</p> <p>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.</p>	P											
			M											
			K											
Grade	WU25CH	<p>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.</p> <p>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.</p>	P											
			M											
			K											
Grade	WU40PH	<p>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.</p> <p>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.</p>	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

Coating		Grade Description		05	10	15	20	25	30	35	40	45	
K10F		<p>Composition: This uncoated fine-grain carbide with high hardness offers excellent abrasive wear resistance paired with excellent toughness for fine-finishing applications.</p> <p>Application: First choice for precision reaming of non-ferrous materials.</p>	P										
			M										
			K										
			N										
			S										
			H										
K10F-DCFD		<p>Composition: With a PVD TiAlN coating and a fine-grain carbide substrate, this grade offers excellent wear resistance paired with excellent toughness for medium-speed fine-finishing applications.</p> <p>Application: First choice for precision reaming of steels, stainless steel, and cast irons.</p>	P										
			M										
			K										
			N										
			S										
			H										
CERMETDCFD		<p>Composition: With a PVD TiAlN coating and a cermet substrate, this grade offers exceptional wear resistance for high-speed fine-finishing applications.</p> <p>Application: First choice for precision reaming of steels and cast irons.</p>	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

Introduction.....	02-04
VariDrill.....	06-045
TOP DRILL S.....	046-073
TOP DRILL S+.....	074-094
TOP DRILL S+ 12 x D.....	096-0101
TOP DRILL Deep-Hole Drills.....	0102-0115
TOP DRILL G.....	0116-0137
Technical Information.....	0138-0145



solid carbide drills for external coolant or dry machining		series	grade	standard						hole tolerance	standard range		
				● first choice ○ alternate choice							diameter range		drilling depth L/D1
				P	M	K	N	S	H		min-max	min-max	
	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						hole tolerance	standard range		
				● first choice ○ alternate choice							diameter range		drilling depth L/D1
				P	M	K	N	S	H		min-max	min-max	
	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

custom solution range			<ul style="list-style-type: none"> ● standard ○ engineered solution capabilities 																page(s)													
diameter range		drilling depth																														
D1 mm	D1 in																															
min-max	min-max																															
1,0–20,0	.0394–1.00	1.5–8 x	●	●				●												○	○							○	●	●	○	O8–O21
3,0–25,0	.1181–1.00	1.5–8 x	●	●				●	●												○	○	●	○					○	○		O48–O72
3,0–25,0	.1181–1.00	1.5–8 x	●	●				●	●												○	○	○	●	●	●			○			O48–O73
3,0–25,0	.1181–1.00	1.5–5 x	●	●				●	●												○	○	○	●	○	●	●					O76–O94

engineered solution range			<ul style="list-style-type: none"> ● standard ○ engineered solution capabilities 																page(s)													
diameter range		drilling depth																														
D1 mm	D1 in																															
min-max	min-max																															
1,0–20,0	.0394–1.00	1.5–8 x			●	●	●															○	○					○	●	●	○	O8–O45
3,0–25,0	.1181–1.00	1.5–8 x			●	●	●															○	●	●	○		○	○	●	○		O48–O72
2,4–20,0	.1181–1.00	1.5–8 x			●	●	●	●														○	○		●	●	●		○			O48–O73
3,0–25,0	.1181–1.00	1.5–8 x			●	●	●	●														○	○	○	●	○	●	○				O76–O94
2,4–16,0	.1181–.7874	1.5–12 x			●	●	●	●														○	○	○	●	○	●	○				O98–O101
3,0–25,0	.0938–.6299	500mm			●	●	●	●															○	●	○	●	○					O104–O115
3,0–25,0	.1181–1.00	1.5–12 x			●	●	●	●	●	●												○	○	○	●	○	●	○				O118–O137

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	-		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	-		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

Application-Specific Drilling for Steel and Cast Iron



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

TOP DRILL S™

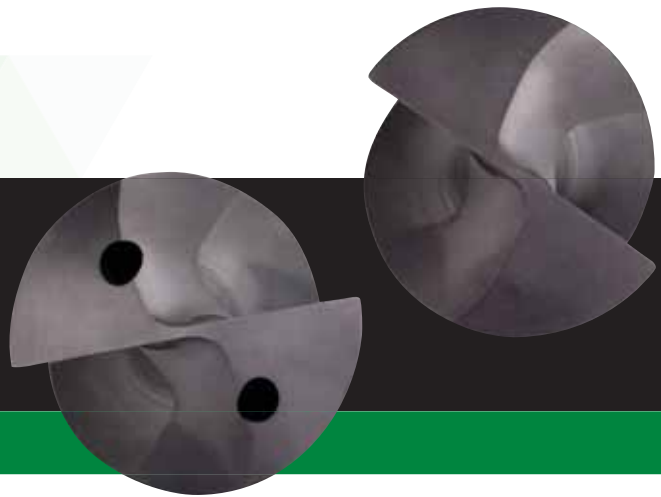
Top Drill S is the WIDIA line of solid carbide drills engineered to provide maximum performance and superior finish to application-specific tasks in steel and cast iron.

- Victory grades WP20PD™ for steel and WK15PD™ for cast iron are specially designed to resist high heat and wear.
- Lower cost-per-hole and greater productivity due to high MRR and long tool life.
- One of the broadest ranges in the market for diameter selection, length series, and coolant options.

To learn more about the benefits of WIDIA™ TOP DRILL S, contact your local distributor.

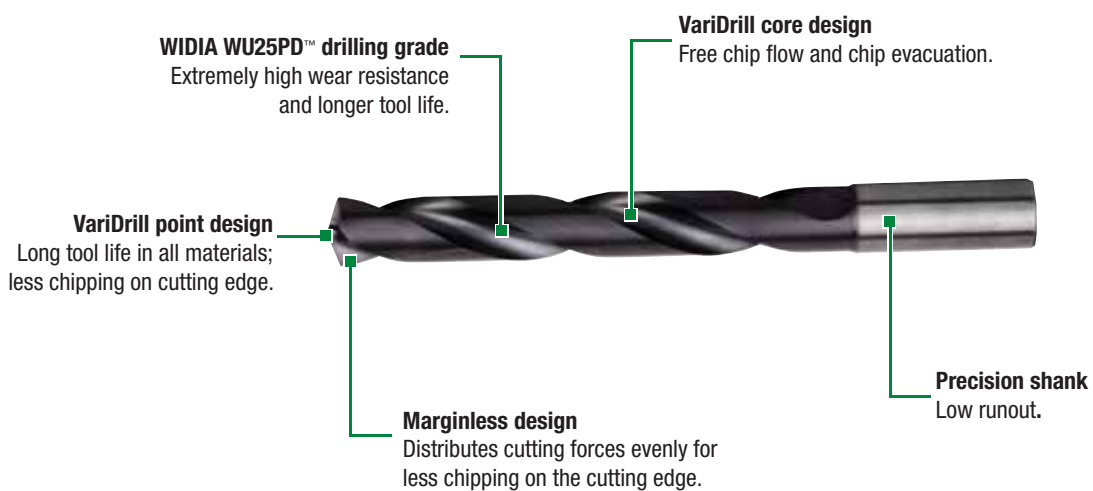
WIDIA 

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

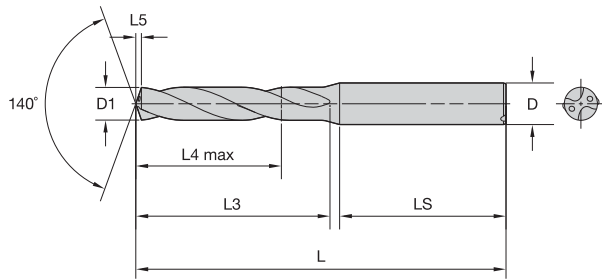
The unique marginless design reduces chipping on the tool's edge and stabilises cutting forces. This unique tool geometry enables chips to roll smoothly and evacuate easily, resulting in noticeably less friction, heat, jamming, and scratching. By minimising these drilling issues, VariDrill delivers an optimum surface finish with every hole — no matter the material.

More Options and Longer Tool Life

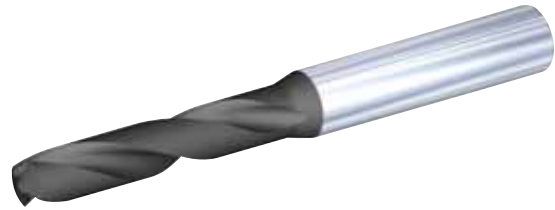
Aside from its uniquely engineered design, VariDrill also offers a broad portfolio of drilling options. With more than 2,200 items, VariDrill offers more choices than any other drill for general engineering operations. And because most drills can be reconditioned, your tools will gain extended life.

*VariDrill — Innovatively designed and technologically advanced.
Make VariDrill your go-to drill for hole after hole...after hole.*

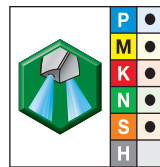
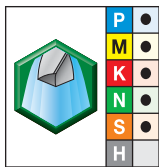




For information on L, L3, and L4 max, see page O139.



■ VDS201A • VDS401A • 3 x D

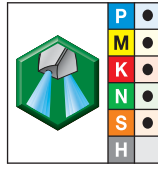
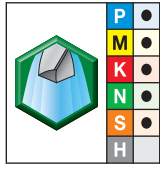


● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter		L4 max	L3	L5	L	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)



● 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
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

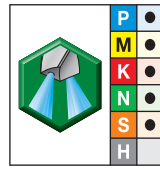
(continued)

Solid Carbide Drills

VariDrill™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 3 x D



(VDS201A • VDS401A • 3 x D – continued)



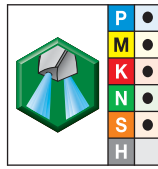
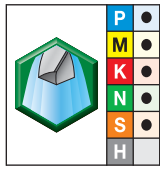
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
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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Solid Carbide Drills

(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

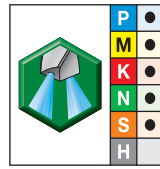
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Solid Carbide Drills

VariDrill™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 3 x D



(VDS201A • VDS401A • 3 x D – continued)



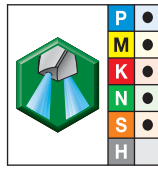
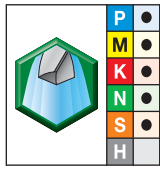
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
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)

Solid Carbide Drills

(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
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

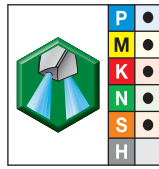
(continued)

Solid Carbide Drills

VariDrill™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 3 x D



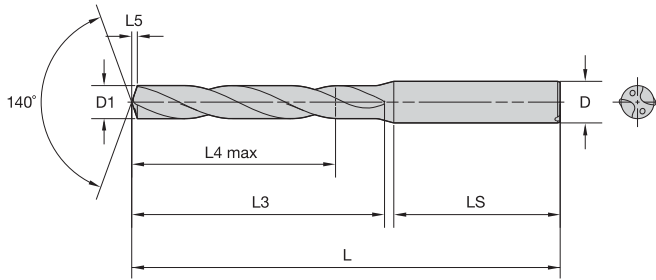
(VDS201A • VDS401A • 3 x D – continued)



● 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
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

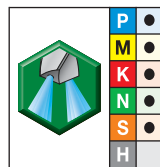
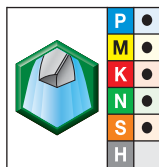
Solid Carbide Drills



For information on L, L3, and L4 max, see page O139.



■ VDS202A • VDS402A • 5 x D



● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter		L4 max	L3	L5	L	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

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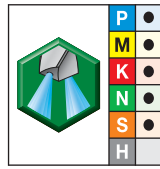
Solid Carbide Drills

Solid Carbide Drills

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(VDS202A • VDS402A • 5 x D – continued)



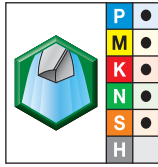
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter		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

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Solid Carbide Drills

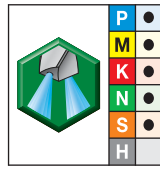
(VDS202A • VDS402A • 5 x D – continued)


 ● 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
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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(VDS202A • VDS402A • 5 x D – continued)



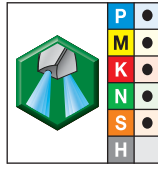
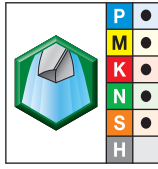
● first choice
○ alternate choice

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

(continued)

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
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

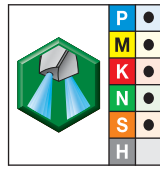
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Solid Carbide Drills

VariDrill™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 5 x D



(VDS202A • VDS402A • 5 x D – continued)



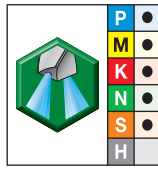
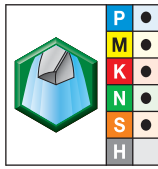
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter		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

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Solid Carbide Drills

(VDS202A • VDS402A • 5 x D – continued)

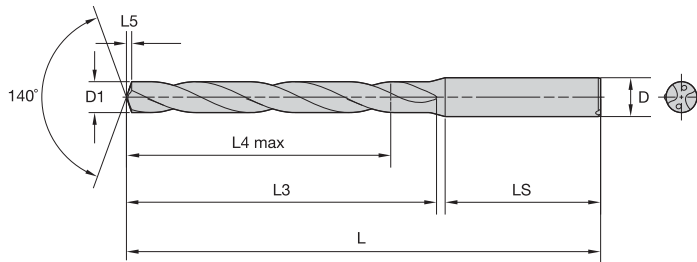


● first choice
○ alternate choice

grade WU25PD TiAIN		grade WU25PD TiAIN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
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

Solid Carbide Drills

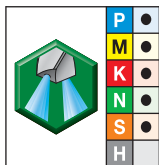
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For information on L, L3, and L4 max, see page O139.



■ VDS403A • 8 x D



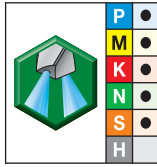
● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter		L4 max	L3	L5	L	LS	D
order #	catalogue #	mm	in						
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

(continued)

Solid Carbide Drills

(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
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

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Solid Carbide Drills

(VDS403A • 8 x D – continued)

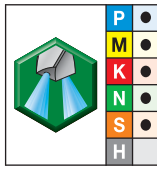


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
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		D1 diameter							
order #	catalogue #	mm	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

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Solid Carbide Drills

VariDrill™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 8 x D



(VDS403A • 8 x D – continued)



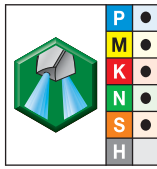
● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
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)

Solid Carbide Drills

(VDS403A • 8 x D – continued)



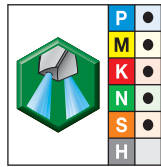
● first choice
○ alternate choice

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)

Solid Carbide Drills

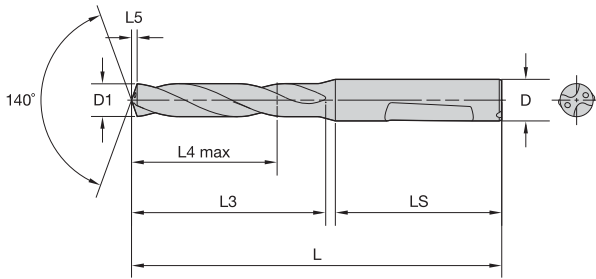
(VDS403A • 8 x D – continued)



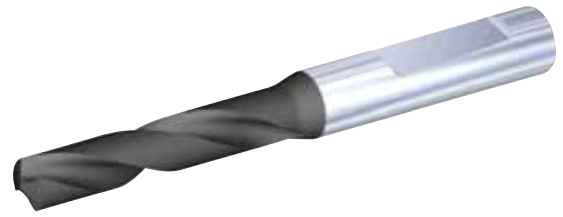
● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter		L4 max	L3	L5	L	LS	D
order #	catalogue #	mm	in						
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

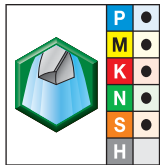
Solid Carbide Drills



For information on L, L3, and L4 max, see page O139.



■ VDS201F • VDS401F • 3 x D



● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter		L4 max	L3	L5	L	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

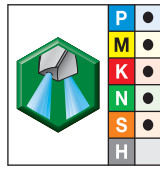
(continued)

Solid Carbide Drills

VariDrill™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 3 x D



(VDS201F • VDS401F • 3 x D — continued)



● first choice
○ alternate choice

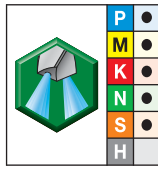
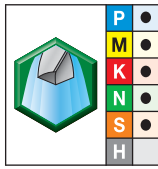
D1 diameter

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter		L4 max	L3	L5	L	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

(continued)

Solid Carbide Drills

(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
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)

Solid Carbide Drills

VariDrill™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 3 x D



(VDS201F • VDS401F • 3 x D — continued)



● first choice
○ alternate choice

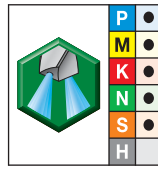
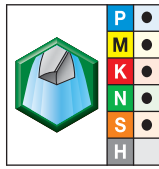
D1 diameter

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

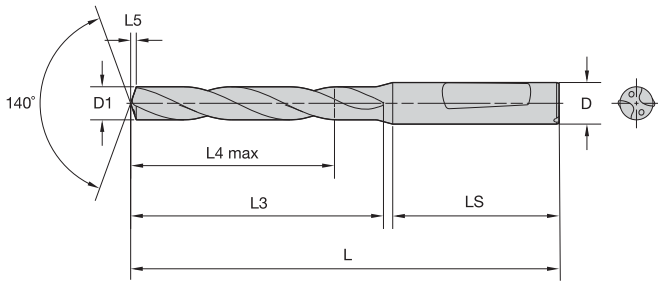
(continued)

Solid Carbide Drills

(VDS201F • VDS401F • 3 x D — continued)


 ● first choice
 ○ alternate choice

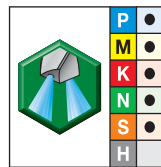
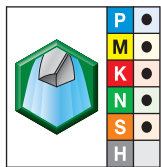
grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148113	VDS201F17400	4140574	VDS401F17400	17,400	.6850	51	73	3,0	123	48	18
4148114	VDS201F17500	4140575	VDS401F17500	17,500	.6890	51	73	3,0	123	48	18
4148115	VDS201F17600	4140576	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 O139.



■ VDS202F • VDS402F • 5 x D

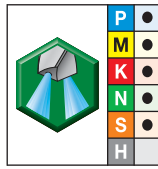


● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter		L4 max	L3	L5	L	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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		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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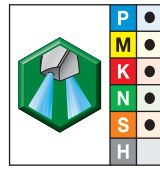
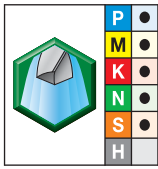
Solid Carbide Drills

Solid Carbide Drills

VariDrill™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 5 x D



(VDS202F • VDS402F • 5 x D — continued)



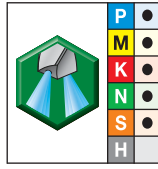
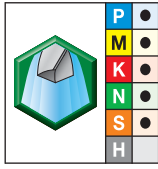
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
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)

Solid Carbide Drills

(VDS202F • VDS402F • 5 x D — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter		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

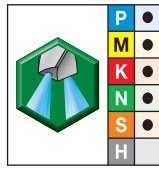
(continued)

Solid Carbide Drills

VariDrill™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 5 x D



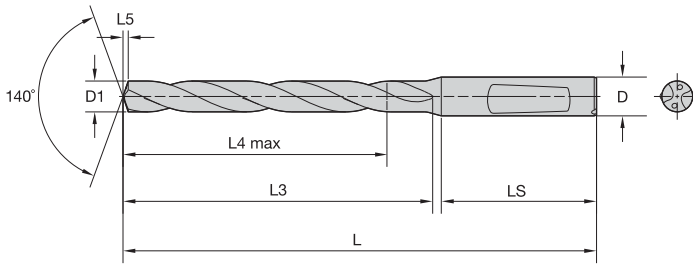
(VDS202F • VDS402F • 5 x D — continued)



● 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

Solid Carbide Drills



For information on L, L3, and L4 max, see page O139.



■ **VDS403F • 8 x D**



● first choice
○ alternate choice

		D1 diameter							
grade WU25PD TiAlN		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)

Solid Carbide Drills

(VDS403F • 8 x D – continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	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		D1 diameter		L4 max	L3	L5	L	LS	D
order #	catalogue #	mm	in						
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)

Solid Carbide Drills

(VDS403F • 8 x D – continued)

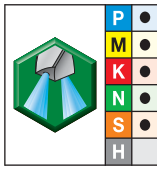


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	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)


 ● first choice
 ○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	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

■ VariDrill • VDS2_Series • WU25PD™ • Flood Coolant • Metric

Material Group	Cutting Speed – vc Range – m/min	Tool Diameter (mm)	Recommended Feed Rate (f) by Diameter												
			min – max			1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
			min	–	max	mm/r	mm/r	mm/r	mm/r	mm/r	mm/r	mm/r	mm/r	mm/r	mm/r
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
	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
	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	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
	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	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
	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
	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
	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	–	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
	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	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
	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

Solid Carbide Drills

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

■ VariDrill • VDS4_Series • WU25PD™ • Through Coolant • Metric

Material Group	Cutting Speed – vc Range – m/min	Tool Diameter (mm)	Recommended Feed Rate (f) by Diameter												
			min	–	max	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
>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

Application-Specific Drilling •

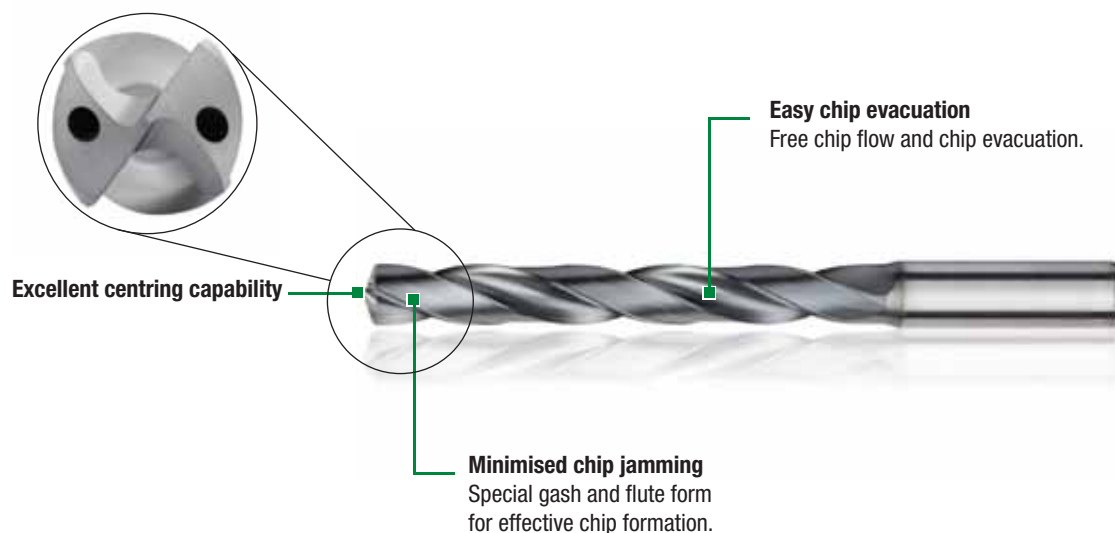
WIDIA™ TOP DRILL S™ for Steel and Cast Iron

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.

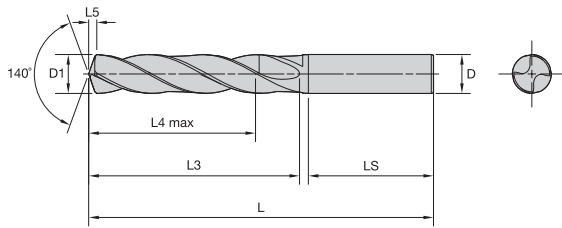
TOP DRILL S for Cast Iron

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 O139.



■ TDS202A • TDS212A • 5 x D



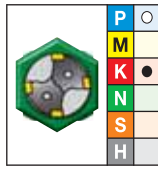
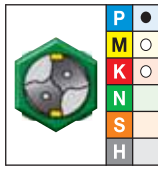
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)

Solid Carbide Drills

(TDS202A • TDS212A • 5 x D – continued)



● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

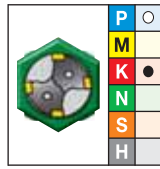
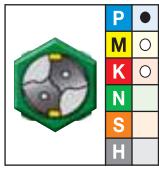
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Solid Carbide Drills

TOP DRILL S™ without Through Coolant • Steel and Cast Iron



(TDS202A • TDS212A • 5 x D – continued)



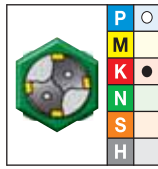
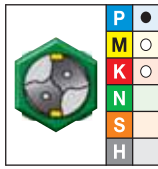
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)

Solid Carbide Drills

(TDS202A • TDS212A • 5 x D – continued)

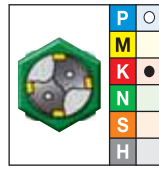
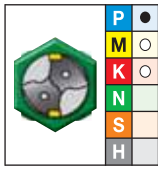


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

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(TDS202A • TDS212A • 5 x D – continued)



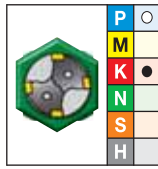
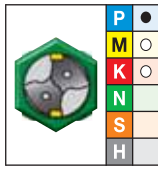
● first choice
○ alternate choice

D1 diameter

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

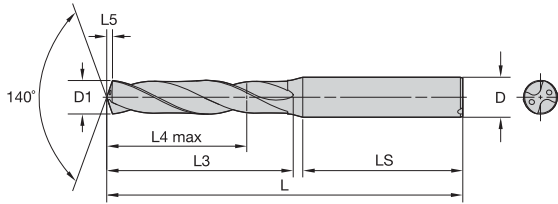
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(TDS202A • TDS212A • 5 x D – continued)

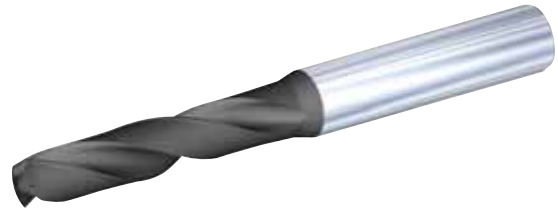


● first choice
○ alternate choice

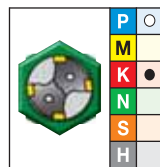
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order #	catalogue #	order #	catalogue #	mm	in						
4167276	TDS202A16500	4162497	TDS212A16500	16,500	.6496	143	93	71	2,9	48	18
4167277	TDS202A16600	4162498	TDS212A16600	16,600	.6535	143	93	71	2,9	48	18
4167278	TDS202A16670	4162499	TDS212A16670	16,670	.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 O139.



■ TDS401A • TDS411A • 3 x D

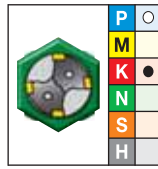
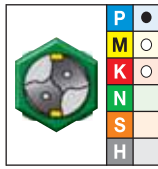


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)

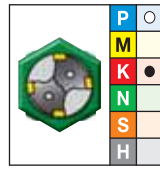
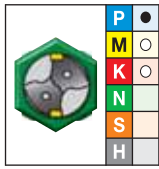


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)

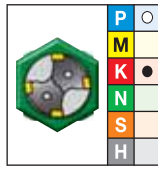
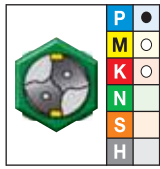


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)



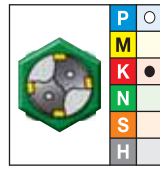
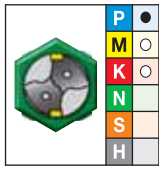
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)

Solid Carbide Drills

(TDS401A • TDS411A • 3 x D – continued)

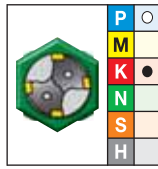
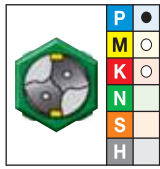


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

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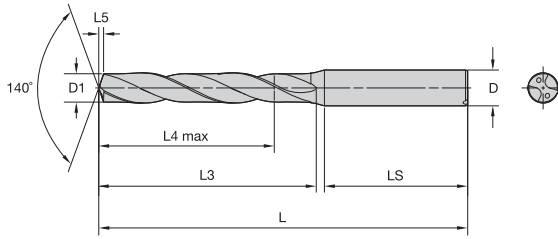
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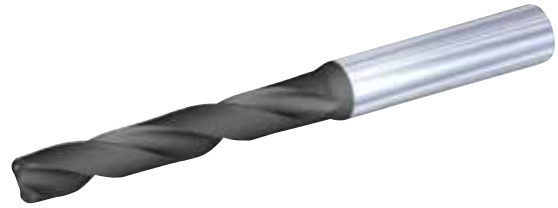
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

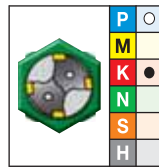
Solid Carbide Drills



For information on L, L3, and L4 max, see page O139.



■ TDS402A • TDS412A • 5 x D

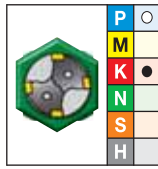
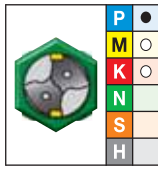


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

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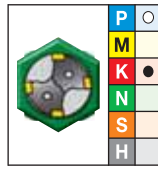
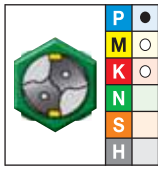
(TDS402A • TDS412A • 5 x D – continued)


 ● first choice
 ○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)



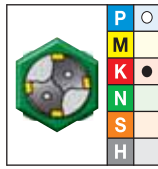
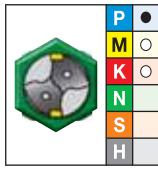
● first choice
○ alternate choice

D1 diameter

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)

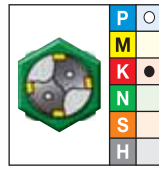


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)

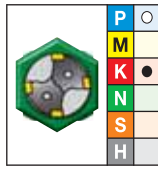
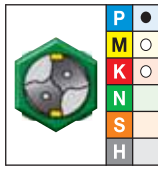


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)

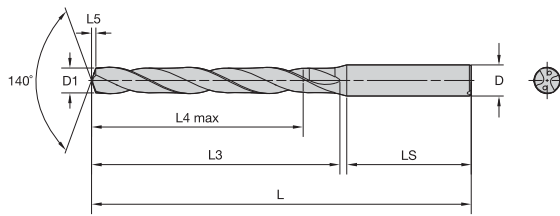
(TDS402A • TDS412A • 5 x D – continued)



● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

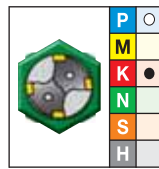
Solid Carbide Drills



For information on L, L3, and L4 max, see page O139.



■ TDS403A • TDS413A • 8 x D

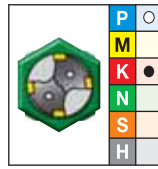
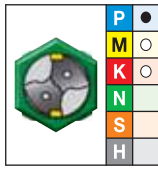


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

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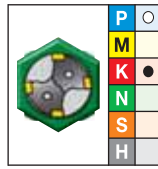
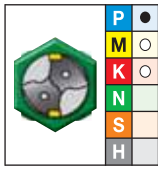
(TDS403A • TDS413A • 8 x D – continued)


 ● first choice
 ○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

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(TDS403A • TDS413A • 8 x D – continued)



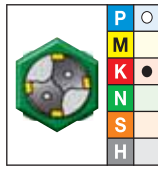
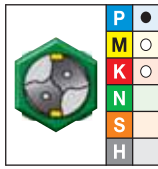
● first choice
○ alternate choice

D1 diameter

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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)



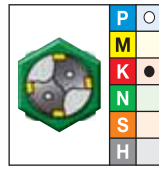
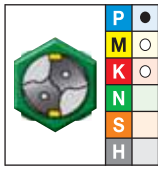
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

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Solid Carbide Drills

(TDS403A • TDS413A • 8 x D – continued)

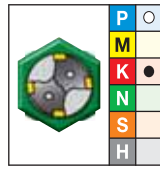
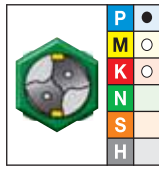


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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		L	L3	L4 max	L5	LS	D
order #	catalogue #	order #	catalogue #	mm	in						
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

■ TOP DRILL S • TDS202 Series • WP20PD™ • Flood Coolant • Metric

Material Group		Cutting Speed – vc Range – m/min		Recommended Feed Rate (f) by Diameter								
				Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
		min	max									
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
	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
	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
	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
	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
	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 Series • WP20PD • Through Coolant • Metric

Material Group		Cutting Speed – vc Range – m/min		Recommended Feed Rate (f) by Diameter								
				Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
		min	max									
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
	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
	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
	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
	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
	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

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 • TDS212 Series • WK15PD™ • Flood Coolant • 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	
			mm/r	mm/r	mm/r	mm/r	mm/r	mm/r	mm/r	mm/r	
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
	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
	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 Series • WK15PD • Through Coolant • 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	
			mm/r	mm/r	mm/r	mm/r	mm/r	mm/r	mm/r	mm/r	
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
	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
	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

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

Multiple-Application Drilling •
TOP DRILL S+™

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.

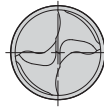
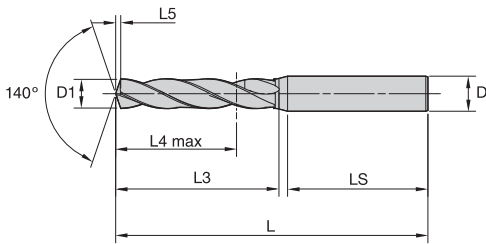
TOP DRILL S+ Drill-Point Design

- Low thrust. Works well on a variety of machines.
- Excellent centring capabilities.
- Easy to regrind.

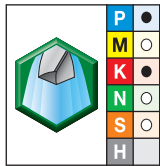
Four-Margin Land Design

- 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		D1 diameter		D	L3	L4 max	L5	LS	L
order #	catalogue #	mm	in						
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)

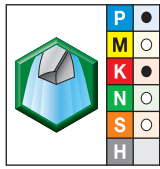

 ● first choice
 ○ alternate choice

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

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Solid Carbide Drills

(TDS301A • 3 x D – continued)



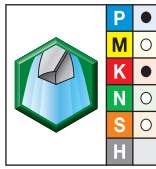
● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter		D	L3	L4 max	L5	LS	L
order #	catalogue #	mm	in						
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

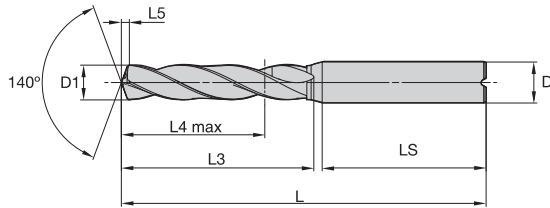
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Solid Carbide Drills

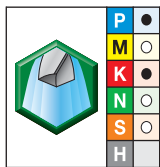
(TDS301A • 3 x D – continued)


 ● first choice
 ○ alternate choice

grade WU25PD TiAlN		D1 diameter		D	L3	L4 max	L5	LS	L
order #	catalogue #	mm	in						
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

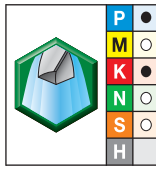


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter		D	L3	L4 max	L5	LS	L
order #	catalogue #	mm	in						
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)


 ● 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

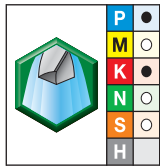
(continued)

Solid Carbide Drills

TOP DRILL S+™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 3 x D



(TDS501A • 3 x D – continued)



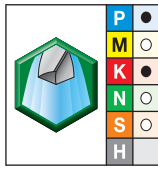
● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	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)

Solid Carbide Drills

(TDS501A • 3 x D – continued)


 ● first choice
 ○ alternate choice

grade WU25PD TiAlN		D1 diameter		D	L3	L4 max	L5	LS	L
order #	catalogue #	mm	in						
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

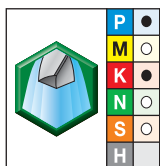
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Solid Carbide Drills

TOP DRILL S+™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 3 x D

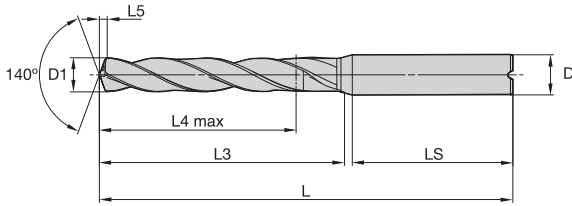


(TDS501A • 3 x D – continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter		D	L3	L4 max	L5	LS	L
order #	catalogue #	mm	in						
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**



● first choice
○ alternate choice

		D1 diameter							
grade WU25PD TiAlN		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

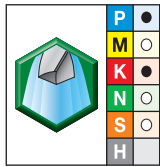
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Solid Carbide Drills

TOP DRILL S+™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 5 x D



(TDS502A • 5 x D – continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	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

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Solid Carbide Drills

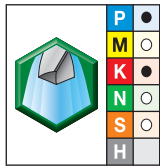
(TDS502A • 5 x D – continued)


 ● first choice
 ○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	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)

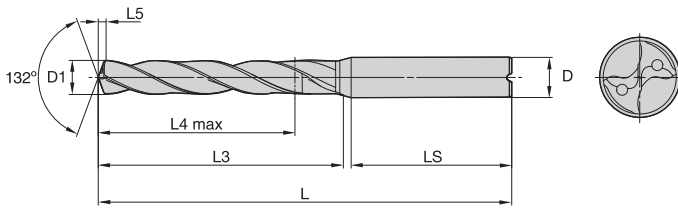
(TDS502A • 5 x D – continued)



● 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

Solid Carbide Drills



■ **TDS503A • 8 x D**



grade WU25PD
TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter		D	L3	L4 max	L5	LS	L
		mm	in						
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

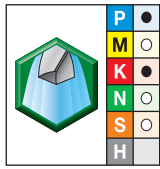
(continued)

Solid Carbide Drills

TOP DRILL S+™ • Steel, Stainless Steel, Cast Iron, Aluminium, and High-Temp Alloys • 8 x D



(TDS503A • 8 x D – continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	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

(continued)

Solid Carbide Drills

(TDS503A • 8 x D – continued)


 ● first choice
 ○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	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)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter		D	L3	L4 max	L5	LS	L
order #	catalogue #	mm	in						
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

Solid Carbide Drills

■ TOP DRILL S+ • TDS301 • WU25PD™ • Flood 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	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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



Solid Carbide Drills

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									
				Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0	
		min	–	max									
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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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

Solid Carbide Drills

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 Programme 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 programme 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

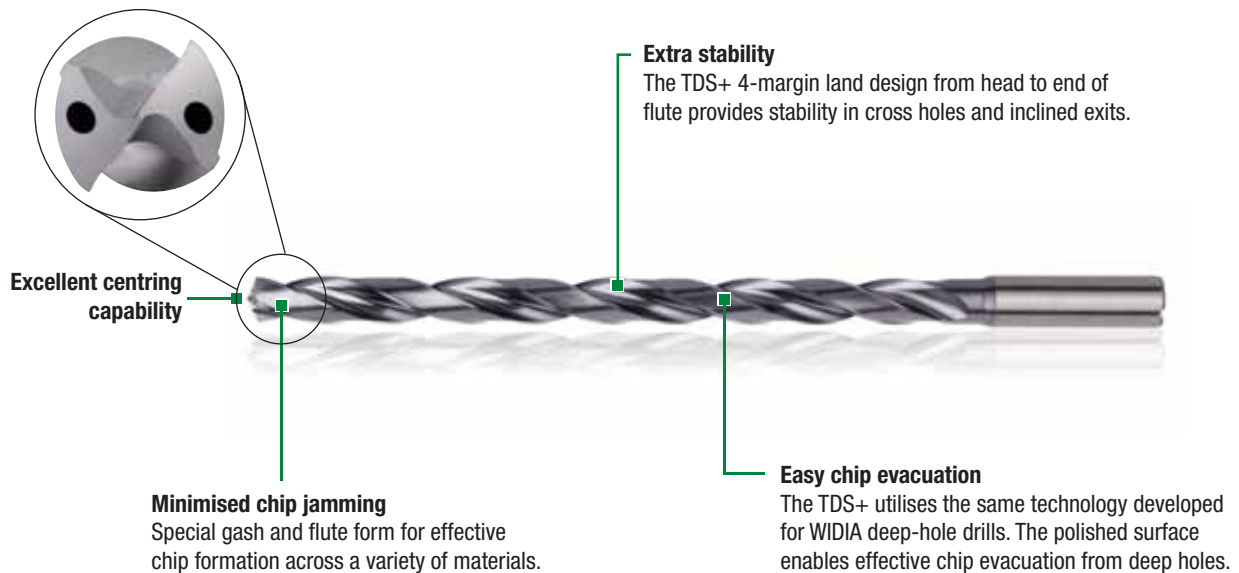
The versatile TOP DRILL S+ provides reliable performance across a broad scope of applications, including alloyed and unalloyed steel, cast iron, and some stainless steels and high-temperature alloys. TDS+ is now available in 12 x D, adding to its already wide range of options from 3–8 x D.



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.



Improved Productivity

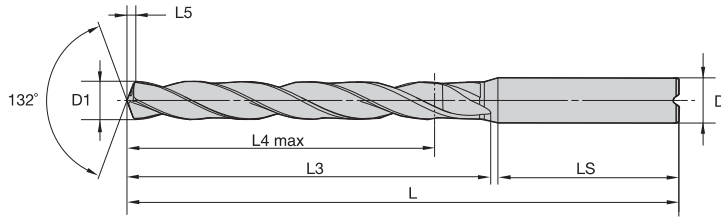
- Excellent centring capability — the new TDS+ 12 x D point is engineered to provide excellent centring capability.
- No pilot drill required — save time and money by reducing the number of steps required for your 12 x D application.

Increased Tool Life

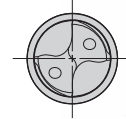
- Minimised runout — cylindrical body design provides guidance, and precision h6 shank is standard for better runout and less breakage.
- New WU20PD™ grade — designed specifically for long tool life.
- Factory regrind service — available through your WIDIA™ reconditioning service.

WIDIA Advantage

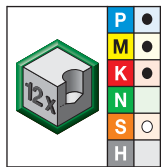
- Lower cost-per-hole due to high MRR and long tool life.
- Consistent performance from internally controlled supply chain:
Powder > Rod > Grinding > Coating
- Part of the complete WIDIA holemaking solution.
- Get more predictable results from local regrind services using OEM standards to recondition, 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 O139.



■ TDS504A • 12 x D



● first choice
○ alternate choice

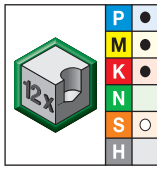
grade WU20PD
TiAlN

D1 diameter

order #	catalogue #	D1 diameter		L	L4 max	L3	L5	LS	D
		mm	in						
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)

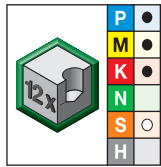


● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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)



● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

Solid Carbide Drills

TOP DRILL S+ • TDS504 Series • WU20PD • 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
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
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
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
	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
	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
	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
	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

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

Superior Deep-Hole Drilling •

WIDIA™ TOP DRILL™ Deep-Hole Drills for Steel and Cast Iron

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.

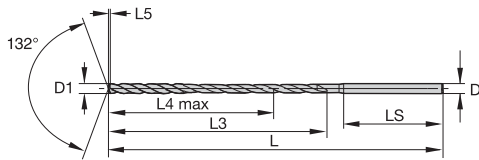
WU20PD™ Grade

- Advanced TiAlN multilayer PVD coating for steel and cast iron.
- Ultra fine-grain carbide ensures process reliability at high feed rates.

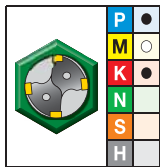
Customisation

- 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



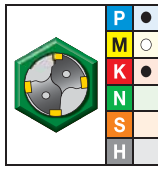
● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter		D	L3	L4 max	L5	LS	L	pilot drill
order #	catalogue #	mm	in							
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

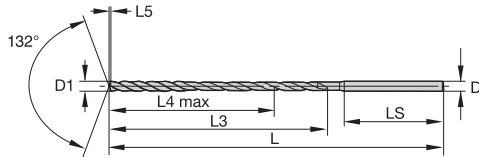
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Solid Carbide Drills

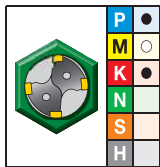
(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 15 x D • Z Shank — continued)


 ● first choice
 ○ alternate choice

grade WU20PD TAIN		D1 diameter								pilot drill
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	
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



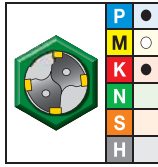
● first choice
○ alternate choice

grade WU20PD TiAIN		D1 diameter		D	L3	L4 max	L5	LS	L	pilot drill
order #	catalogue #	mm	in							
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

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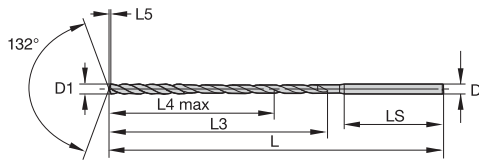
Solid Carbide Drills

(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 20 x D • Z Shank — continued)

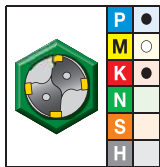

 ● first choice
 ○ alternate choice

grade WU20PD TAIN		D1 diameter								pilot drill
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	
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

Solid Carbide Drills



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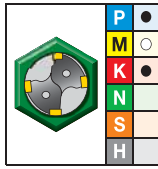
● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter		D	L3	L4 max	L5	LS	L	pilot drill
order #	catalogue #	mm	in							
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

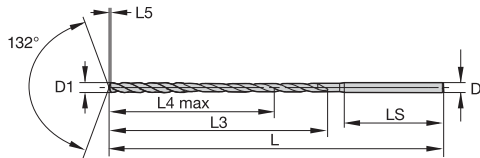
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Solid Carbide Drills

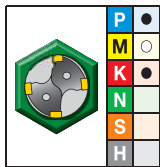
(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 25 x D • Z Shank — continued)


 ● first choice
 ○ alternate choice

grade WU20PD TAIN		D1 diameter								
order #	catalogue #	mm	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



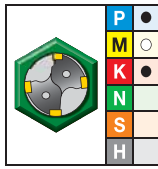
● first choice
○ alternate choice

order #	catalogue #	D1 diameter		D	L3	L4 max	L5	LS	L	pilot drill
		mm	in							
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)

Solid Carbide Drills

(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 30 x D • Z Shank — continued)


 ● first choice
 ○ alternate choice

grade WU20PD TAIN		D1 diameter								pilot drill
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	
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

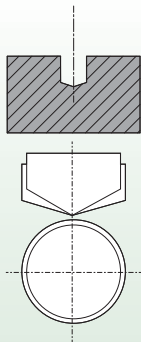
- Length variations, including longer versions up to 550mm depending on diameter, available as custom solutions.

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 ™

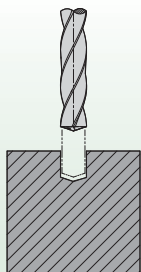


1) Pilot Drill Hole — IMPORTANT!

- 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 \varnothing = nominal \varnothing 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°!

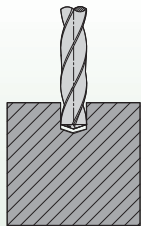


2) Feed TDD10* into Pilot Hole

- 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

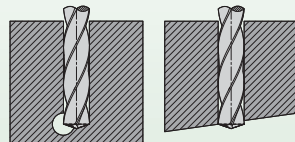
Recommendations:

- Reduce cutting speed to minimise imbalances in machine spindle/adaptor!



3) Drill Hole

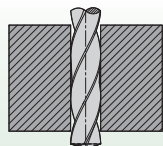
Cutting Parameters: Start recommended speed and feed rate at 1mm from the bottom of the pilot hole, clockwise.



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!



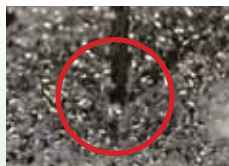
4) Drill Retraction

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

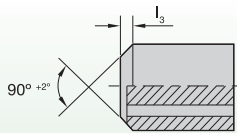
- If the pilot holes are close to each other, chips can fall into the neighboring hole.
- Do not enter a pilot hole that might contain chips with a deep hole drill to avoid chip jamming, wear, or breakage.
- If required holes are close to each other, use smart drilling strategies, make sure the pilot 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.

D1	12mm hydraulic reducer sleeve		20mm hydraulic reducer sleeve		25mm hydraulic reducer sleeve		32mm hydraulic reducer sleeve		.500" hydraulic reducer sleeve		.750" hydraulic reducer sleeve	
	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

Difficult Drilling Applications •

WIDIA™ TOP DRILL G™ for Non-Ferrous Materials

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.

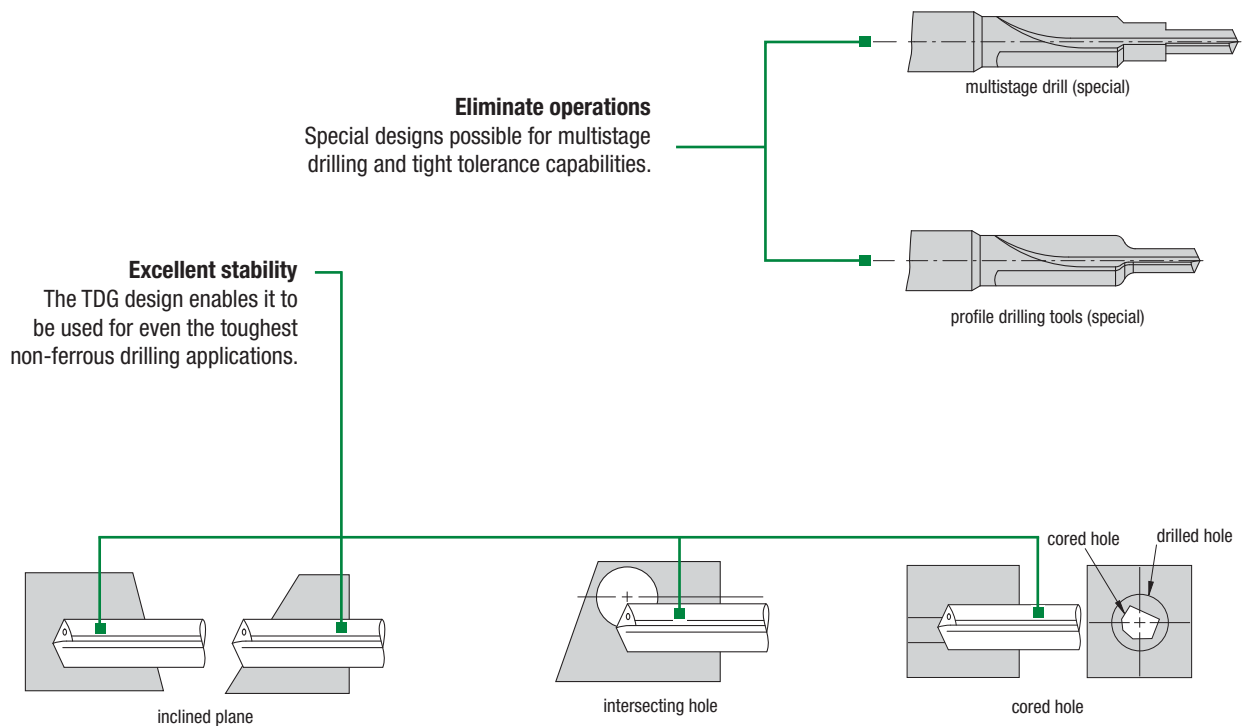
- Next generation of GGX WIDIA-Rübig™ series.
- Targeted for aluminium and non-ferrous materials.
- Can be used in challenging conditions.
- Good for multi-step drills.

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.

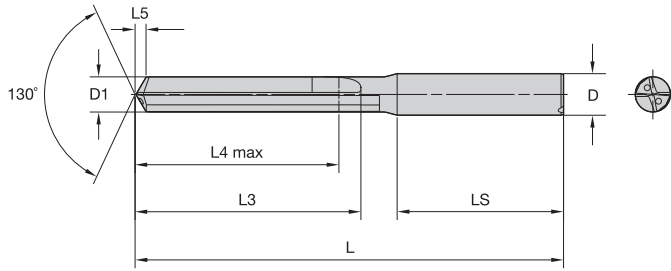
WIDIA™ Advantage

- 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.



Solid Carbide Drills

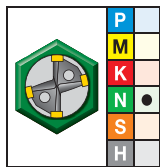
TOP DRILL G™ • Non-Ferrous Materials • 5 x D



For information on L, L3, and L4 max, see page O139.



TDG532A • 5 x D



grade WN10HD

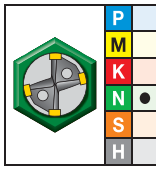
D1 diameter

- first choice
- alternate choice

order #	catalogue #	D1 diameter		L	L4 max	L3	L5	LS	D
		mm	in						
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

(continued)

(TDG532A • 5 x D – continued)

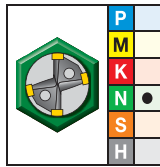


● first choice
○ alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

(continued)

(TDG532A • 5 x D – continued)

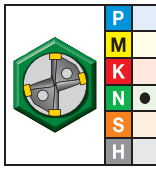


- first choice
- alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

(continued)

(TDG532A • 5 x D – continued)



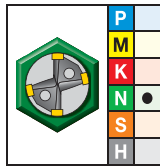
● first choice
○ alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

(continued)

Solid Carbide Drills

(TDG532A • 5 x D – continued)

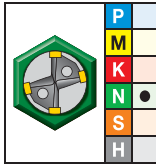


● first choice
○ alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

(continued)

(TDG532A • 5 x D – continued)



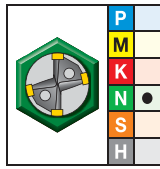
● first choice
○ alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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)

Solid Carbide Drills

(TDG532A • 5 x D – continued)



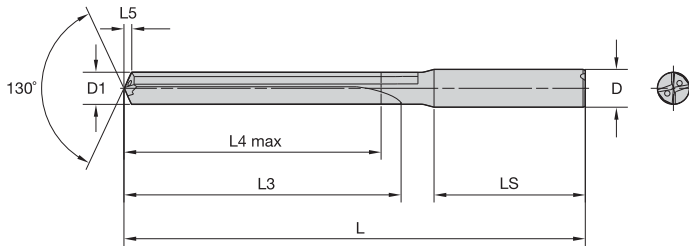
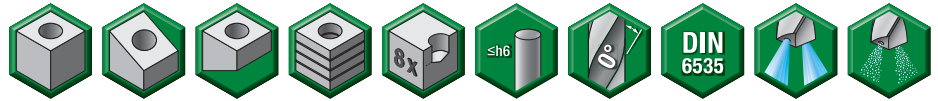
● first choice
○ alternate choice

grade WN10HD

D1 diameter

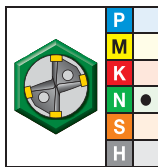
order #	catalogue #	D1 diameter		L	L4 max	L3	L5	LS	D
		mm	in						
4158618	TDG532A19800	19,800	.7795	153	77	101	4,6	50	20
4158620	TDG532A19900	19,900	.7835	153	77	101	4,6	50	20
4158622	TDG532A20000	20,000	.7874	153	77	101	4,7	50	20
4158634	TDG532A21000	21,000	.8268	167	85	114	4,9	50	20
4158636	TDG532A22000	22,000	.8661	167	85	114	5,1	50	20
4158637	TDG532A23000	23,000	.9055	184	98	126	5,4	56	25

Solid Carbide Drills



For information on L, L3, and L4 max, see page O139.

■ TDG533A • 8 x D



grade WN10HD

- first choice
- alternate choice

order #	catalogue #	D1 diameter		L	L4 max	L3	L5	LS	D
		mm	in						
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

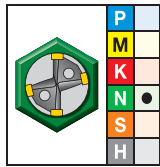
(continued)

Solid Carbide Drills

TOP DRILL G™ • Non-Ferrous Materials • 8 x D



(TDG533A • 8 x D – continued)



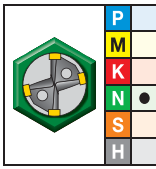
- first choice
- alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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)

Solid Carbide Drills

(TDG533A • 8 x D – continued)

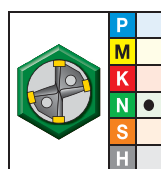


● first choice
○ alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

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(TDG533A • 8 x D – continued)

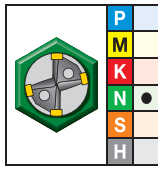


- first choice
- alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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)



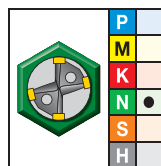
● first choice
○ alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

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Solid Carbide Drills

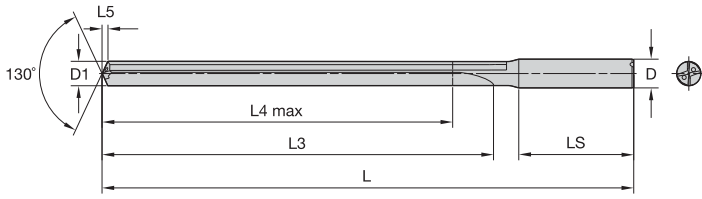
(TDG533A • 8 x D – continued)



● first choice
○ alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

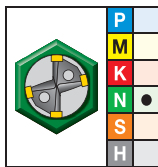
Solid Carbide Drills



For information on L, L3, and L4 max, see page O139.



■ TDG534A • 12 x D



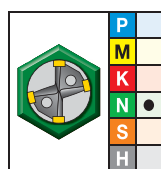
grade WN10HD

- first choice
- alternate choice

order #	catalogue #	D1 diameter		L	L4 max	L3	L5	LS	D
		mm	in						
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)

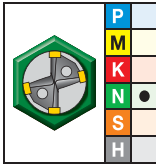


● first choice
○ alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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)



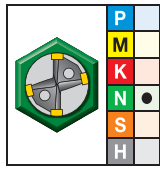
● first choice
○ alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

(continued)

Solid Carbide Drills

(TDG534A • 12 x D — continued)

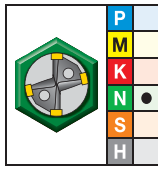


- first choice
- alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

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(TDG534A • 12 x D — continued)

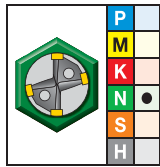


- first choice
- alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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)



- first choice
- alternate choice

grade WN10HD		D1 diameter		L	L4 max	L3	L5	LS	D
order #	catalogue #	mm	in						
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

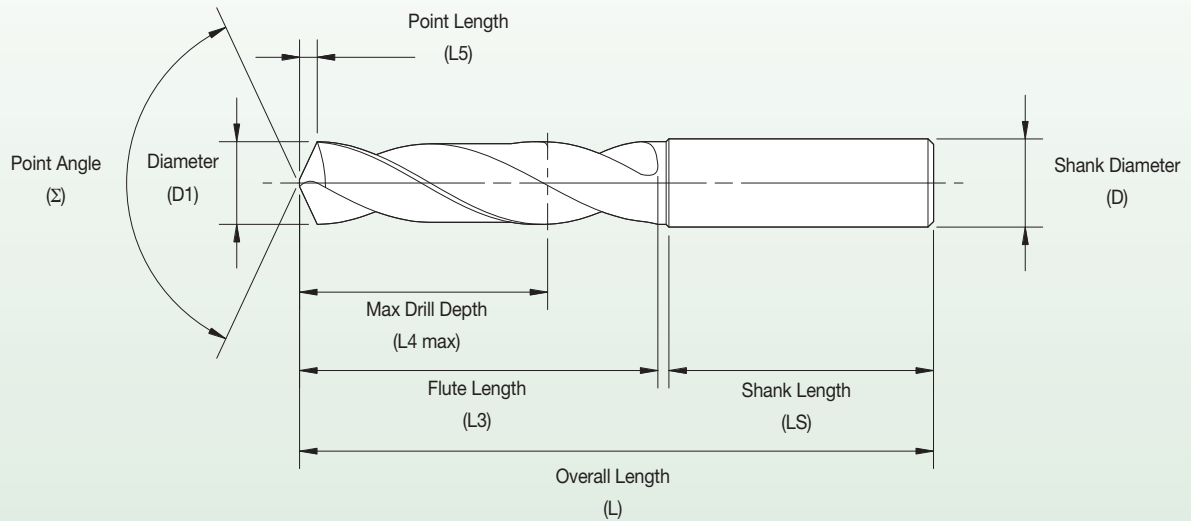
Material Group												
		Cutting Speed – vc	Recommended Feed Rate (f) by Diameter									
		Range – m/min										
		min – min	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0	
N	21	100 – 450	mm/r	0,16–0,25	0,19–0,29	0,23–0,35	0,27–0,42	0,31–0,50	0,36–0,57	0,44–0,69	0,52–0,82	
	22, 23, 24	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

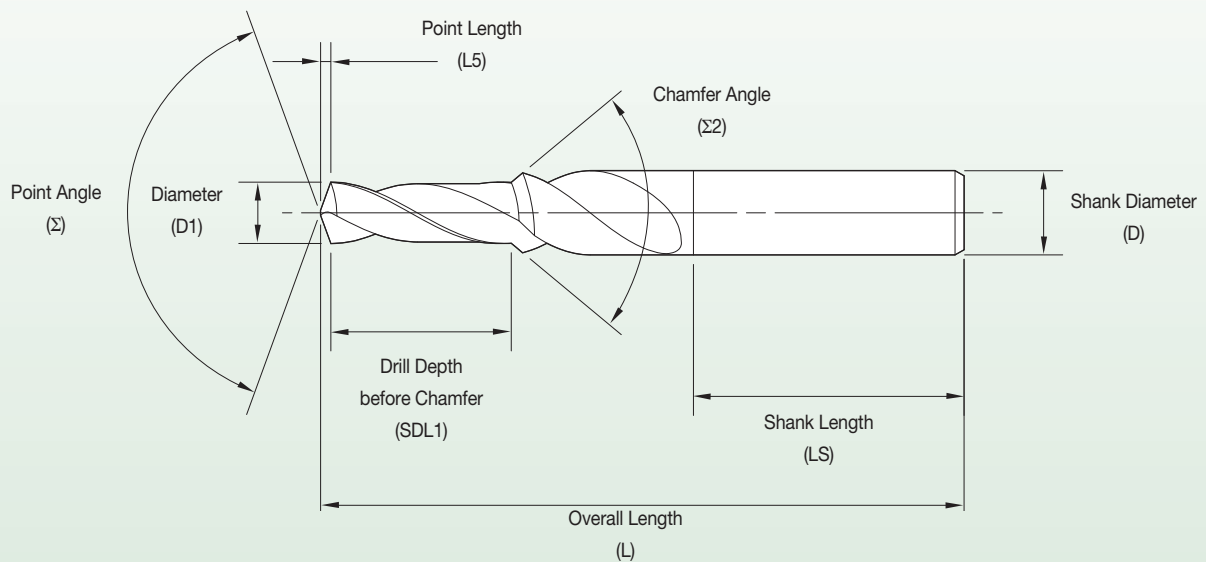
nominal size range	D1 tolerance m7	D tolerance h6
>3–6	0,004/0,016	0,000/-0,008
>6–10	0,006/0,021	0,000/-0,009
>10–18	0,007/0,025	0,000/-0,011
>18–25,4	0,008/0,029	0,000/-0,013

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.



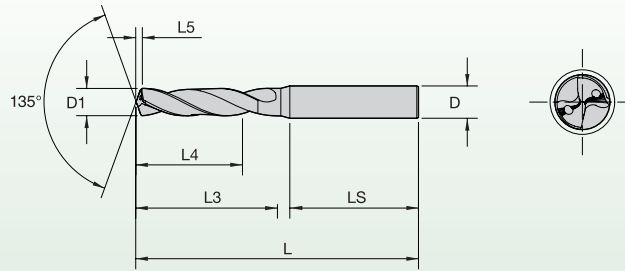
Shank Designs to DIN 6535



Form HE,
2° angle
Design F



Form HA,
straight
design A



Dimensions for WIDIA™ High-Performance Solid Carbide Drills

mm ∅		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

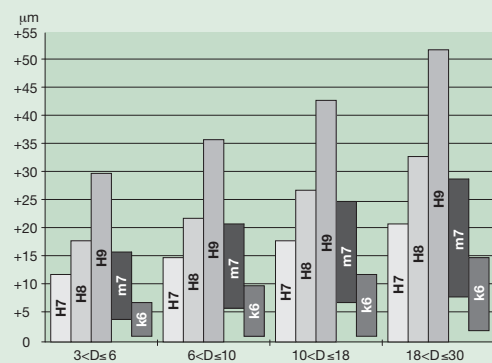
* D1 < 20mm to DIN 6537K
D1 > 20mm to factory standard
** To factory standard

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

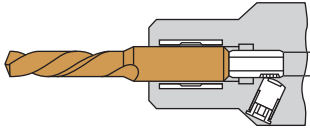
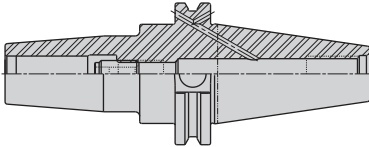
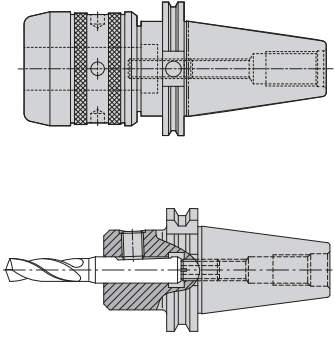
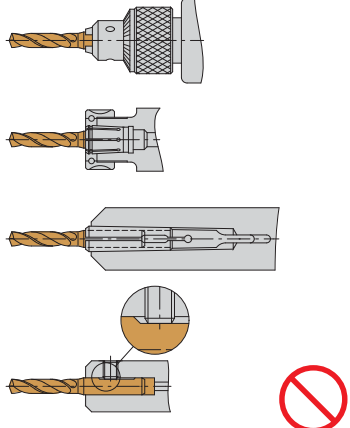
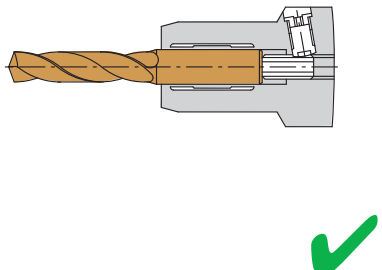
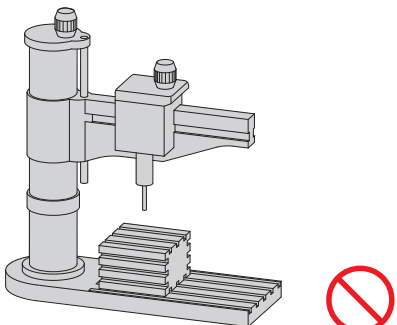
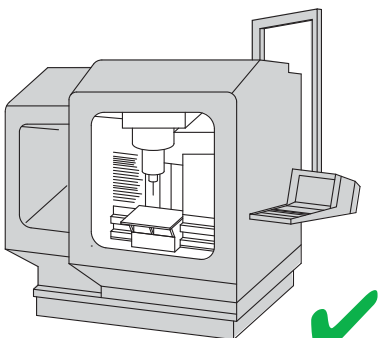
High-performance solid carbide drills with tolerances of m7 create holes with tolerances of H9. H8 can be achieved in very good conditions. The drill should be used for holes in H8, and in favourable conditions, H7 can be achieved. Solid carbide drills with H7 create holes in K9-K11. Other drilling tolerances require special solid carbide drill versions.

Tolerances of diameter D1 on:
Spiral Flute
TDG Drill



Toolholding Systems

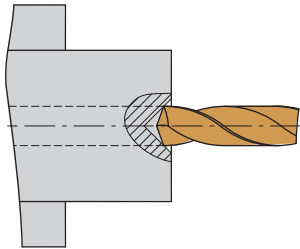
As with any drilling system, components of the entire system contribute to the quality of the machined hole, not just the drill itself. For maximum efficiency and accuracy, the following toolholding systems are your best choices:

<p>First Choice Hydraulic chucks</p> 	<p>Second Choice Shrink Fit</p> 	<p>Third Choice High-performance milling chucks with reduction sleeves</p> 
<p>Not Recommended</p> 	<p>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.</p>	<p>Highly Recommended Hydraulic chucks ensure a secure torque transmission with excellent concentricity.</p> 
<p>Not Recommended</p> 	<p>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 $\pm 0.025\text{mm}$. However, it also means that drills require rigid machine tools with good spindles.</p>	<p>Rigid Machine Tool Recommended</p> 

(continued)

(continued)

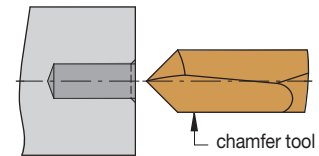
Wrong



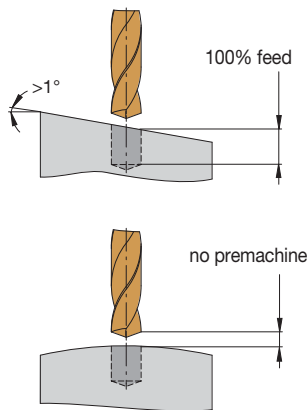
Drilling and Chamfering

Drill into the solid first, then chamfer.

Correct



Wrong



Drilling on Inclined or Rounded Surfaces

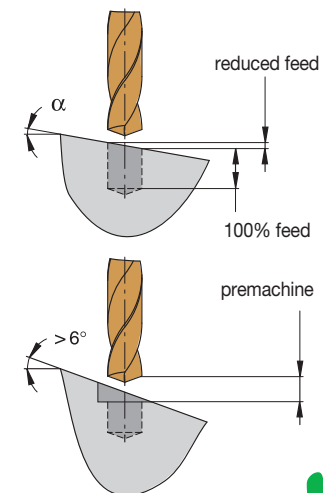
When drilling on inclined or curved surfaces, use a lower feed than the standard value. The reduction of feed required is dependent on the inclination angle of the workpiece surface and the drill type (see table).

reduced feed (% of standard value)

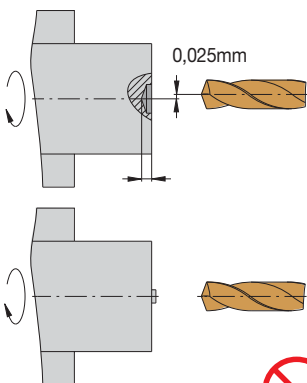
inclination α	3 x D	5 x D Long	<5 x D
1°	100%	80%	premachine
2°	80–50%	80–50%	premachine
3°	65%	50%	premachine
4°	50%	premachine	premachine
6°	30%	premachine	premachine

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 $\pm 0.025\text{mm}$. 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.

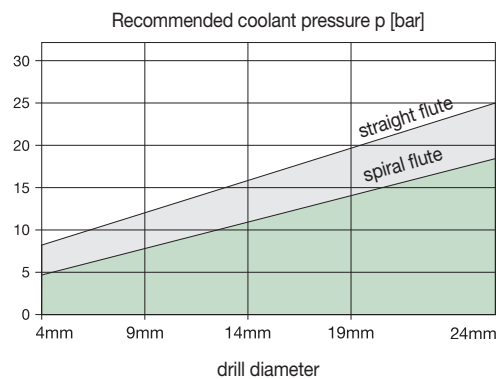
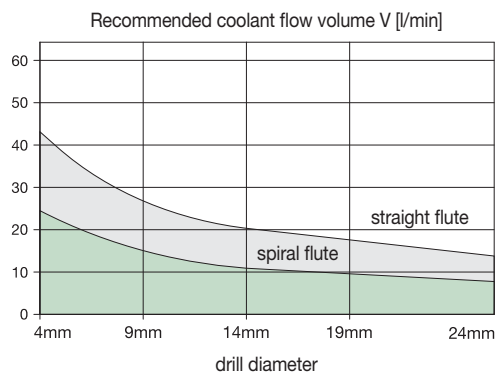
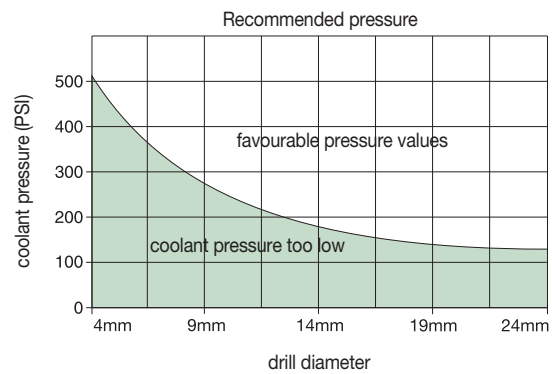
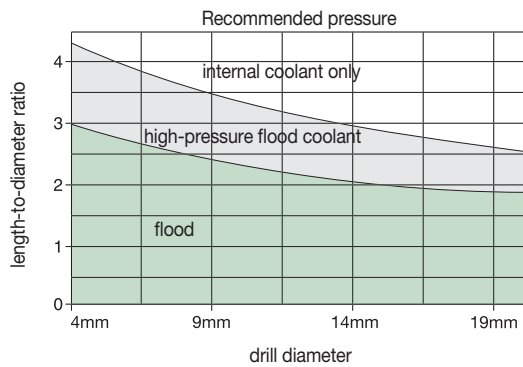
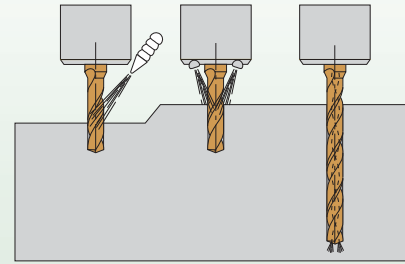
Hole Depths Greater than 3 x D

Hole depths that are deeper than three times the drill diameter may require a speed reduction. A 15% lower speed is suggested.

Coolant

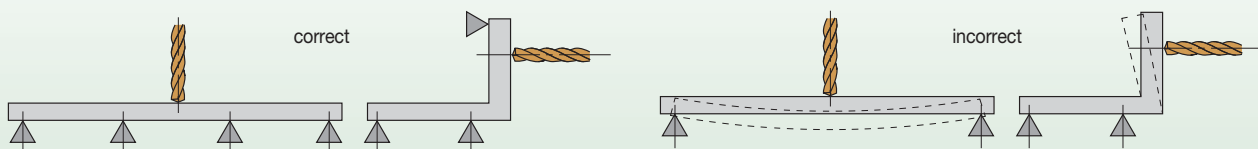
- To optimise their performance, drills must be adequately cooled. With the proper coolant flow, better tool life and higher maximum effective cutting speeds can be achieved.
- If not properly cooled, the drill will heat up rapidly. This causes the drill diameter to expand, which in turn may cause the 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

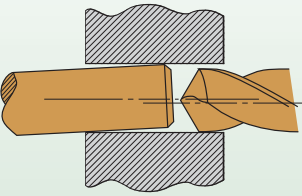
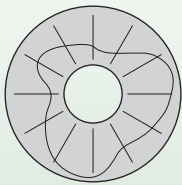
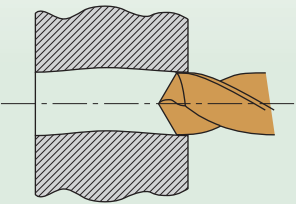



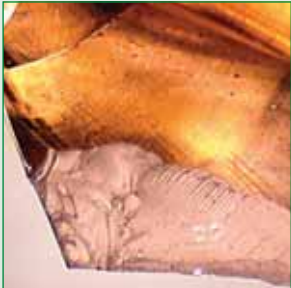
Workpiece Rigidity

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Stabilise workpiece chucking and check stability of machine tool.
	wrong drill	<ul style="list-style-type: none"> • Check drill type, drilling depth, cooling system, and workpiece material.
	cutting conditions	<ul style="list-style-type: none"> • Reduce cutting speed; increase feed.
splintering on the chisel edge 	clamping chuck	<ul style="list-style-type: none"> • Check clamping accuracy. Use hydraulic clamping chuck or high-precision chucking system.
	cutting conditions	<ul style="list-style-type: none"> • Decrease feed; increase speed.
built-up edge 	insufficient coolant	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Increase speed 20–30%.
splintering on the cutting edges 	clamping chuck	<ul style="list-style-type: none"> • Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	cutting conditions caused by built-up edge	<ul style="list-style-type: none"> • Check cutting values, and possibly increase cutting speed.
		<ul style="list-style-type: none"> • Examine regularly for built-up edge.
thermal checking/comb cracking 	cutting conditions	<ul style="list-style-type: none"> • Adapt coolant and cutting conditions to reduce thermal shock.

problem	source	solution
<p>hole too big</p> 	cutting conditions	<ul style="list-style-type: none"> • Check cutting values, increase cutting speed, or reduce feed.
	clamping chuck	<ul style="list-style-type: none"> • Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	wrong drill	<ul style="list-style-type: none"> • Check drill diameter. Please note that drills are ground to a positive tolerance. Check concentric running.
<p>hole too small</p> 	insufficient coolant	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Decrease feed; increase speed.
	wrong drill	<ul style="list-style-type: none"> • Check cutting-edge diameter.
<p>hole not cylindrical</p> 	clamping chuck	<ul style="list-style-type: none"> • Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	workpiece movement	<ul style="list-style-type: none"> • Stabilise workpiece chucking and check stability of machine tool.
	wrong drill	<ul style="list-style-type: none"> • Check drill type and drilling depth. Use longer drills.
	cutting conditions	<ul style="list-style-type: none"> • Reduce feed at entry.

problem	source	solution
<p>drill breakage</p> 	<p>clamping chuck</p>	<ul style="list-style-type: none"> • Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	<p>workpiece movement</p>	<ul style="list-style-type: none"> • Stabilise workpiece chucking and check stability of machine tool.
	<p>wrong drill</p>	<ul style="list-style-type: none"> • Check drill type, drilling depth, cooling system, and workpiece material.
	<p>insufficient coolant</p>	<ul style="list-style-type: none"> • 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.
	<p>cutting conditions</p>	<ul style="list-style-type: none"> • Check cutting values, and possibly reduce feed.
	<p>clamping chuck</p>	<ul style="list-style-type: none"> • Check torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
<p>splintering on the cutting corners</p> 	<p>workpiece movement</p>	<ul style="list-style-type: none"> • Stabilise workpiece chucking and check stability of machine tool.
	<p>wrong drill</p>	<ul style="list-style-type: none"> • Check drill type, drilling depth, cooling system, and workpiece material. Possibly use longer drill.
	<p>insufficient coolant</p>	<ul style="list-style-type: none"> • 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.
	<p>cutting conditions</p>	<ul style="list-style-type: none"> • Check cutting values, and possibly reduce feed.



Holemaking • Modular Drills

Introduction.....P2-P3
TOP DRILL M1P4-P24
Spade BladesP26-P45



modular drills with internal coolant channel		grade/series	standard*						hole tolerance	standard range			
			● first choice ○ alternate choice							diameter range			
			P	M	K	N	S	H		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 K20FTIAIN.

● Standard Product
 ○ Engineered Solutions

engineered solution range			coolant	drilling	inclined exit	counter-sinking	counter-boring	2 flute, 2 margin cooled	corner chamfer	plain shank $\leq H6$	SCF Shanks	page(s)
diameter range												
D1 mm min-max	D1 inch min-max	max drilling depth										
TOP DRILL M1™ with front clamping mechanism (continued)												
7,94–27,99	.3125–1.1020	–		●	●			●	●			P10–P15
12,50–36,01	.4921–1.4177	–				●						P16–P19
		–				●	●					
7,94 ≤ Ø < 9,50	.3125 ≤ Ø < .3740	12 x D	●	●	●	○	○			●	●	P6–P8
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™ Modular Drill System

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

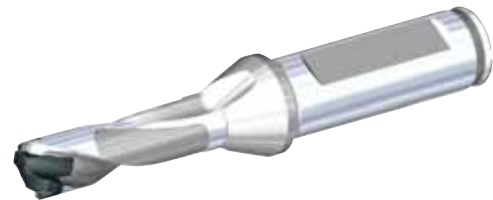
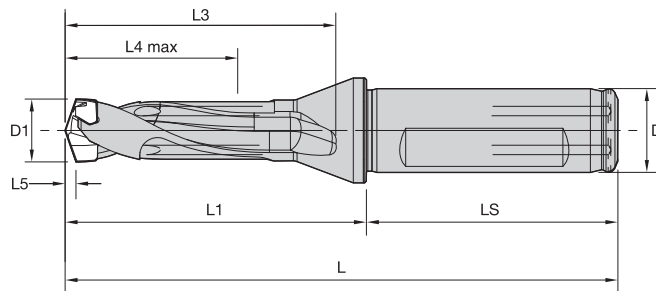
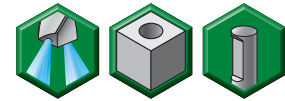
- No reconditioning costs.
- Consistent performance from tip to tip.
- Eliminates number of tools waiting for reconditioning, thus avoiding hidden costs.

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.



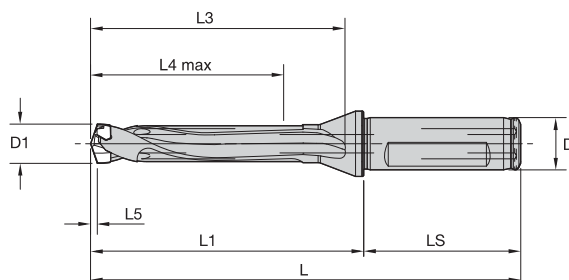
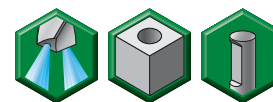
- Tool body shipped with insert wrench.



■ 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

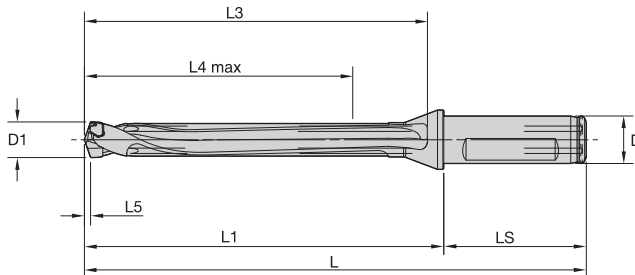
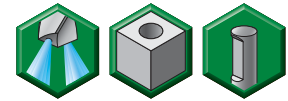
- Tool body shipped with insert wrench.



■ 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

- 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



ToolBOSS™



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

Shared Rewards

Free use of ToolBOSS vending machine combined with a comprehensive maintenance and service package based on agreed sales targets for specified contract terms.

Direct Purchase of Equipment

ToolBOSS vending machines are available for purchase. Maintenance and service packages available with annual agreements.

For more information, please contact us at:
toolboss.com



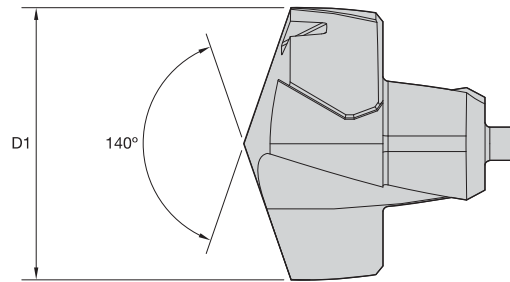
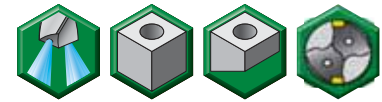
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WIDIA 



■ 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)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1	seat size/series
order #	catalogue #		
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)

(TOP DRILL M1 • UP(M) – continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1	seat size/series
order #	catalogue #		
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)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1	seat size/series
order #	catalogue #		
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)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1	seat size/series
order #	catalogue #		
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)


 ● first choice
 ○ alternate choice

grade WU25PD TiAlN		D1	seat size/series
order #	catalogue #		
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.

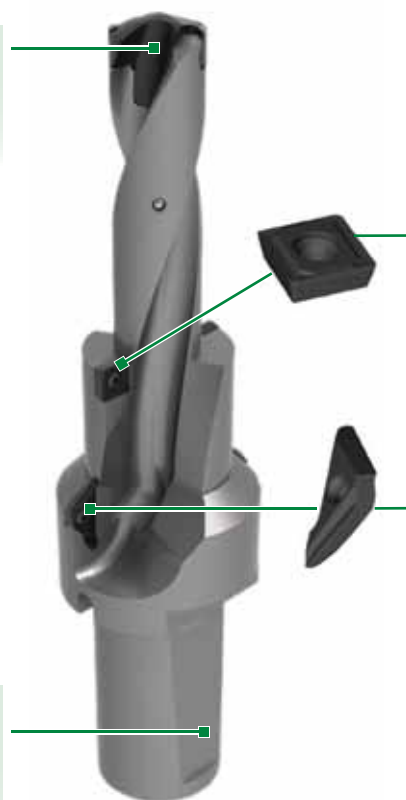
Standard
TOP DRILL M1™ inserts.

Standard
TopSTEP SH counterboring insert.

Standard
TopSTEP VG chamfering insert.

Made-to-Order TDM1 Toolholder

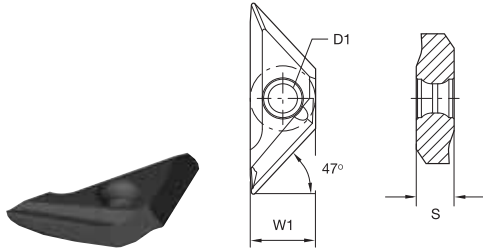
- Available within 3–4 weeks.
- Made custom to your needs.



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

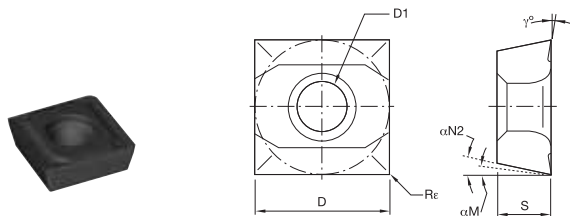
P	●
M	○
K	●
N	○
S	○
H	

■ TopSTEP VG Chamfering Inserts

catalogue number	W1	D1	S	WP20PH
VXGX10030234	6,35	2,85	3,48	5983706

TopSTEP SH Counterboring 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

P	●
M	○
K	○
N	
S	
H	

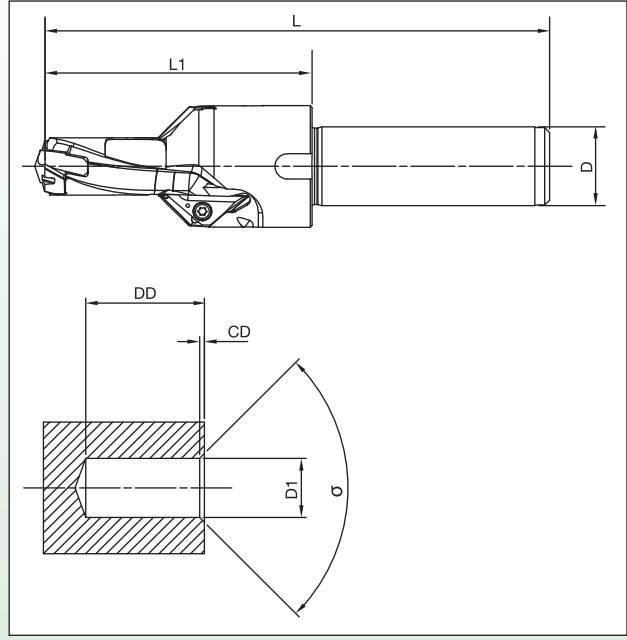
■ TopSTEP SH Counterboring Inserts

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.

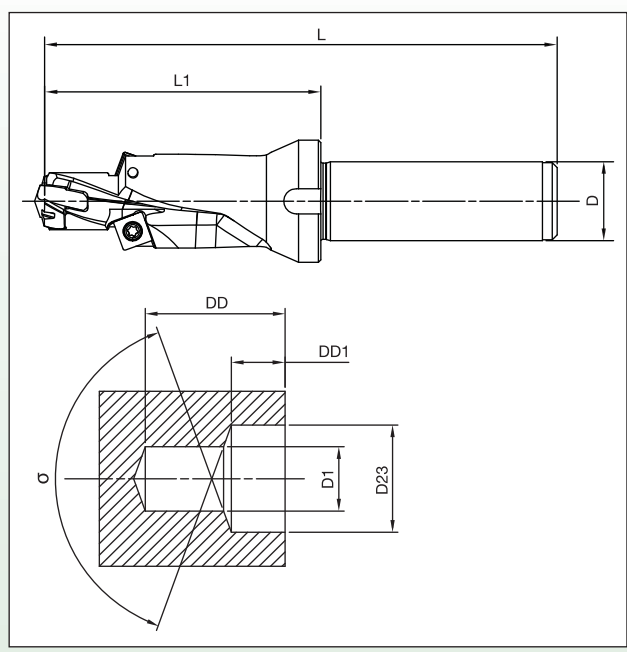
Option 1 TOP DRILL M1 Drilling and Chamfering

Overall Length	[L]	<input type="text"/>
Drill Length	[L1]	<input type="text"/>
Shank Diameter	[D]	<input type="text"/>
Drill Diameter Min	[D1]	<input type="text"/>
Drilling Depth	[DD]	<input type="text"/>
Cutting Diameter 2 Angle	σ	<input type="text"/>
Chamfering Depth	[CD]	<input type="text"/>



Option 2 TOP DRILL M1 Drilling and Countersinking

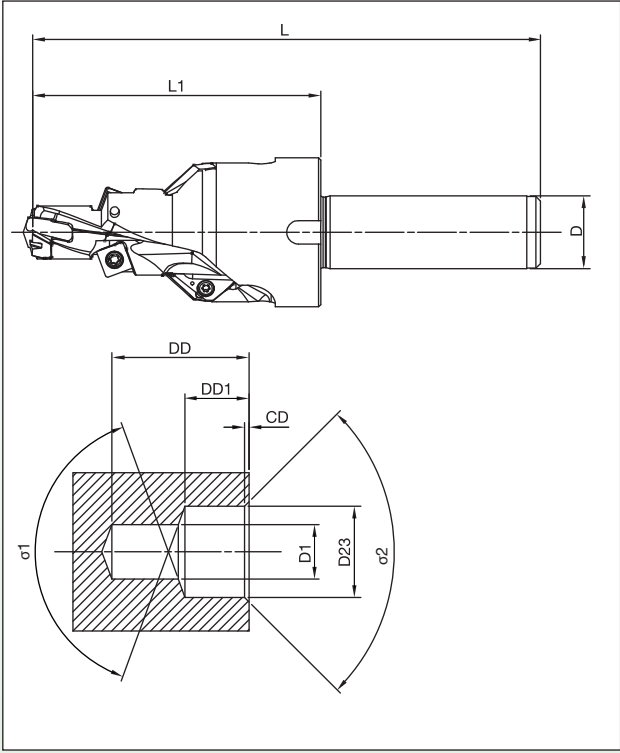
Overall Length	[L]	<input type="text"/>
Drill Length	[L1]	<input type="text"/>
Shank Diameter	[D]	<input type="text"/>
Drill Diameter Min	[D1]	<input type="text"/>
Drilling Depth	[DD]	<input type="text"/>
Cut Diameter 23	[D23]	<input type="text"/>
Countersinking Depth	[DD1]	<input type="text"/>
Cutting Diameter 2 Angle	σ	<input type="text"/>



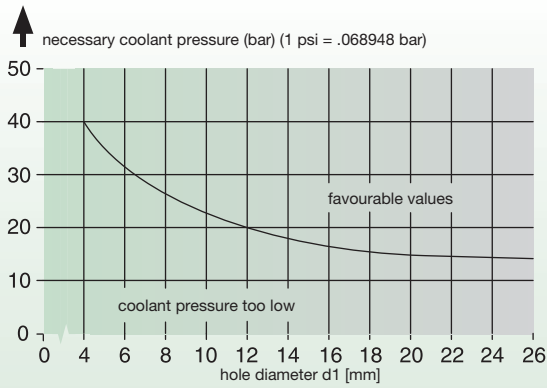
Please utilise guide below to plan your TOP DRILL M1™ modular step drill based on your needs and requirements. Please contact your distributor for a quote.

Option 3 TOP DRILL M1 Drilling and Countersinking and Chamfering

Overall Length	[L]	<input type="text"/>
Drill Length	[L1]	<input type="text"/>
Shank Diameter	[D]	<input type="text"/>
Drill Diameter Min	[D1]	<input type="text"/>
Drilling Depth	[DD]	<input type="text"/>
Cut Diameter 23	[D23]	<input type="text"/>
Countersinking Depth	[DD1]	<input type="text"/>
Cutting Diameter 2 Angle	$\sigma 1$	<input type="text"/>
Cutting Diameter 3 Angle	$\sigma 2$	<input type="text"/>
Chamfering depth	[CD]	<input type="text"/>



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			Recommended Feed Rate							
					Tool Diameter (mm)	8,0	10,0	12,0	14,0	16,0	20,0	25,0
		min	Starting Value	max								
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 arbor 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?)



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.)

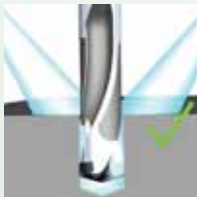
**To order the TDM1 Wrench, please use order number 3861623 and catalogue number 170.315.*

Cautions

Coolant



1) Internal coolant is recommended.



2) In case of external coolant, cutting depth must be 3 x D or less.

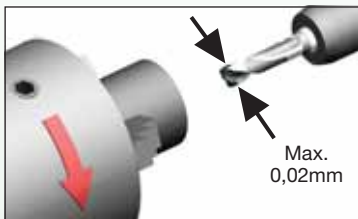


3) Dry cutting is not recommended. Limited applicability in cast iron materials, MQL strongly recommended.

Usage Precautions

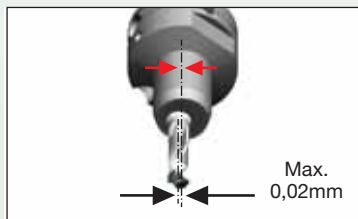
Core deviation

1) For Turning Machines



Set deviation amount under 0,02mm between workpiece and drill.

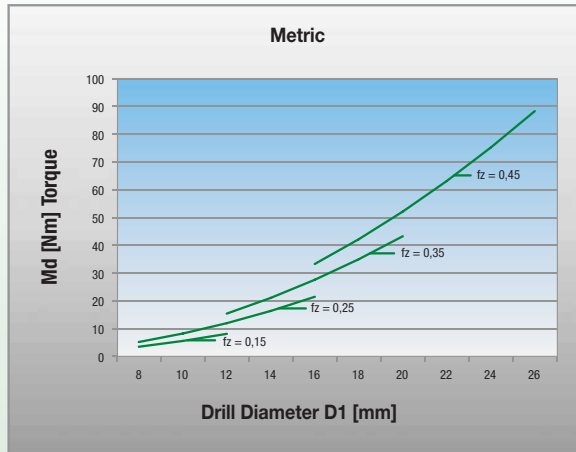
2) For Machining Centres



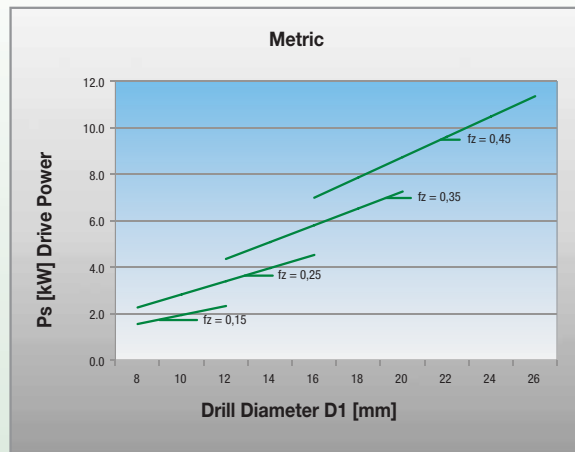
Do not use any arbor with a damaged attachment surface. Centre of arbor deviation must be within 0,02mm.

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	

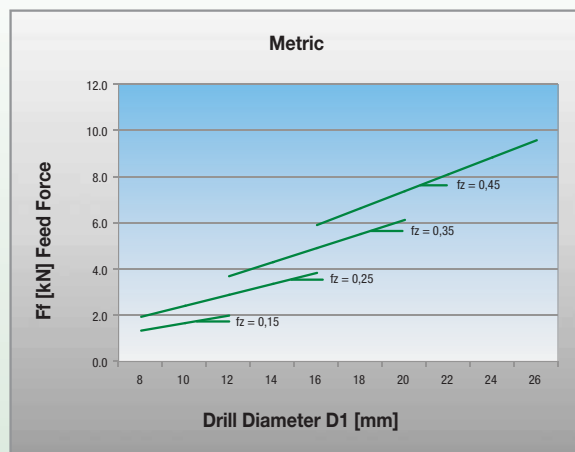
■ Torque



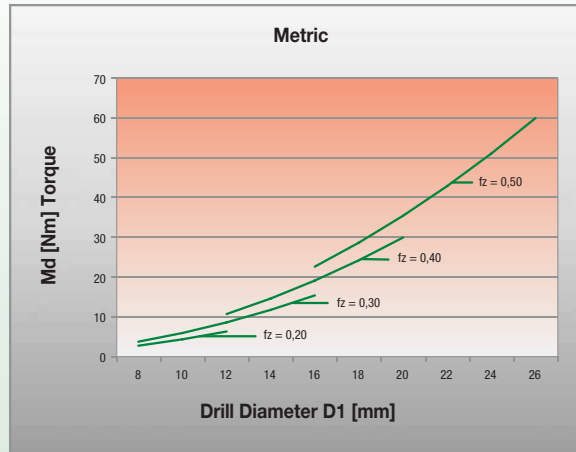
■ Power



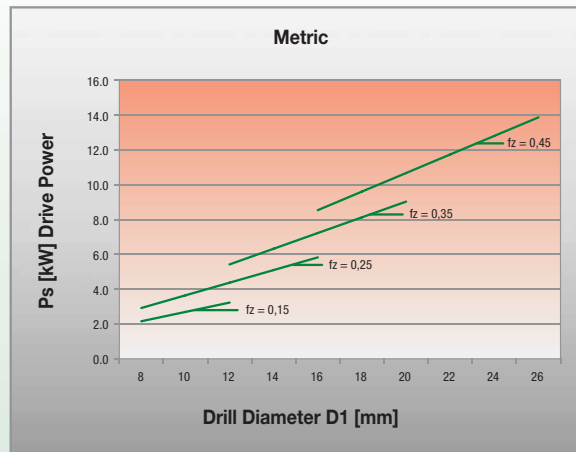
■ Feed Force



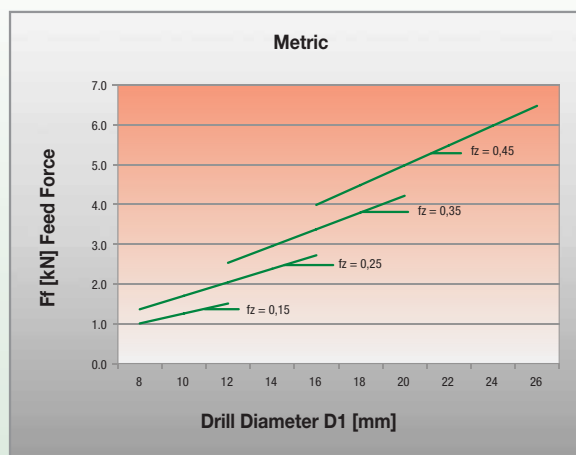
■ Torque



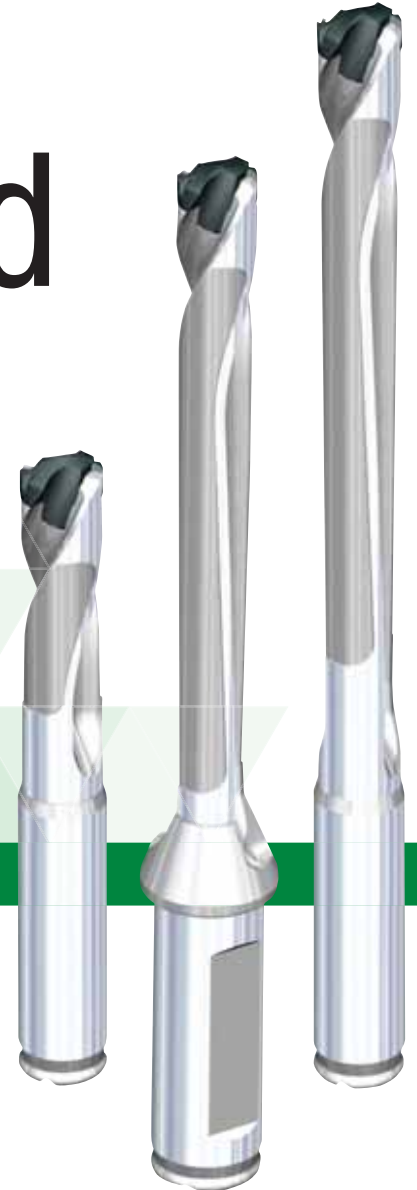
■ Power



■ Feed Force



Cut Time and Costs, Not Quality and Performance



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

TOP DRILL M1™

The TDM1 modular drill system offers performance levels and Metal Removal Rates (MRR) comparable to that of solid carbide drills. The unique front clamping system enables inserts to be changed quickly, even inside the machine tool, saving setup time and manufacturing costs.

- UP(M) drill point design in WU25PD™.
- Diameter ranges from 8–25,99mm in L/D ratios of 3, 5, and 8 x D.
- Disposable — eliminates number of tools waiting for reconditioning, avoiding hidden costs.
- All intermediate diameters available as semi-standards. Multiple step drills available as customised solutions. New TopSTEP range of inserts offer extended chamfering and counterboring.

To learn more about the benefits of **WIDIA™ TOP DRILL M1**, contact your local distributor.

WIDIA 

WIDIA-Metcut™ Spade Blades •
A complement to TOP DRILL M1™

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

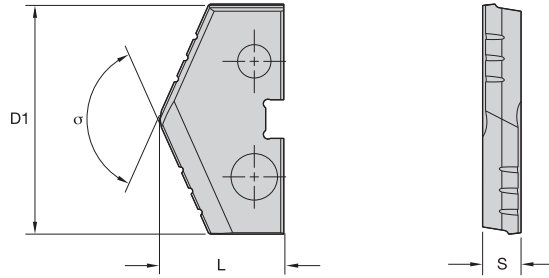
T-15 HSS spade blades are recommended:

- 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.



■ Seat Size Z



TiAlN



TiN

● first choice
○ alternate choice

order #	catalogue #	order #	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.

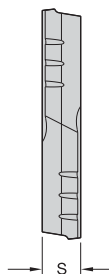
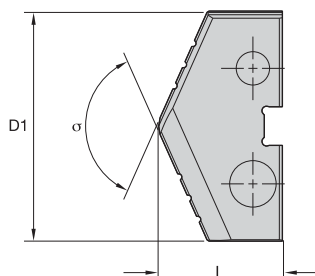




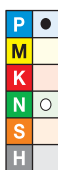
TiAlN



TiN


■ Seat Size 0


TiAlN



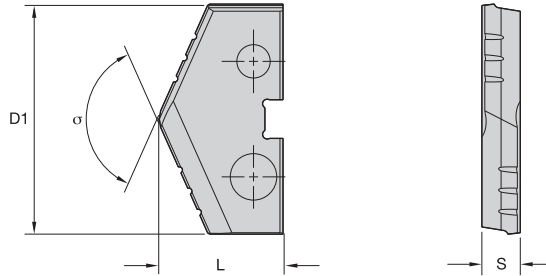
TiN

● first choice

○ alternate choice

TiAlN		TiN		D1	L	S	σ
order #	catalogue #	order #	catalogue #	mm	mm	mm	
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.



■ Seat Size 1



TiAlN

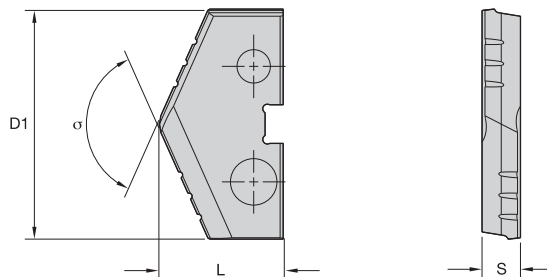
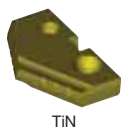


TiN

● first choice
○ alternate choice

TiAlN		TiN		D1	L	S	σ
order #	catalogue #	order #	catalogue #	mm	mm	mm	
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

● first choice
○ alternate choice

order #	catalogue #	order #	catalogue #	D1 mm	L mm	S 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°

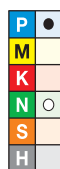
NOTE: Toolholders available upon request as an Engineered Solution.

(continued)

(Seat Size 2 – continued)



TiAlN

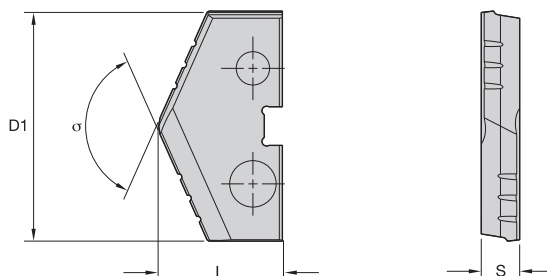
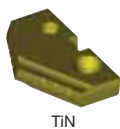


TiN

● first choice
○ alternate choice

TiAlN		TiN		D1	L	S	σ
order #	catalogue #	order #	catalogue #	mm	mm	mm	
—	—	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.



■ Seat Size 3



TiAlN

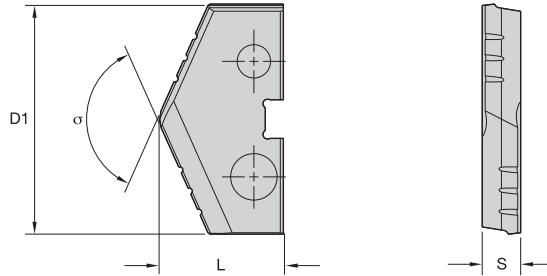


TiN

● first choice
○ alternate choice

order #	catalogue #	order #	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.



■ Seat Size 4



TiAlN



TiN

● first choice
○ alternate choice

order #	catalogue #	order #	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

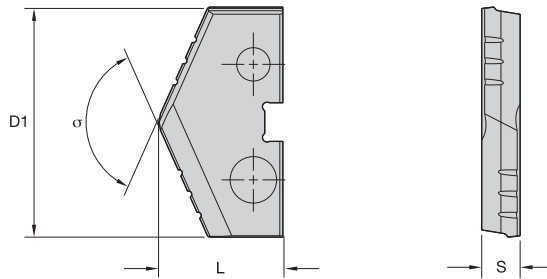


TiN

● first choice
○ alternate choice

TiAlN		TiN		D1	L	S	σ
order #	catalogue #	order #	catalogue #	mm	mm	mm	
—	—	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°

NOTE: Toolholders available upon request as an Engineered Solution.



■ Seat Size 5



TiAlN

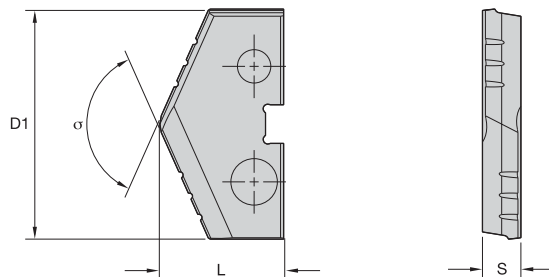
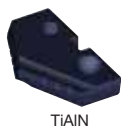


TiN

● first choice
○ alternate choice

order #	catalogue #	order #	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.



■ Seat Size 6



TiAlN



TiN

● first choice
○ alternate choice

order #	catalogue #	order #	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

● first choice
○ alternate choice

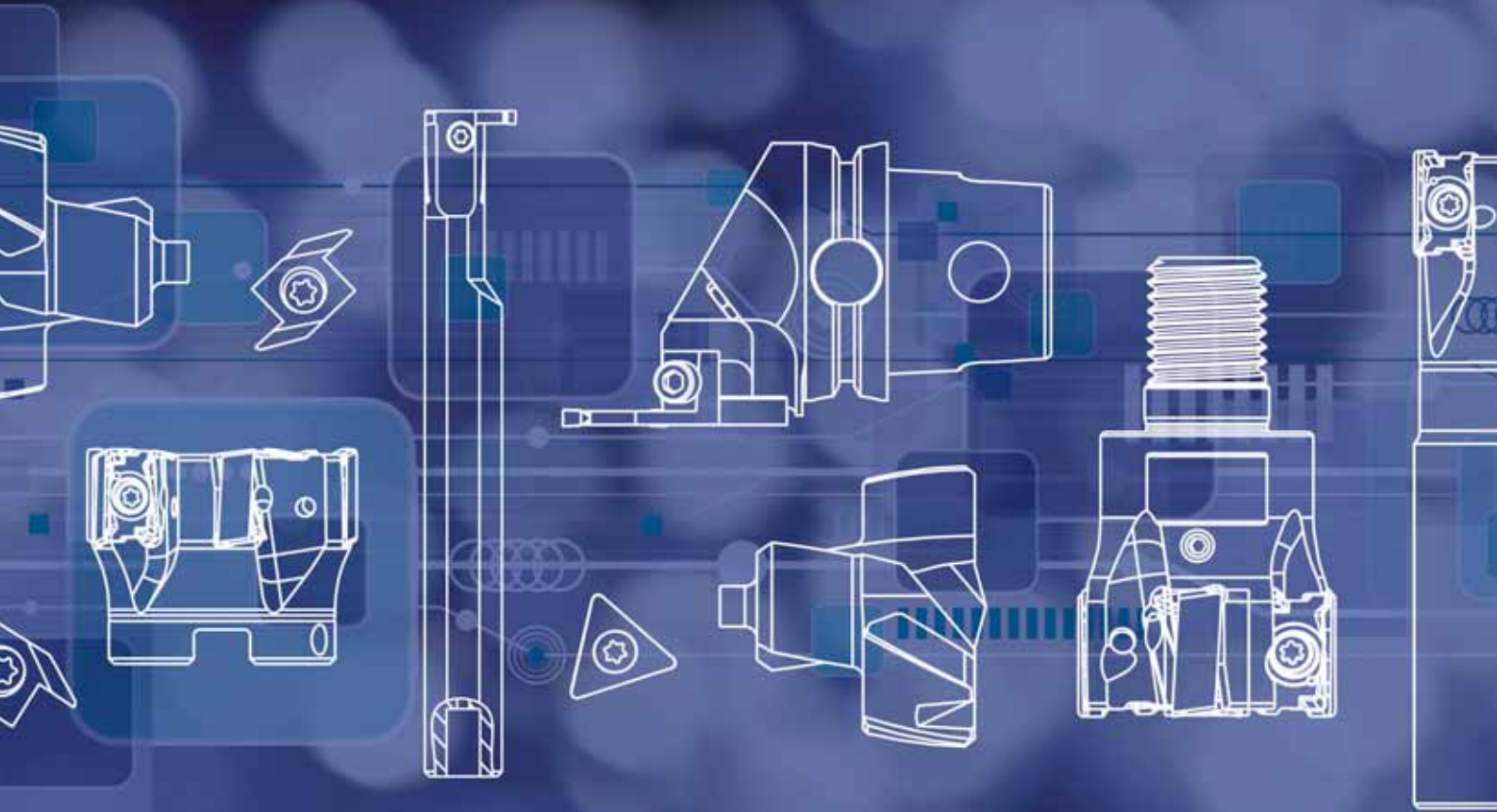
order #	catalogue #	order #	catalogue #	D1 mm	L mm	S mm	σ
—	—	3279755	7F7-3543T	90,00	31,50	11,13	144°
—	—	2759703	7F7-3563T	90,49	31,50	11,13	144°
—	—	2759698	7F7-3688T	93,66	31,50	11,13	144°
—	—	2759688	7F7-3938T	96,00	31,50	11,13	144°
2972689	7F7-3813A	—	—	96,84	31,50	11,13	144°
2759684	7F7-4000A	—	—	101,60	31,50	11,13	144°

NOTE: Toolholders available upon request as an Engineered Solution.

■ HSS Spade Blades • Speed and Feed Chart • Metric

Material Group	Hardness BHN	Grade		Feed (mm/rev)								
		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

Modular Drills



NOVO KNOWS ART TO PART TO PROFIT

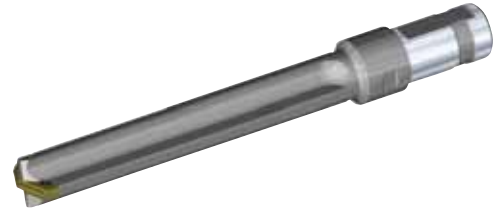
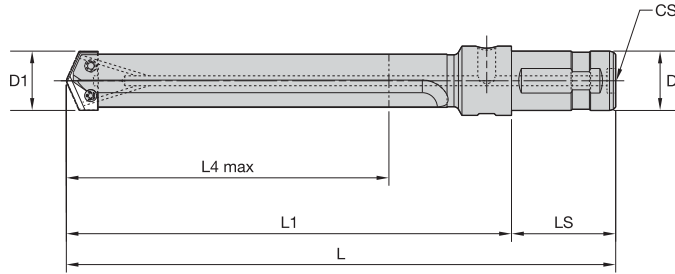
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01

THE DIGITAL SOURCE FOR DELIVERING SMART MACHINING SOLUTIONS

widia.com/novo**NOVO**™ 



■ Straight Flute Holders • Inch • Short

short	D1		D1 max		L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
	mm	in	mm	in									
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		D1 max		L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
	mm	in	mm	in									
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		D1 max		L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
	mm	in	mm	in									
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

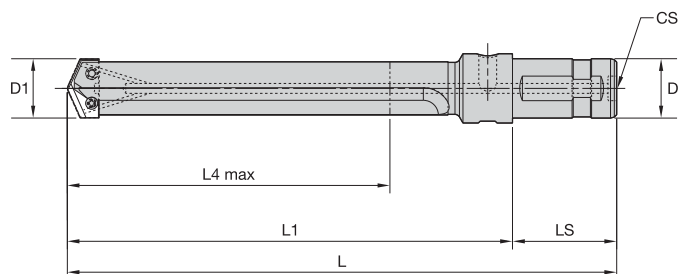


■ Straight Flute Holders • Inch • Extra Long

extra long	D1		D1 max		L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
	mm	in	mm	in									
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



Modular Drills



■ Straight Flute Holders • Metric • Short

short	D1		D1 max		L	L1	L4 max	LS	D	seat size	insert screw	Torx wrench
	mm	in	mm	in								
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		D1 max		L	L1	L4 max	LS	D	seat size	insert screw	Torx wrench
	mm	in	mm	in								
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

Modular Drills

■ Straight Flute Holders • Metric • Long

long	D1		D1 max		L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
	mm	in	mm	in									
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

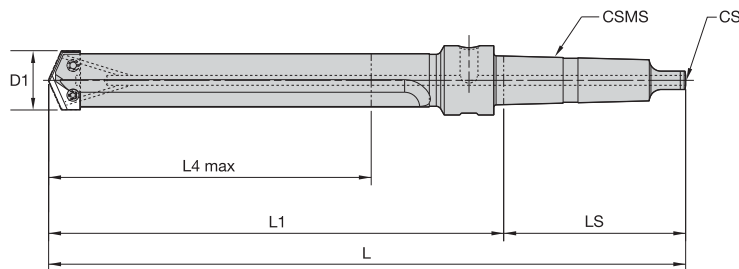


■ Straight Flute Holders • Metric • Extra Long

extra long	D1		D1 max		L	L1	L4 max	LS	D	seat size	insert screw	Torx wrench
	mm	in	mm	in								
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 glands below.



■ Straight Flute Holders • Short

short	D1		D1 max		L	L1	L4 max	LS	CSMS system size	seat size	CS	insert screw	Torx wrench
	mm	in	mm	in									
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

medium	D1		D1 max		L	L1	L4 max	LS	CSMS system size	seat size	CS	insert screw	Torx wrench
	mm	in	mm	in									
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

long	D1		D1 max		L	L1	L4 max	LS	CSMS system size	seat size	CS	insert screw	Torx wrench
	mm	in	mm	in									
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

extra long	D1		D1 max		L	L1	L4 max	LS	CSMS system size	seat size	CS	insert screw	Torx wrench
	mm	in	mm	in									
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.




Modular Drills



Holemaking • Indexable Drills

Introduction..... Q2-Q3
Top Cut 4..... Q4-Q40





























		standard						hole tolerance	standard range			customised solution range		
		● first choice ○ alternate choice							diameter range		drilling depth L/D1	diameter range		drilling depth
		P	M	K	N	S	H		D1 mm	D1 in		D1 mm	D1 inch	
		min-max		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														
														
	●	●●	●	●	●	●	●	●	●*	●	●	●	●	Q8-Q23

WIDIA™ Top Cut 4™ •

New Generation Indexable Drilling System

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, 45° 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

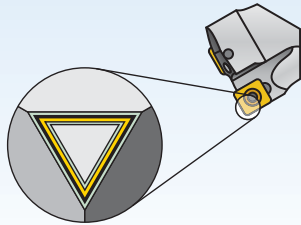
Periphery Insert

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

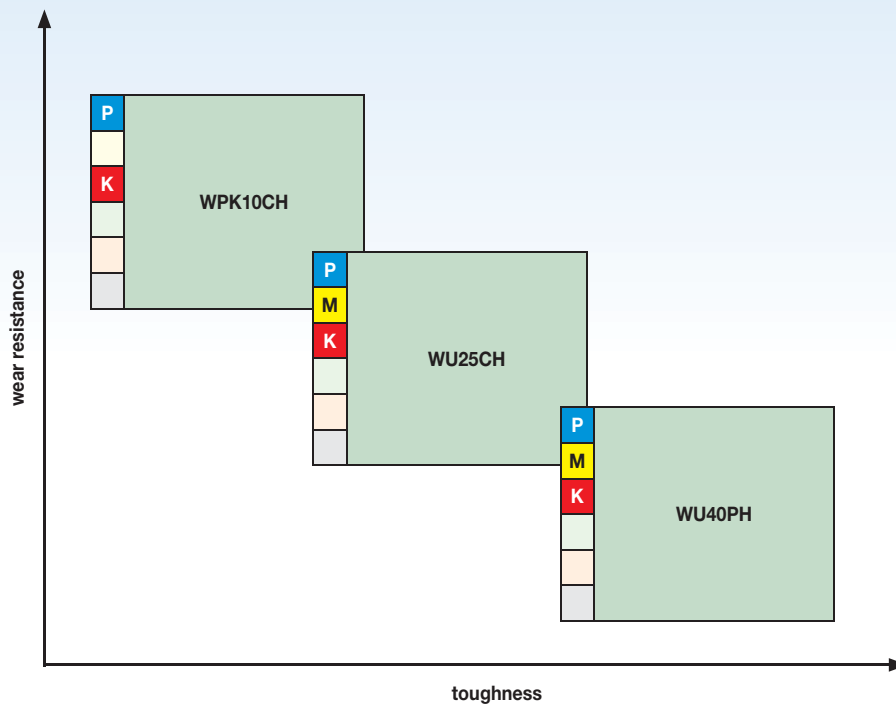


Coatings provide high-speed capability and are engineered for finishing to light roughing.

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

wear resistance ← → toughness

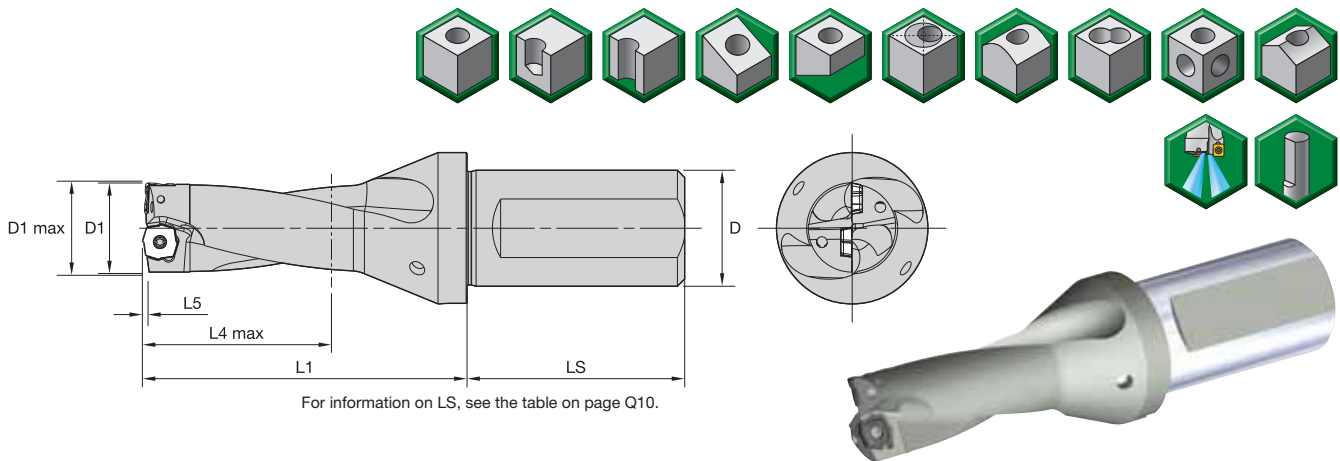
Coating		Grade Description		05	10	15	20	25	30	35	40	45		
Grade	WPK10CH TiCN-Al ₂ O ₃	<p>Composition: With an advanced CVD TiCN-Al₂O₃ coating combined with a cobalt-enriched carbide substrate, this grade offers a balanced combination of deformation-resistance and edge toughness.</p> <p>Application: Offers 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.</p>	P											
			M											
			K											
WU25CH TiCN-Al ₂ O ₃	<p>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.</p> <p>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.</p>	P												
		M												
		K												
WU40PH TiCN-Al ₂ O ₃	<p>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.</p> <p>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.</p>	P												
		M												
		K												



WPK10CH:
High-Speed Grade

WU25CH:
High Metal Removal Rate Grade

WU40PH:
High Toughness Grade



■ **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



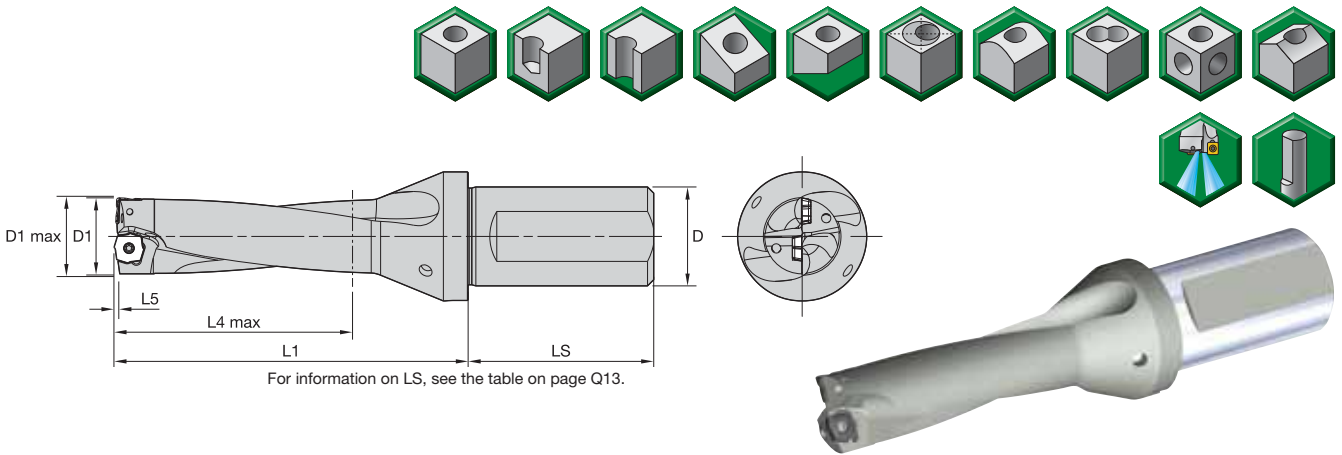
insert size	periphery insert	centre insert	insert screw order number	Torx size	Torx driver order number	tightening torque Nm
A	TCF040204AP	TCF040203AC	2025073	T5	2029221	0,40
B	TCF050204BP	TCF060203BC	1175225	T6	1138455	0,53
C	TCF070306CP	TCF070304CC	1021337	T7	2029266	0,90
D	TCF080308DP	TCF090305DC	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 Q20–Q23 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 Q13.

■ 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)

(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

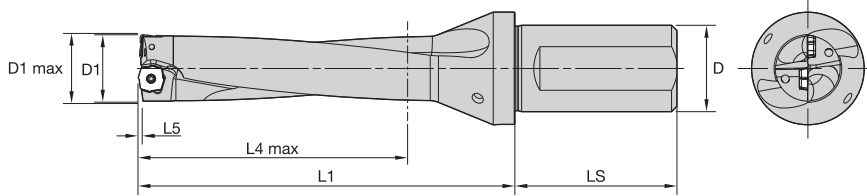
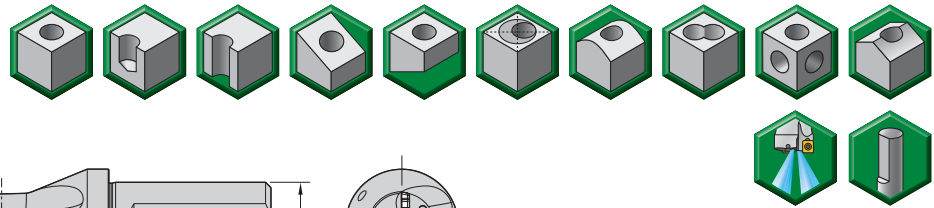
NOTE: Drilling in stacked plates possible in certain applications. Ask for technical support.
 Drill shipped with insert screws and Torx wrench.
 See pages Q20–Q23 for inserts.
 SL = Side Lock
 D1 max is an achievable diameter using x-offset.



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.

Indexable Drills



For information on LS, see the table on page Q16.



■ 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



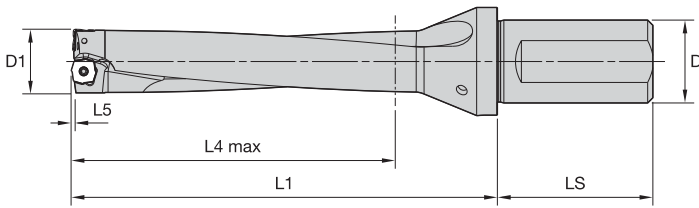
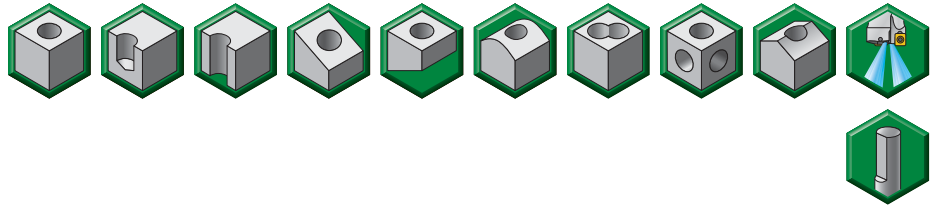
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A	TCF040204AP	TCF040203AC	2025073	T5	2029221	0,40
B	TCF050204BP	TCF060203BC	1175225	T6	1138455	0,53
C	TCF070306CP	TCF070304CC	1021337	T7	2029266	0,90
D	TCF080308DP	TCF090305DC	1134385	T8	2029598	1,10
E	TCF100408EP	TCF120405EC	2018194	T9	1138430	2,00
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

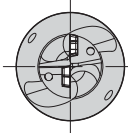
NOTE: Drilling in stacked plates possible in certain applications. Ask for technical support.
Drill shipped with insert screws and Torx wrench.
See pages Q20–Q23 for inserts.
SL = Side Lock
D1 max is an achievable diameter using x-offset.



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 Q19.



■ 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

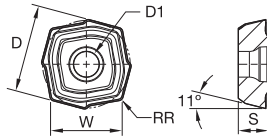
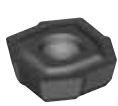
D	LS
20,00	50
25,00	56
32,00	60
40,00	70
50,00	80

NOTE: Drill shipped with insert screws and Torx wrench.
 See pages Q20–Q23 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

P	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
K	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
S	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

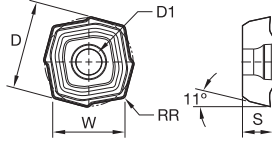
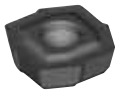
■ Top Cut 4 Drill • Centre Inserts • V34

catalogue number	D	D1	W	S	RR	insert size	WPK10CH	WU25CH	WU40PH
TCF040203ACV34	4,47	2,10	3,65	2,00	0,300	A	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
TCF060203BCV34	6,00	2,40	4,90	2,40	0,300	B	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
TCF070304CCV34	7,59	2,60	6,20	2,80	0,400	C	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
TCF090305DCV34	9,55	2,80	7,80	3,00	0,500	D	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
TCF120405ECV34	12,00	3,40	9,80	3,60	0,500	E	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
TCF150406FCV34	14,94	4,80	12,20	4,20	0,600	F	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
TCF180508GCV34	17,88	6,00	14,60	5,40	0,800	G	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
TCF210608HCV34	21,68	7,50	17,70	6,50	0,800	H	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

NOTE: For application-specific insert selection, please refer to the application data on pages Q24–Q35.

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.

Indexable Drills



● first choice
○ alternate choice

P	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
K	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
S	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

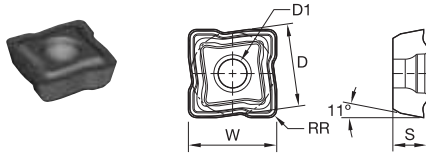
■ Top Cut 4 Drill • Centre Inserts • V36

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 Q24–Q35.

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

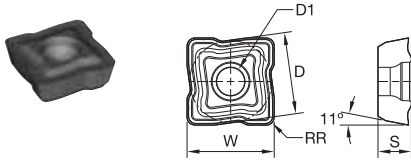
P	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
K	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
S	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

■ Top Cut 4 Drill • Periphery Inserts • V34

catalogue number	D	D1	W	S	RR	insert size			
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 Q24–Q35.

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

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	○	○	○
TCF050204BPV36	5,07	2,40	5,40	2,40	0,400	B	○	○	○
TCF070306CPV36	6,67	2,60	7,10	2,80	0,600	C	○	○	○
TCF080308DPV36	8,08	2,80	8,60	3,00	0,800	D	○	○	○
TCF100408EPV36	9,96	3,40	10,60	3,60	0,800	E	○	○	○
TCF120412FPV36	12,59	4,80	13,40	4,20	1,200	F	○	○	○
TCF150512GPV36	15,13	6,00	16,10	5,40	1,200	G	○	○	○
TCF180614HPV36	18,04	7,50	19,20	6,50	1,400	H	○	○	○

NOTE: For application-specific insert selection, please refer to the application data on pages Q24–Q35.

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

Indexable Drills

■ 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
			C	V36	WU40PH												
		U	P	V36	WU40PH	110	120	140	130	150	220	130	170	250	140	170	250
			C	V36	WU40PH												
		I	P	V36	WU40PH	90	100	120	130	150	210	130	170	240	140	170	240
			C	V36	WU40PH												
	2	S	P	V34	WPK10CH	120	140	160	140	170	260	150	190	280	160	190	280
			C	V34	WU40PH												
		U	P	V34	WU25CH	110	120	140	130	170	240	140	180	260	150	180	260
			C	V34	WU40PH												
		I	P	V34	WU40PH	90	100	120	130	170	230	130	170	240	140	170	240
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	120	140	180	140	170	270	150	200	290	160	200	310
			C	V34	WU40PH												
		U	P	V34	WU25CH	110	120	160	130	160	260	140	200	280	150	200	280
			C	V34	WU40PH												
		I	P	V34	WU40PH	100	110	140	120	150	250	130	180	260	140	180	260
			C	V34	WU40PH												
	4	S	P	V34	WPK10CH	120	140	180	140	170	270	150	200	290	160	200	310
			C	V34	WU40PH												
		U	P	V34	WU25CH	110	120	160	130	160	260	140	200	280	150	200	280
			C	V34	WU40PH												
		I	P	V34	WU40PH	100	110	140	120	150	250	130	180	260	140	180	260
			C	V34	WU40PH												
5	S	P	V36	WU25CH	120	140	160	140	170	240	150	180	250	160	180	250	
		C	V36	WU40PH													
	U	P	V36	WU40PH	110	120	140	130	160	230	140	170	240	150	170	240	
		C	V36	WU40PH													
	I	P	V36	WU40PH	90	100	120	130	160	230	130	160	220	140	160	220	
		C	V36	WU40PH													
6	S	P	V36	WU25CH	120	140	160	140	170	200	140	170	210	150	170	210	
		C	V36	WU40PH													
	U	P	V36	WU40PH	110	120	140	120	150	190	130	160	200	140	160	200	
		C	V36	WU40PH													
	I	P	V36	WU40PH	90	100	120	110	130	180	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

■ 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	0,13	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												
		I	P	V36	WU40PH	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												
	2	S	P	V34	WPK10CH	0,13	0,15	0,20	0,15	0,18	0,21	0,16	0,24	0,28	0,17	0,25	0,30
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,13	0,15	0,20	0,15	0,18	0,21	0,16	0,24	0,28	0,17	0,25	0,30
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,13	0,15	0,20	0,15	0,18	0,21	0,16	0,24	0,28	0,17	0,25	0,30
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	0,14	0,16	0,22	0,16	0,20	0,24	0,18	0,25	0,30	0,19	0,26	0,32
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,14	0,16	0,20	0,16	0,20	0,23	0,18	0,25	0,28	0,19	0,26	0,30
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,14	0,16	0,20	0,16	0,20	0,22	0,18	0,25	0,28	0,19	0,26	0,30
			C	V34	WU40PH												
	4	S	P	V34	WPK10CH	0,14	0,16	0,22	0,16	0,20	0,24	0,18	0,25	0,30	0,19	0,26	0,32
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,14	0,16	0,20	0,16	0,20	0,22	0,18	0,25	0,28	0,19	0,26	0,30
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,14	0,16	0,20	0,16	0,20	0,22	0,18	0,25	0,28	0,19	0,26	0,30
			C	V34	WU40PH												
5	S	P	V36	WU25CH	0,13	0,15	0,18	0,15	0,18	0,20	0,16	0,24	0,28	0,17	0,25	0,30	
		C	V36	WU40PH													
	U	P	V36	WU40PH	0,13	0,15	0,18	0,15	0,18	0,20	0,16	0,24	0,28	0,17	0,25	0,30	
		C	V36	WU40PH													
	I	P	V36	WU40PH	0,13	0,15	0,18	0,15	0,18	0,20	0,16	0,24	0,28	0,17	0,25	0,30	
		C	V36	WU40PH													
6	S	P	V36	WU25CH	0,13	0,15	0,18	0,15	0,17	0,20	0,16	0,23	0,28	0,17	0,24	0,29	
		C	V36	WU40PH													
	U	P	V36	WU40PH	0,13	0,15	0,18	0,15	0,17	0,20	0,16	0,23	0,28	0,17	0,24	0,29	
		C	V36	WU40PH													
	I	P	V36	WU40PH	0,13	0,15	0,18	0,15	0,17	0,20	0,16	0,23	0,28	0,17	0,24	0,29	
		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

■ 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

■ 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.
 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 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.
 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 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.
 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

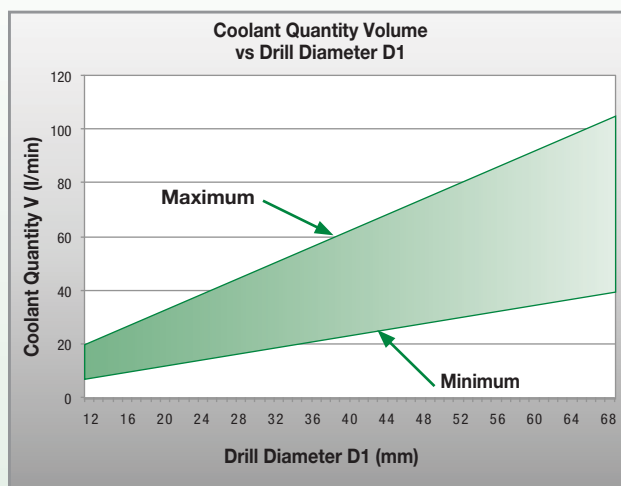
■ **Top Cut 4 • Drill Depth • 2 x D/3 x D • Hole Tolerance Table**

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

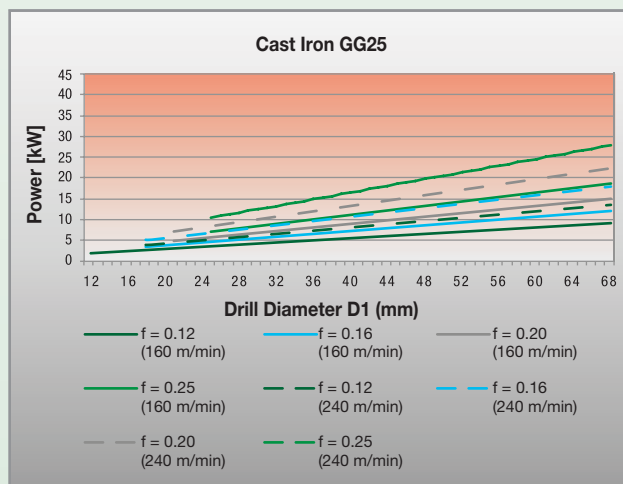
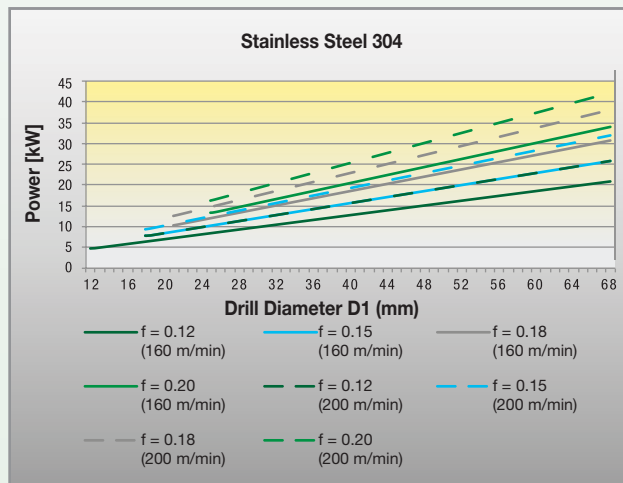
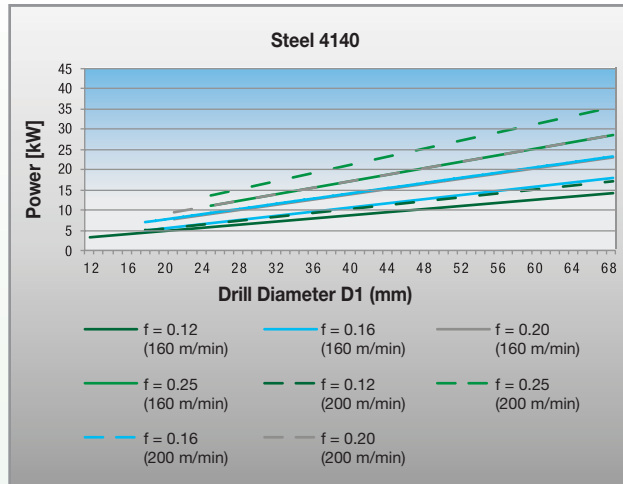
■ **Top Cut 4 • Drill Depth • 4 x D/5 x D • Hole Tolerance Table**

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

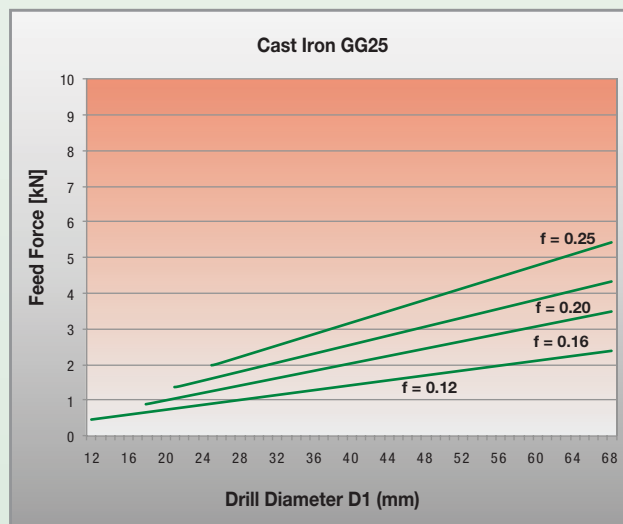
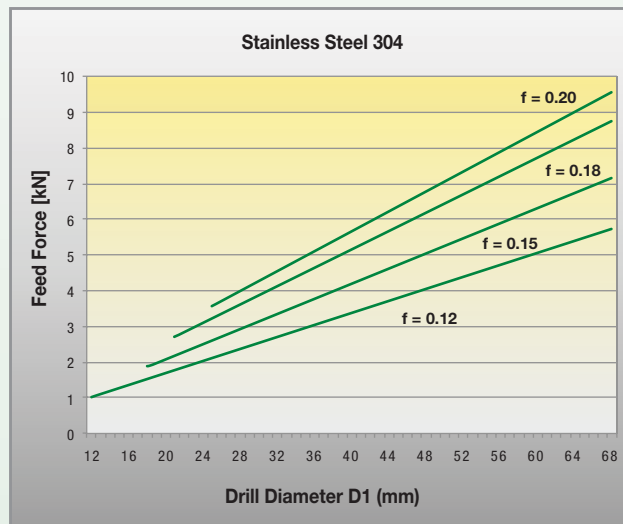
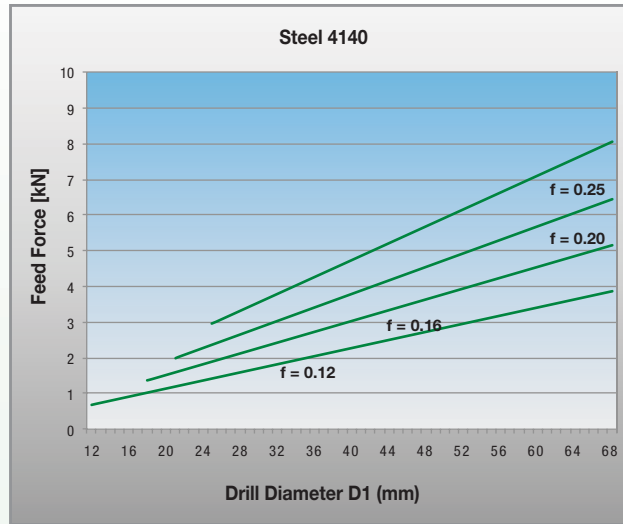
■ **Coolant Requirement/Recommendation**



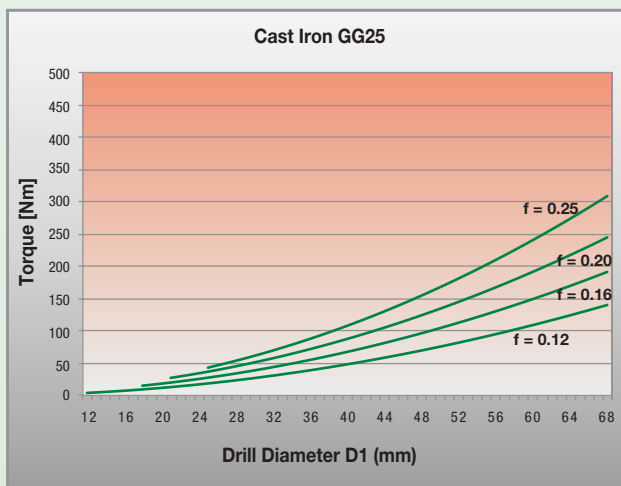
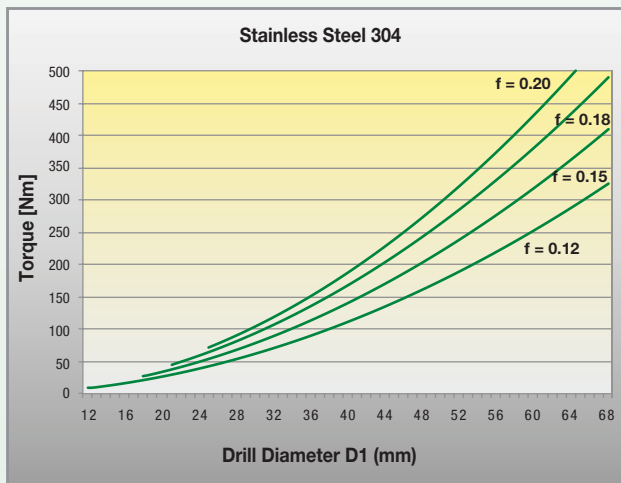
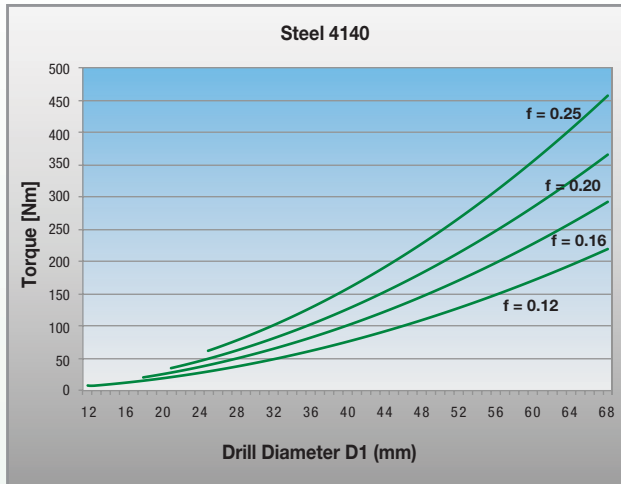
■ Power Requirement



■ 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	–	–

Unmatched Versatility Meets Powerful Performance



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

Top Cut 4™

Specifically designed for versatility — Top Cut 4 offers outstanding flexibility, increased productivity, and is the one tool to apply to a variety of drilling applications and different workpiece materials.

- High tool life at accelerated speeds.
- Efficient chip evacuation.
- Increased coolant supply.
- Up to 5 x D.

To learn more about the benefits of **WIDIA™ Top Cut 4**, contact your local distributor.

WIDIA 

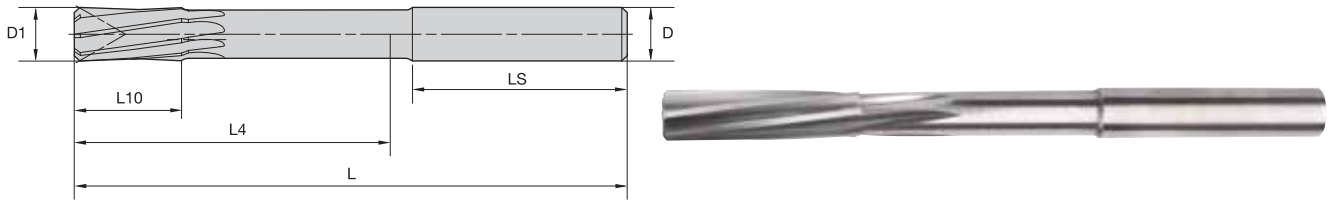


Holemaking • Hole Finishing

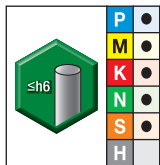
HSR Reaming Tools R2-R23

WIDIA TRM R24-R25





■ HSR Reamers with Helical Flutes for Through Holes • K10™ • 1,4–10mm



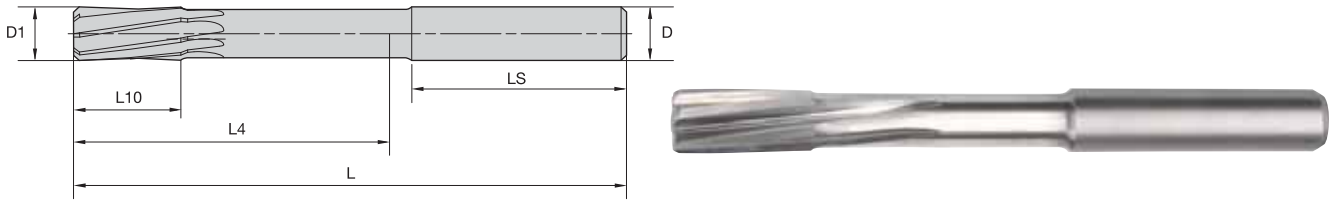
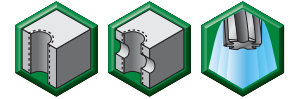
● first choice
○ alternate choice

grade K10
uncoated

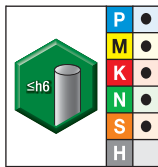
order #	catalogue #	D1	D	L	L4	L10	LS	Z
2293636	050221-000014	1,40	1,40	40	18	8	22	3
2293637	050221-000015	1,50	1,50	40	18	8	22	3
2293638	050221-000016	1,60	1,60	43	20	9	23	3
2283423	050221-000020	2,00	2,00	49	24	11	25	4
2283424	050221-000022	2,20	2,20	53	26	12	27	4
2283426	050221-000025	2,50	2,50	57	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

Hole Finishing

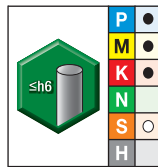
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 hole tolerance capability starting at diameter 10mm is available as a Custom Solution. Additional diameters and lengths made to order.



■ HSR Reamers with Helical Flutes for Through Holes • K10F™/K10F-DCFD™ • 2–144mm



grade K10F
uncoated

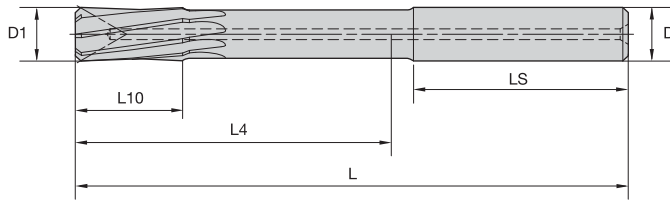
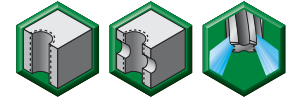


grade K10F-DCFD
TiAlN

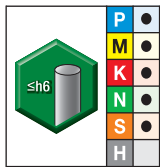
- first choice
- alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN		D1	D	L	L4	L10	LS	Z
order #	catalogue #	order #	catalogue #							
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

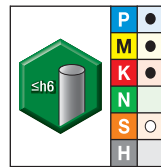
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.



■ HSR Reamers with Helical Flutes for Through Holes • K10F™/K10F-DCFD™ • 5–14mm



grade K10F
uncoated

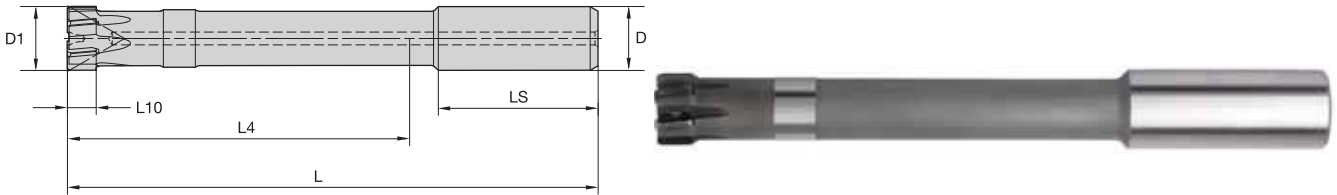
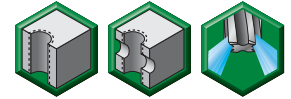


grade K10F-DCFD
TiAlN

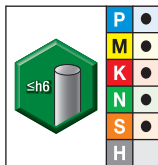
- first choice
- alternate choice

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

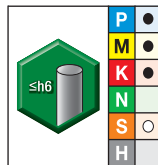
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.



■ HSR Reamers with Helical Flutes for Through Holes • K10F™/K10F-DCFD™ • 14–32mm



grade K10F
uncoated



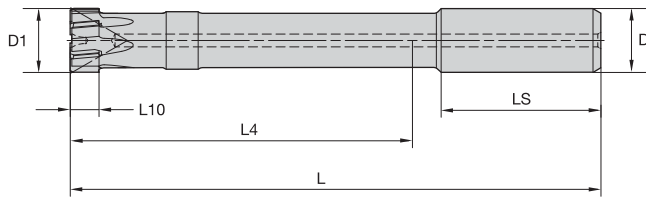
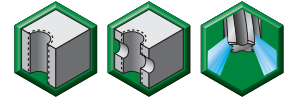
grade K10F-DCFD
TiAlN

- first choice
- alternate choice

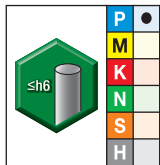
grade K10F uncoated		grade K10F-DCFD TiAlN		D1	D	L	L4	L10	LS	Z
order #	catalogue #	order #	catalogue #							
3084978	050281-001400	3084312	450281-001400	14,00	16,00	145	90	9	48	6
3084983	050281-001600	3084317	450281-001600	16,00	20,00	157	100	9	50	6
3084992	050281-001800	3084321	450281-001800	18,00	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.



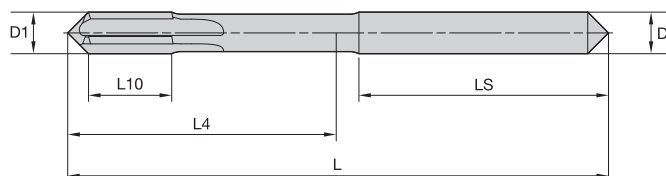
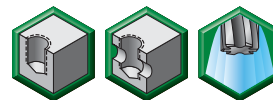
■ HSR Reamers with Helical Flutes for Through Holes • CERMET-DCFD™ • 14–20mm



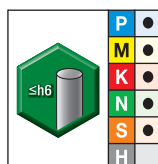
- first choice
- alternate choice

grade CERMET-DCFD TiAlN		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

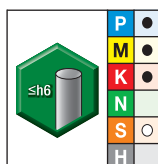
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.



■ HSR Reamers with Straight Flutes for Blind Holes • K10F™/K10F-DCFD™ • 2–4mm



grade K10F
uncoated

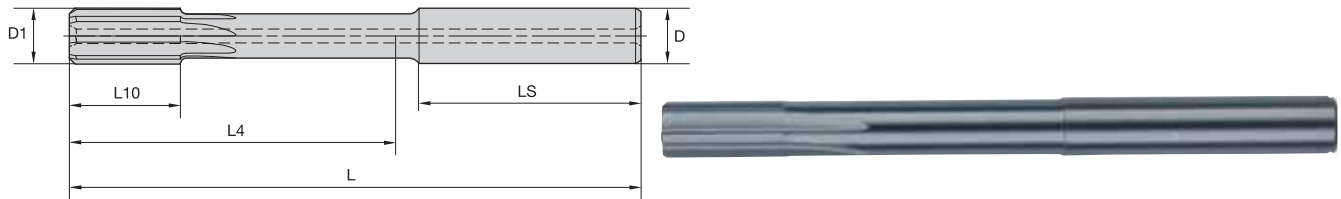
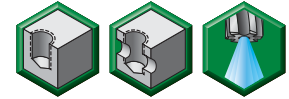


grade K10F-DCFD
TiAlN

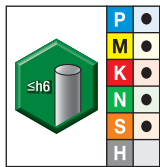
- first choice
- alternate choice

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

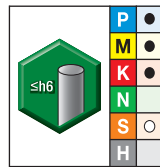
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.



■ HSR Reamers with Straight Flutes for Blind Holes • K10F™/K10F-DCFD™ • 5-14mm



grade K10F
uncoated

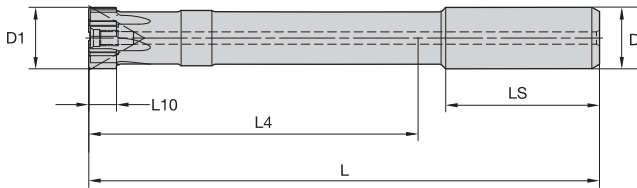
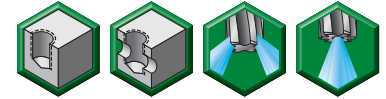


grade K10F-DCFD
TiAlN

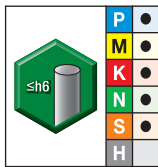
- first choice
- alternate choice

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

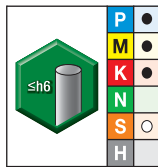
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.



■ HSR Reamers with Straight Flutes for Blind Holes • K10F™/K10F-DCFD™ • 14–32mm



grade K10F
uncoated



grade K10F-DCFD
TiAlN

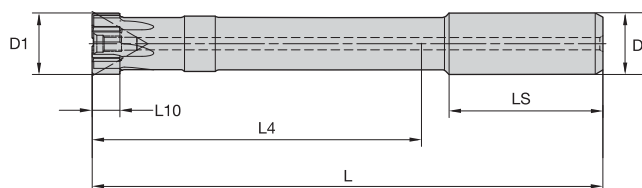
- first choice
- alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN		D1	D	L	L4	L10	LS	Z
order #	catalogue #	order #	catalogue #							
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

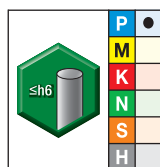


Hole Finishing

- 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 Straight Flutes for Blind Holes • CERMET-DCFD™ • 14–20mm



- first choice
- alternate choice

grade CERMET-DCFD TiAlN		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			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	
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			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	



■ 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

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	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

■ Series 456681 • Cermet-Tipped • Helical Flute • Grade CERMET-DCFD™ • 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
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



■ 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
M		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
K		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
N		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
S		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
		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
M		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
P		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
M		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
K		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
N		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
S		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
M		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
K		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
N		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
S		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
		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
P		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
M		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			Recommended Feed Rate per Rev			
		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

HSR™ Application Data • Series 456680

■ Series 456680 • Cermet-Tipped • Straight Flute • Grade CERMET-DCFD™ • 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
							 
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.

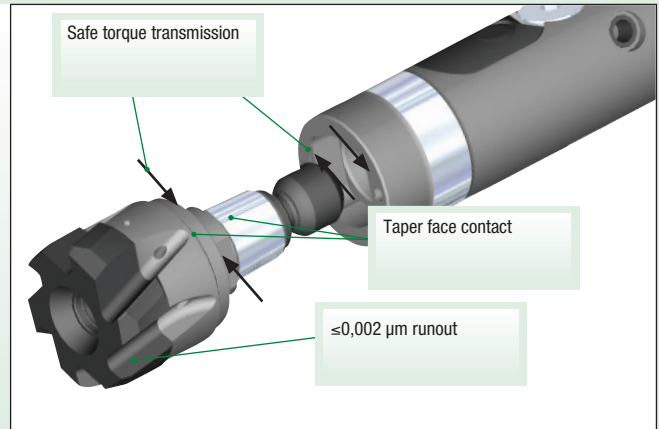
Ordering Process

- Please contact your local Authorised Distributor for a quote.

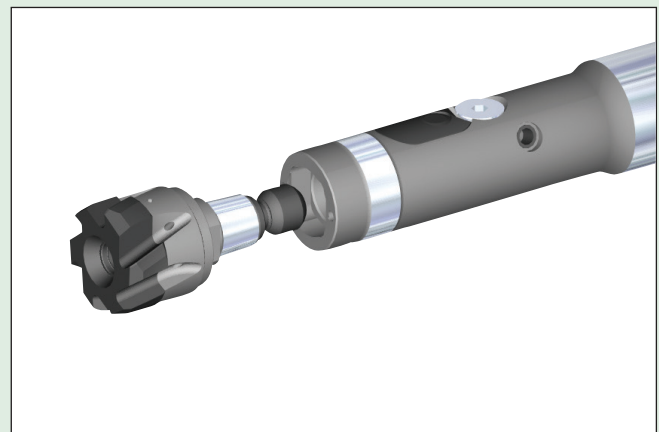
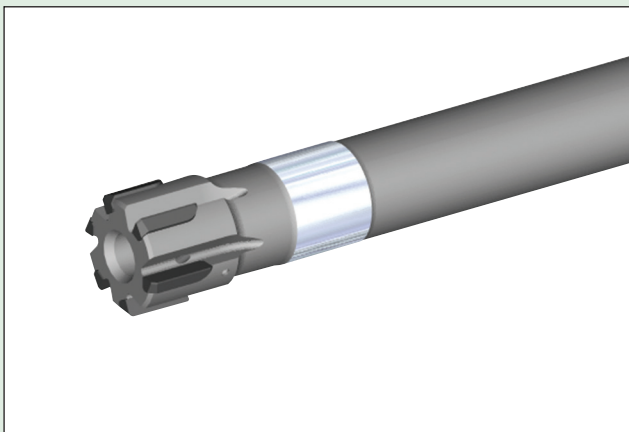


WST™ — WIDIA™ Short Taper

- 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.).














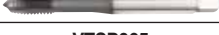






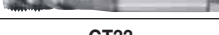




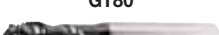

WIDIA Top Ream

- 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.



























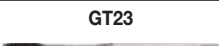


Tapping

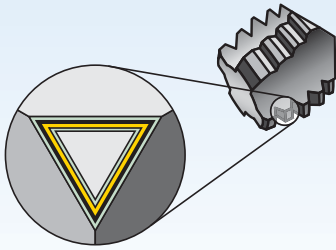
Taps Introduction	S2-S9
Spiral-Point/Left-Hand Spiral-Flute Taps.....	T2-T17
Spiral-Flute Taps	T18-T42
Straight-Flute Taps.....	T44-T56
Forming Taps.....	T58-T63
Thread Mills.....	T64-T78
High-Performance Taps Application Data	T79-T81

★ Good ★★ Better ★★★ Best	hole		thread		coolant		size range min-max	grade/ coating	material				chamfer		helix angle	dimension
	through	blind	cutting	forming	flood	through			carbide	HSS-E-PM	HSS-E	HSS	type	form		
																
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		page(s)	recommended cutting parameters
	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		
Spiral-Point and Left-Hand Spiral-Flute Taps (continued)																		
	★★★		★★★		★★★		★★	★	★		★★						T4	T80
	★★★		★★★		★★★		★★	★	★		★★						T5	T80
	★★★		★★★		★★★		★★	★	★		★★						T6	T80
												★★★	★★★				T7	T80
														★★★			T8	T80
							★★★	★	★								T9	T80
		★★★		★★★	★	★	★						★				T10	T80
	★★	★	★		★★	★	★★	★	★★	★★	★						T11	T81
	★★	★	★		★★	★	★★	★	★★	★★	★						T14	T81
	★★	★	★		★★	★	★★	★	★★	★★	★						T17	T81
Spiral-Flute Taps (continued)																		
	★★★		★★★		★★★		★★	★	★			★★					T21	T80
	★★★		★★★		★★★		★★	★	★			★★					T20	T80
	★★★		★★★		★★★		★★	★	★			★★					T22	T80
	★★★		★★★		★★★		★★	★	★			★★					T23	T80
	★★★		★★★		★★★		★★	★	★			★★					T24	T80
	★★★		★★★		★★★		★★	★	★			★★					T25	T80
	★★★		★★★				★★										T26	T80
	★★★		★★★				★★										T28	T80
												★★★	★★★				T30	T80
													★★★				T31	T80
							★★★										T32	T80

★ Good ★★ Better ★★★ Best	hole		thread		coolant		size range min-max	grade/ coating	material				chamfer		helix angle	dimension
	through	blind	cutting	forming	flood	through			carbide	HSS-E-PM	HSS-E	HSS	type	form		
																
Spiral-Flute Taps (continued)																
		X	X		X		M3-M20	WP31MG	X				semi-bottom	C	25°	DIN 371, 374, 376
		X	X		X		M3-M20	WH36MG	X				semi-bottom	C	42°	DIN 371, 374, 376
		X	X		X		#4-1"	WP49EG, WU41EG		X			semi-bottom	C	45°	DIN 371, 376
		X	X		X		M2-M36	WP42EG, WU41EG, WP49EG, WU40EG		X			semi-bottom	C	45°	DIN 371, 374, 376
		X	X		X		M3-M20	WP49EG, WP42EG		X			bottoming	E	45°	DIN 371, 374, 376
		X	X		X		M3-M20	WU41EG, WU40EG		X			semi-bottom	C	45°	JIS
Straight-Flute Taps																
	X	X	X		X		M3-M16	WH16PG	X				semi-bottom	C	0°	DIN 371, 374, 376
		X	X			X	M6-M16	WK12PG	X				bottom	E	0°	HA6535
		X	X			X	M6-M14	WK12PG	X				bottom	E	0°	DIN 371, 374, 376
		X	X			X	M6-M10	WN14PG	X				bottoming	E	0°	DIN 371
		X	X			X	M6-M16	WN14PG	X				bottom	E	0°	HA6535
		X	X			X	M4-M14	WK12PG	X				semi-bottom	C	0°	DIN 371, DIN 376
	X	X	X		X		M4-M22	GP6520	X				semi-bottom	C	0°	DIN 371, 374, 376
	X	X	X			X	M4-M20	GP6520	X				semi-bottom	C	0°	DIN 371, 374, 376
		X	X		X		M5-M20	GP6520	X				bottoming	E	0°	DIN 371, 374, 376
		X	X			X	M5-M20	GP6520	X				bottoming	E	0°	DIN 371, 374, 376
	X	X	X		X		M6-M16	WS32MG	X				semi-bottom	C	0°	DIN 371, 374, 376
Form Taps																
		X		X		X	M6-M10	WN14PG	X				bottoming	E	—	DIN 374
		X		X		X	M6-M12	WN14PG	X				bottoming	E	—	HA6535
	X	X		X	X		M3-M16	WP31MG, WN38MG	X				semi-bottom	C	—	DIN 2174
	X	X		X		X	M5-M16	WP31MG, WN38MG	X				semi-bottom	C	—	DIN 2174

		P				M	K		N			S				H		page(s)	recommended cutting parameters
		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		
Spiral-Flute Taps (continued)																			
		★★★		★★★	★	★	★						★					T33	T80
		★★★		★★★														T34	T80
	★★	★	★		★★	★	★★	★	★★	★★	★							T35	T81
	★★	★	★		★★	★	★★	★	★★	★★	★							T38	T81
	★★	★	★		★★	★	★★	★	★★	★★	★							T41	T81
	★★	★	★		★★	★	★★	★	★★	★★	★							T42	T81
Straight-Flute Taps (continued)																			
																★★★		T46	T79
						★★★	★★★											T47	T79
						★★★	★★★											T48	T79
									★★★									T49	T79
									★★★									T50	T79
						★★★	★★★											T51	T79
						★★★	★★★		★★★	★★								T52	T80
						★★★	★★★		★★★	★★								T53	T80
						★★★	★★★		★★★	★★								T54	T80
						★★★	★★★		★★★	★★								T55	T80
																★★★		T56	T80
Form Taps (continued)																			
								★★★	★★									T60	T79
								★★★	★★									T61	T79
	★★★							★★★	★★									T62	T80
	★★★							★★★	★★									T63	T80

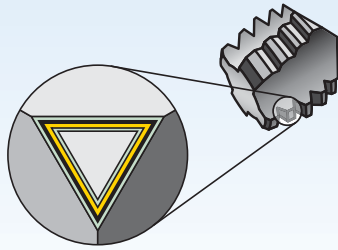


Coatings are designed for optimised tapping performance in specific materials.

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

wear resistance ← → toughness

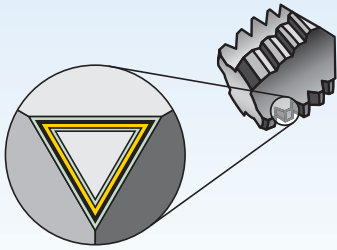
Grade	Coating	Grade Description	Material Hardness (HRC)																				
			05	10	15	20	25	30	35	40	45												
WK12PG		PVD coated TiCN and fine grain carbide. Extraordinary wear resistance when tapping cast iron. High-temperature hardness allows long life at up to 4x faster speed than HSS-E-PM 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.

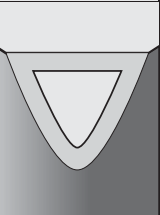
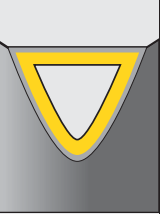
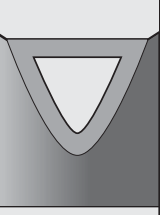
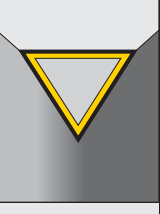
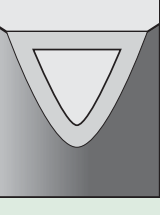
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

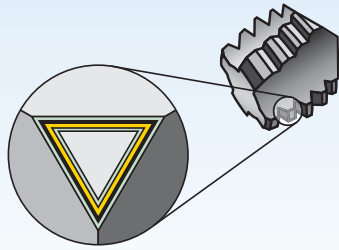
		wear resistance ← → toughness											
		05	10	15	20	25	30	35	40	45			
Grade	Coating	Grade Description											
Grade	WS34MG	Coated HSS-E-PM, PVD heat- and wear-resistant high-vanadium, high-cobalt powder metal HSS-E-PM substrate. Coating consists of low-friction CrC/C over wear-resistant TiN base 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										
Coating	Grade Description	05	10	15	20	25	30	35	40	45		
Grade	 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.											
	 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.											
	 WN38MG Coated HSS-E-PM, PVD powder metal HSS-E substrate with DLC coating. Use for form tapping aluminium. Not recommended for steel.											
	 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.											
	 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.											



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									
			N									
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 Taps	T2-T17
High-Performance Victory HSS-E-PM Taps	T4-T10
Multipurpose VariTap	T11-T17
Spiral-Flute Taps	T18-T42
High-Performance Victory HSS-E-PM Taps	T20-T34
Multipurpose VariTap	T35-T42
Straight-Flute Taps.....	T44-T56
High-Performance Victory Solid Carbide Taps	T46-T51
High-Performance Victory HSS-E-PM Taps	T52-T56
Forming Taps.....	T58-T63
High-Performance Victory Solid Carbide Taps	T60-T61
High-Performance Victory HSS-E-PM Taps	T62-T63
Thread Mills.....	T64-T78
High-Performance Taps Application Data	T79-T81

Solutions for Through Hole Applications •

WIDIA-GTD™

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.

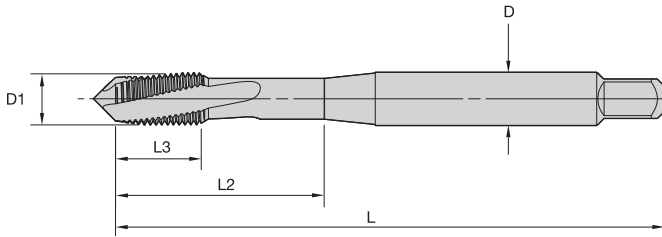


WIDIA
VICTORY

High-Performance Taps

Victory™ Left-Hand Spiral-Flute HSS-E-PM Taps • Through Holes

- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.

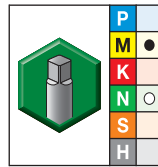
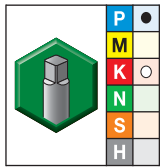


Shank Tolerance

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



■ GT20 • Form D Plug Chamfer • Metric DIN 371, 374, and 376 • For Steel and Stainless Steel

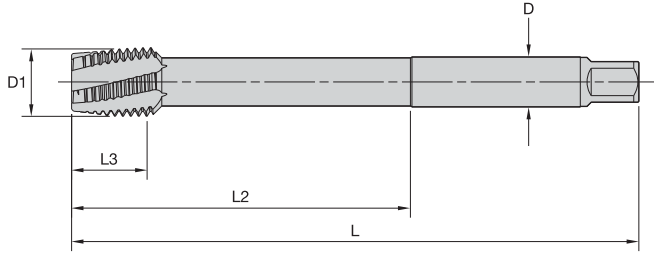


- first choice
- alternate choice

grade GP6520 TiCN		grade GM6515 TiN+CrC/C		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
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

High-Performance Taps

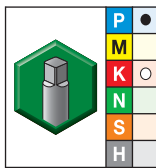
- GP6520 TiCN for steel and cast iron.



Shank Tolerance	
D mm	tolerance h6
12-18	+0, -0,011
20-30	+0, -0,013
32-36	+0, -0,016



- GT20 • Form D Plug Chamfer • Larger Sizes • Metric Extra Long • For Steel and Cast Iron



- first choice
- alternate choice

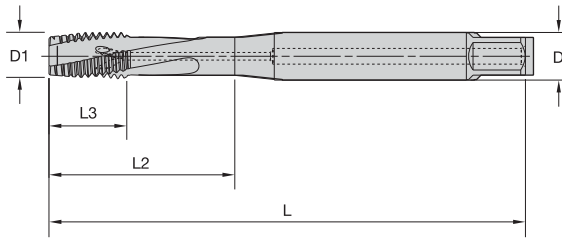
grade GP6520 TiCN		metric dimensions					number of flutes	class of fit
order #	catalogue #	D1 size	L	L3	L2	D		
4033765	GT205122	M24 X 3	200	30	120	18,0	5	6HX
4033767	GT205124	M30 X 3,5	250	35	150	22,0	5	6HX
4033768	GT205125	M33 X 3,5	250	35	150	25,0	5	6HX
4033770	GT205127	M36 X 4	250	40	150	28,0	6	6HX
4033772	GT205129	M42 X 4,5	300	45	180	32,0	6	6HX

High-Performance Taps

Victory™ Left-Hand Spiral-Flute HSS-E-PM Taps • Through Holes



- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.

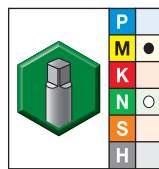
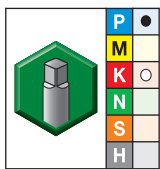


Shank Tolerance

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



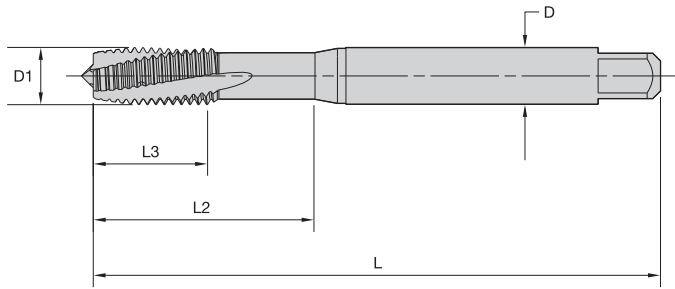
■ GT21 • Form D Plug Chamfer • Through Coolant • Metric DIN 371 and 376 • For Steel and Stainless Steel



- first choice
- alternate choice

grade GP6520 TiCN		grade GM6515 TiN+CrC/C		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
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.

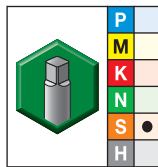


Shank Tolerance

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



■ GT10 • Form D Plug Chamfer • Metric DIN 371 and 376 • For Nickel and Nickel Alloys



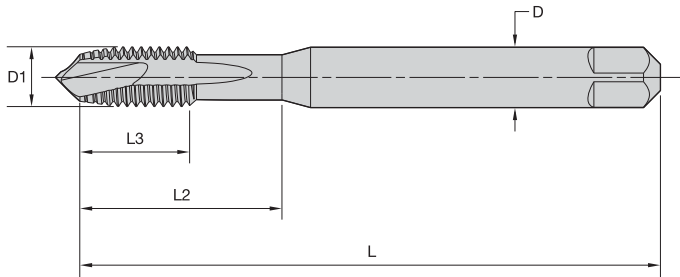
- first choice
- alternate choice

grade WS32MG TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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

High-Performance Taps

Victory™ Spiral-Point Plug HSS-E-PM Taps • Through Holes

- WN35MG TIN/DLC for titanium and titanium alloys.

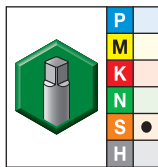


Shank Tolerance

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



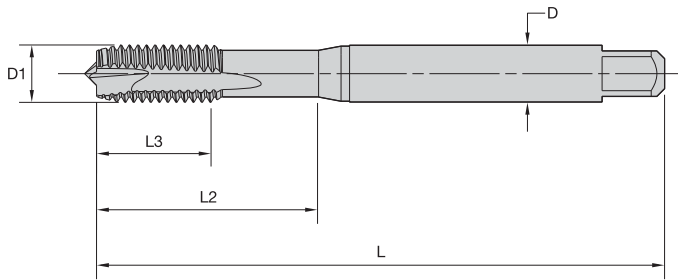
■ GT14 • Form B Plug Chamfer • Metric DIN 371 and 376 • For Titanium and Titanium Alloys



- first choice
- alternate choice

grade WN35MG TIN/DLC		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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.

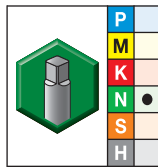


Shank Tolerance

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



■ GT70 • Form B Plug Chamfer • Metric DIN 371 and 376 • For Aluminium



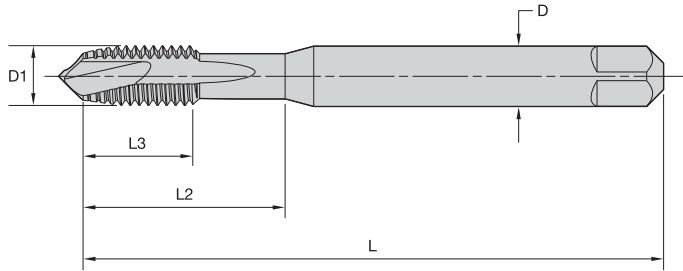
- first choice
- alternate choice

grade WN48EG DLC		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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

High-Performance Taps

Victory™ Spiral-Point Plug HSS-E-PM Taps • Through Holes

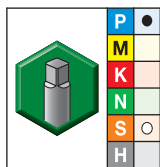
- WP31MG TiN for steel
32–44 HRC.



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



■ GT00 • Form B Plug Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel

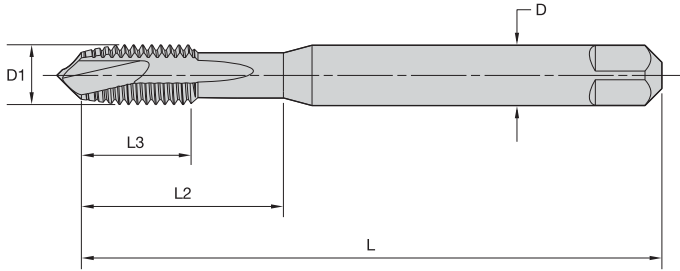


- first choice
- alternate choice

grade WP31MG TiN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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

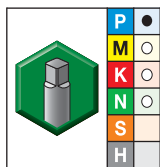
High-Performance Taps

- WU41EG TiN
- WP49EG oxide

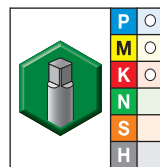


Shank Tolerance	
D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

■ VT-SPO • Form B Plug Chamfer • Machine Screw and Fractional • DIN 371 and 376



grade WU41EG
TiN



grade WP49EG
Oxide

- first choice
- alternate choice

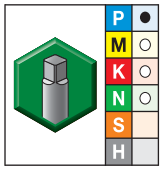
order #	catalogue #	order #	catalogue #	metric dimensions					number of flutes	dimension standard	class of fit
				D1 size	L	L3	L2	D			
5472633	VTSP06005	5387704	VTSP06005	4 - 40	56	8	18	3,5	2	DIN 371	2B
5472635	VTSP06007	5387707	VTSP06007	5 - 40	56	9	20	4,0	2	DIN 371	2B
5472636	VTSP06008	5387708	VTSP06008	6 - 32	56	9	20	4,0	2	DIN 371	2B
5472638	VTSP06010	5387760	VTSP06010	6 - 40	56	9	20	4,0	2	DIN 371	2B
5472639	VTSP06011	5387761	VTSP06011	8 - 32	63	11	21	4,5	2	DIN 371	2B
5472641	VTSP06013	5387763	VTSP06013	10 - 24	70	12	25	6,0	2	DIN 371	2B
5472644	VTSP06014	5387764	VTSP06014	10 - 32	70	12	25	6,0	2	DIN 371	2B
5472646	VTSP06016	5387766	VTSP06016	1/4 - 20	80	15	30	7,0	3	DIN 371	2B
5472647	VTSP06017	5387767	VTSP06017	1/4 - 28	80	15	30	7,0	3	DIN 371	2B
5472649	VTSP06019	5387769	VTSP06019	5/16 - 18	90	15	35	8,0	3	DIN 371	2B
5472650	VTSP06020	5387770	VTSP06020	5/16 - 24	90	15	35	8,0	3	DIN 371	2B
5472652	VTSP06022	5387772	VTSP06022	3/8 - 16	100	19	39	10,0	3	DIN 371	2B
5472653	VTSP06023	5387773	VTSP06023	3/8 - 24	100	19	39	10,0	3	DIN 371	2B
5472655	VTSP06025	5387776	VTSP06025	7/16 - 14	100	18	41	8,0	3	DIN 376	2B
5472656	VTSP06026	5387777	VTSP06026	7/16 - 20	100	18	41	8,0	3	DIN 376	2B
5472658	VTSP06028	5387779	VTSP06028	1/2 - 13	110	23	47	9,0	3	DIN 376	2B
5472659	VTSP06029	5387780	VTSP06029	1/2 - 20	110	23	47	9,0	3	DIN 376	2B
5472661	VTSP06031	5387782	VTSP06031	9/16 - 12	110	25	53	11,0	3	DIN 376	2B
5472662	VTSP06032	5387783	VTSP06032	9/16 - 18	110	25	53	11,0	3	DIN 376	2B
5472663	VTSP06033	5387784	VTSP06033	5/8 - 11	110	24	51	12,0	3	DIN 376	2B

(continued)

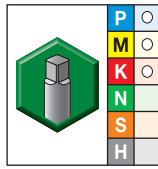
Multipurpose Taps

VariTap™ Spiral-Point HSS-E Taps • Through Holes

(VT-SPO • Form B Plug Chamfer • Machine Screw and Fractional • DIN 371 and 376 – continued)



grade WU41EG
TiN

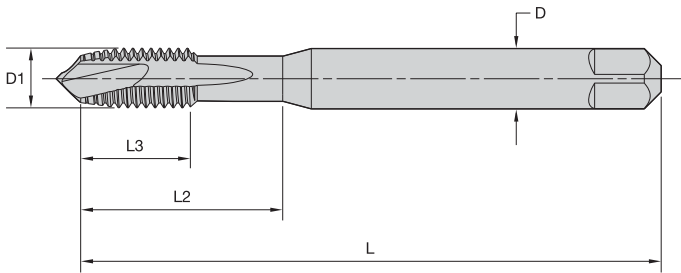


grade WP49EG
Oxide

- first choice
- alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5472664	VTSP06034	5387785	VTSP06034	5/8 - 18	110	24	51	12,0	3	DIN 376	2B
5472665	VTSP06035	5387786	VTSP06035	3/4 - 10	140	30	64	16,0	3	DIN 376	2B
5472666	VTSP06036	5387787	VTSP06036	3/4 - 16	140	30	64	16,0	3	DIN 376	2B
5472667	VTSP06037	5387788	VTSP06037	7/8 - 9	140	34	71	18,0	3	DIN 376	2B
5472668	VTSP06038	5387789	VTSP06038	7/8 - 14	140	34	71	18,0	3	DIN 376	2B
5472669	VTSP06039	5387790	VTSP06039	1 - 8	160	38	81	18,0	3	DIN 376	2B
5472670	VTSP06040	5387791	VTSP06040	1 - 12	160	38	81	18,0	3	DIN 376	2B

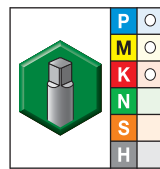
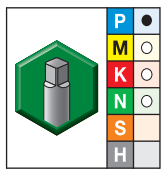
- WU41EG TiN
- WP49EG oxide



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 • UNJC/UNJF • Inch DIN 371 and 376



- first choice
- alternate choice

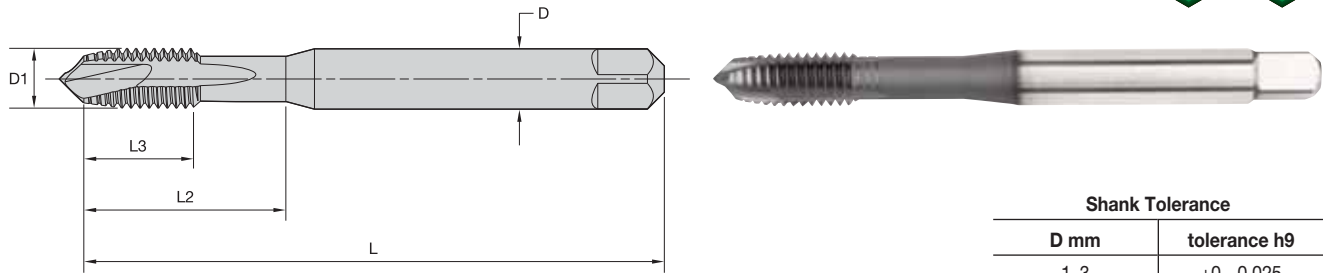
grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5472634	VTSP06006	5387705	VTSP06006	4 - 40	56	8	18	3,5	2	DIN 371	3B
5472637	VTSP06009	5387709	VTSP06009	6 - 32	56	9	20	4,0	2	DIN 371	3B
5472640	VTSP06012	5387762	VTSP06012	8 - 32	63	11	21	4,5	2	DIN 371	3B
5472645	VTSP06015	5387765	VTSP06015	10 - 32	70	12	25	6,0	2	DIN 371	3B
5472648	VTSP06018	5387768	VTSP06018	1/4 - 28	80	15	30	7,0	3	DIN 371	3B
5472651	VTSP06021	5387771	VTSP06021	5/16 - 24	90	15	35	8,0	3	DIN 371	3B
5472654	VTSP06024	5387774	VTSP06024	3/8 - 24	100	19	39	10,0	3	DIN 371	3B
5472657	VTSP06027	5387778	VTSP06027	7/16 - 20	100	18	41	8,0	3	DIN 376	3B
5472660	VTSP06030	5387781	VTSP06030	1/2 - 20	110	23	47	9,0	3	DIN 376	3B

Multipurpose Taps

VariTap™ Spiral-Point HSS-E Taps • Through Holes

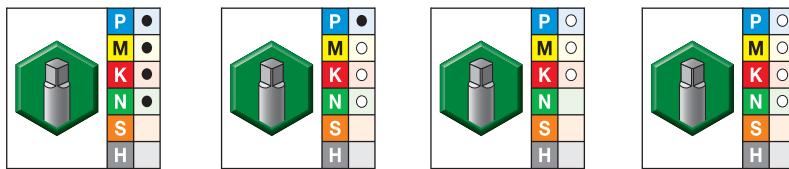


- WU40EG bright
- WU41EG TiN
- WP42EG TiCN
- WP49EG oxide



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



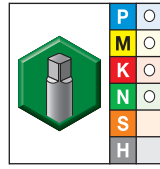
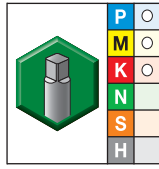
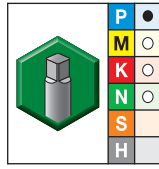
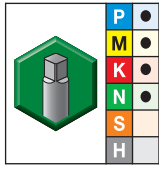
- first choice
- alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions				number dimension class			
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	of flutes	standard	of fit
5366647	VTSP06505	5366646	VTSP06505	5366648	VTSP06505	5366649	VTSP06505	M2 X 0,4	45	7	13	2,8	2	DIN 371	6H
-	-	-	-	5366660	VTSP06506	-	-	M2 X 0,4	45	7	13	2,8	2	DIN 371	6G
-	-	-	-	5366661	VTSP06507	-	-	M2,2 X 0,45	45	7	13	2,8	2	DIN 371	6H
-	-	5366662	VTSP06508	5366663	VTSP06508	5366664	VTSP06508	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6H
-	-	-	-	5366665	VTSP06509	-	-	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6G
-	-	-	-	5368602	VTSP06545	5368603	VTSP06545	M3 X 0,35	56	8	-	2,2	2	DIN 374	6H
-	-	5368514	VTSP06525	5368515	VTSP06525	5368516	VTSP06525	M3 X 0,5	56	8	-	2,2	2	DIN 376	6H
-	-	-	-	5366670	VTSP06511	-	-	M3 X 0,5	56	8	18	3,5	2	DIN 371	6G
5366667	VTSP06510	5366666	VTSP06510	5366668	VTSP06510	5366669	VTSP06510	M3 X 0,5	56	8	18	3,5	2	DIN 371	6H
-	-	5366671	VTSP06512	5366673	VTSP06512	5366674	VTSP06512	M3,5 X 0,6	56	9	20	4,0	2	DIN 371	6H
-	-	-	-	5368604	VTSP06546	5368605	VTSP06546	M4 X 0,5	63	10	21	2,8	2	DIN 374	6H
-	-	5368517	VTSP06526	5368518	VTSP06526	5368519	VTSP06526	M4 X 0,7	63	10	21	2,8	2	DIN 376	6H
-	-	-	-	5366679	VTSP06514	-	-	M4 X 0,7	63	11	21	4,5	2	DIN 371	6G
5366676	VTSP06513	5366675	VTSP06513	5366677	VTSP06513	5366678	VTSP06513	M4 X 0,7	63	11	21	4,5	2	DIN 371	6H
-	-	-	-	5368606	VTSP06547	5368607	VTSP06547	M5 X 0,5	70	12	25	3,5	2	DIN 374	6H
-	-	5368540	VTSP06527	5368541	VTSP06527	5368542	VTSP06527	M5 X 0,8	70	12	25	3,5	2	DIN 376	6H
-	-	-	-	5366685	VTSP06516	-	-	M5 X 0,8	70	12	25	6,0	2	DIN 371	6G
5366681	VTSP06515	5366680	VTSP06515	5366682	VTSP06515	5366684	VTSP06515	M5 X 0,8	70	12	25	6,0	2	DIN 371	6H
-	-	-	-	5368608	VTSP06548	5368609	VTSP06548	M6 X 0,5	80	12	30	4,5	3	DIN 374	6H
-	-	-	-	5368610	VTSP06549	5368611	VTSP06549	M6 X 0,75	80	12	30	4,5	3	DIN 374	6H
-	-	5368543	VTSP06528	5368544	VTSP06528	5368545	VTSP06528	M6 X 1	80	12	30	4,5	3	DIN 376	6H
5366687	VTSP06517	5366686	VTSP06517	5366688	VTSP06517	5366689	VTSP06517	M6 X 1	80	12	30	6,0	3	DIN 371	6H
-	-	-	-	5366690	VTSP06518	-	-	M6 X 1	80	12	30	6,0	3	DIN 371	6G
-	-	-	-	5368612	VTSP06550	5368613	VTSP06550	M7 X 0,75	80	12	30	5,5	3	DIN 374	6H

(continued)

Multipurpose Taps

(VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376 – continued)



● first choice
○ alternate choice

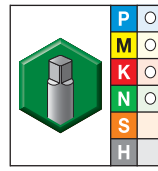
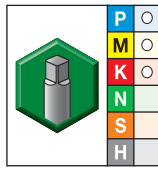
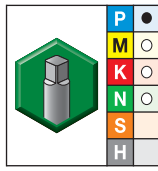
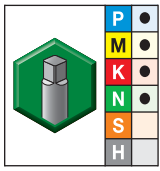
grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5366693	VTSP06519	5366692	VTSP06519	5366695	VTSP06519	5366696	VTSP06519	M7 X 1	80	12	30	7,0	3	DIN 371	6H
-	-	-	-	5366697	VTSP06520	-	-	M7 X 1	80	12	30	7,0	3	DIN 371	6G
-	-	-	-	5368614	VTSP06551	5368615	VTSP06551	M8 X 0,75	80	12	30	6,0	3	DIN 374	6H
-	-	-	-	5368616	VTSP06552	5368617	VTSP06552	M8 X 1	90	15	35	6,0	3	DIN 374	6H
-	-	5368546	VTSP06529	5368547	VTSP06529	5368548	VTSP06529	M8 X 1,25	90	15	35	6,0	3	DIN 376	6H
5366700	VTSP06521	5366698	VTSP06521	5366701	VTSP06521	5366703	VTSP06521	M8 X 1,25	90	15	35	8,0	3	DIN 371	6H
-	-	-	-	5366704	VTSP06522	-	-	M8 X 1,25	90	15	35	8,0	3	DIN 371	6G
-	-	-	-	5368618	VTSP06553	5368619	VTSP06553	M10 X 0,75	90	15	35	7,0	3	DIN 374	6H
-	-	-	-	5368620	VTSP06554	5368621	VTSP06554	M10 X 1	90	15	35	7,0	3	DIN 374	6H
-	-	-	-	5368622	VTSP06555	5368623	VTSP06555	M10 X 1,25	100	18	39	7,0	3	DIN 374	6H
-	-	-	-	5366709	VTSP06524	-	-	M10 X 1,5	100	18	39	10,0	3	DIN 371	6G
5366706	VTSP06523	5366705	VTSP06523	5366707	VTSP06523	5366708	VTSP06523	M10 X 1,5	100	18	39	10,0	3	DIN 371	6H
-	-	5368549	VTSP06530	5368550	VTSP06530	5368551	VTSP06530	M10 X 1,5	100	18	39	7,0	3	DIN 376	6H
-	-	-	-	5368624	VTSP06556	5368625	VTSP06556	M11 X 1	90	15	36	8,0	3	DIN 374	6H
-	-	-	-	5368626	VTSP06557	5368627	VTSP06557	M12 X 1	100	21	39	9,0	3	DIN 374	6H
-	-	-	-	5368628	VTSP06558	5368629	VTSP06558	M12 X 1,25	100	21	39	9,0	3	DIN 374	6H
-	-	-	-	5368630	VTSP06559	5368631	VTSP06559	M12 X 1,5	100	21	39	9,0	3	DIN 374	6H
-	-	-	-	5368556	VTSP06532	-	-	M12 X 1,75	110	21	44	9,0	3	DIN 376	6G
5368553	VTSP06531	5368552	VTSP06531	5368554	VTSP06531	5368555	VTSP06531	M12 X 1,75	110	21	44	9,0	3	DIN 376	6H
-	-	-	-	5368632	VTSP06560	5368633	VTSP06560	M14 X 1	100	21	47	11,0	3	DIN 374	6H
-	-	-	-	5368634	VTSP06561	5368635	VTSP06561	M14 X 1,25	100	21	47	11,0	3	DIN 374	6H
-	-	-	-	5368636	VTSP06562	5368637	VTSP06562	M14 X 1,5	100	21	47	11,0	3	DIN 374	6H
5368558	VTSP06533	5368557	VTSP06533	5368559	VTSP06533	5368560	VTSP06533	M14 X 2	110	24	52	11,0	3	DIN 376	6H
-	-	-	-	5368561	VTSP06534	-	-	M14 X 2	110	24	52	11,0	3	DIN 376	6G
-	-	-	-	5368638	VTSP06563	5368639	VTSP06563	M16 X 1	100	21	46	12,0	3	DIN 374	6H
-	-	-	-	5368640	VTSP06564	5368641	VTSP06564	M16 X 1,5	100	21	46	12,0	3	DIN 374	6H
5368563	VTSP06535	5368562	VTSP06535	5368565	VTSP06535	5368566	VTSP06535	M16 X 2	110	24	51	12,0	3	DIN 376	6H
-	-	-	-	5368567	VTSP06536	-	-	M16 X 2	110	24	51	12,0	3	DIN 376	6G
-	-	-	-	5368642	VTSP06565	5368643	VTSP06565	M18 X 1	110	21	50	14,0	3	DIN 374	6H
-	-	-	-	5368683	VTSP06566	5368684	VTSP06566	M18 X 1,5	110	21	50	14,0	3	DIN 374	6H
-	-	-	-	5368685	VTSP06567	5368686	VTSP06567	M18 X 2	125	30	58	14,0	3	DIN 374	6H
5368569	VTSP06537	5368568	VTSP06537	5368570	VTSP06537	5368571	VTSP06537	M18 X 2,5	125	30	58	14,0	3	DIN 376	6H
-	-	-	-	5368687	VTSP06568	5368688	VTSP06568	M20 X 1	125	24	56	16,0	3	DIN 374	6H
-	-	-	-	5368689	VTSP06569	5368690	VTSP06569	M20 X 1,5	125	24	56	16,0	3	DIN 374	6H
-	-	-	-	5368691	VTSP06570	5368692	VTSP06570	M20 X 2	140	30	64	16,0	3	DIN 374	6H
5368573	VTSP06538	5368572	VTSP06538	5368574	VTSP06538	5368575	VTSP06538	M20 X 2,5	140	30	64	16,0	3	DIN 376	6H

(continued)

Multipurpose Taps

VariTap™ Spiral-Point HSS-E Taps • Through Holes

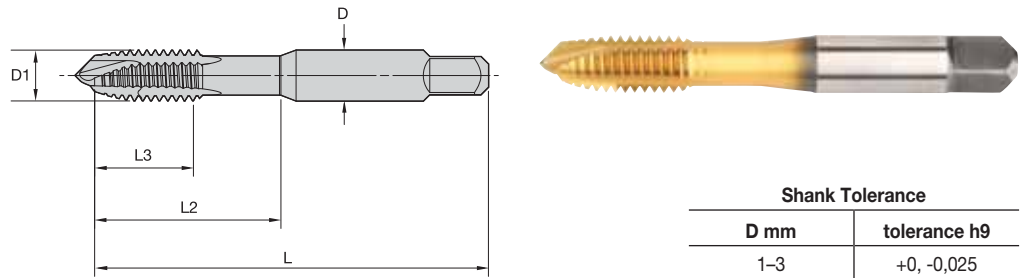
(VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376 – continued)



- first choice
- alternate choice

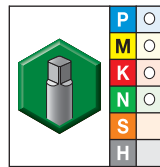
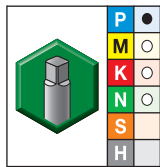
grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions				number dimension class of flutes standard of fit			
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
-	-	-	-	5368693	VTSP06571	5368694	VTSP06571	M22 X 1,5	125	24	62	18,0	3	DIN 374	6H
-	-	-	-	-	-	5368695	VTSP06572	M22 X 2	140	30	70	18,0	3	DIN 374	6H
5368577	VTSP06539	5368576	VTSP06539	5368578	VTSP06539	5368579	VTSP06539	M22 X 2,5	140	30	70	18,0	3	DIN 376	6H
-	-	-	-	5368696	VTSP06573	5368697	VTSP06573	M24 X 1,5	140	28	67	18,0	3	DIN 374	6H
-	-	-	-	-	-	5368698	VTSP06574	M24 X 2	140	30	67	18,0	3	DIN 374	6H
5368581	VTSP06540	5368580	VTSP06540	5368582	VTSP06540	5368583	VTSP06540	M24 X 3	160	36	77	18,0	3	DIN 376	6H
-	-	5368584	VTSP06541	5368585	VTSP06541	5368586	VTSP06541	M27 X 3	160	36	82	20,0	4	DIN 376	6H
-	-	-	-	-	-	5368699	VTSP06575	M30 X 2	150	28	80	22,0	4	DIN 374	6H
-	-	5368587	VTSP06542	5368588	VTSP06542	5368589	VTSP06542	M30 X 3,5	180	42	91	22,0	4	DIN 376	6H
-	-	-	-	5368600	VTSP06543	-	-	M33 X 3,5	180	42	100	25,0	4	DIN 376	6H
-	-	-	-	5368601	VTSP06544	-	-	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

■ VT-SPO • Form B Plug Chamfer • Metric • JIS



- first choice
- alternate choice

grade WU41EG TiN		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	tap class
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5387861	VTSP07505	5387859	VTSP07505	M3 X 0,5	46	11	19	4,0	2	JIS	ISO 2
5387865	VTSP07506	5387863	VTSP07506	M4 X 0,7	52	13	21	5,0	2	JIS	ISO 2
5387869	VTSP07507	5387867	VTSP07507	M5 X 0,8	60	16	24	5,5	2	JIS	ISO 2
5387873	VTSP07508	5387871	VTSP07508	M6 X 1	62	19	29	6,0	3	JIS	ISO 2
5387877	VTSP07509	5387875	VTSP07509	M8 X 1,25	70	22	37	6,2	3	JIS	ISO 2
5387881	VTSP07510	5387879	VTSP07510	M10 X 1,5	75	24	41	7,0	3	JIS	ISO 2
-		5387883	VTSP07511	M12 X 1,25	82	29	48	8,5	3	JIS	ISO 2
-		5387887	VTSP07513	M12 X 1,5	82	29	48	8,5	3	JIS	ISO 2
-		5387885	VTSP07512	M12 X 1,75	82	29	48	8,5	3	JIS	ISO 2
-		5387891	VTSP07515	M14 X 1,5	88	30	48	10,5	3	JIS	ISO 2
-		5387889	VTSP07514	M14 X 2	88	30	48	10,5	3	JIS	ISO 2
-		5387895	VTSP07517	M16 X 1,5	95	32	52	12,5	3	JIS	ISO 2
-		5387893	VTSP07516	M16 X 2	95	32	52	12,5	3	JIS	ISO 2
-		5387898	VTSP07518	M18 X 2,5	100	37	55	14,0	3	JIS	ISO 2
-		5387900	VTSP07519	M20 X 2,5	105	37	60	15,0	3	JIS	ISO 2

Solutions for Blind Hole Applications •

WIDIA-GTD™

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™

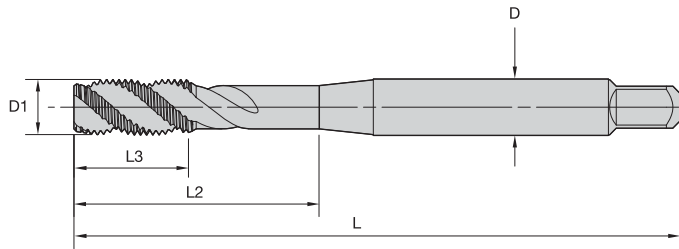
- Spiral-flute geometry optimised to provide efficient chip ejection in blind holes.
- Manufactured from high-vanadium HSS-E to provide long and consistent life.
- Ideal for customers who have a variety of materials to machine.
- Geometry designed to allow tapping of a wide variety of ductile materials: 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.



High-Performance Taps

Victory™ Spiral-Flute HSS-E-PM Taps • Blind Holes

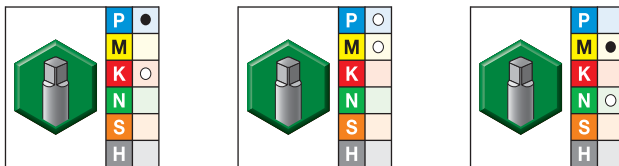
- GM6515 TiN + Cr/C for stainless steel.
- GP6520 TiCN for steel.
- GP6505 oxide for steel.



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



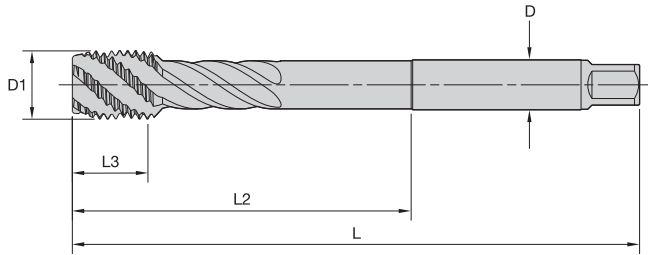
■ GT30 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Steel and Stainless Steel



- first choice
- alternate choice

grade GP6520 TiCN		grade GP6505 Oxide		grade GM6515 TiN+Cr/C		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
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

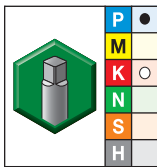
- GP6520 TiCN for steel and cast iron.



Shank Tolerance	
D mm	tolerance h6
12-18	+0, -0,011
20-30	+0, -0,013
32-36	+0, -0,016



- GT30 • Form C Semi-Bottoming Chamfer • Larger Sizes • Metric Extra Long • For Steel and Cast Iron



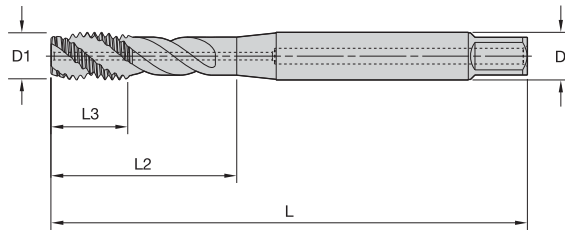
- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	class of fit
order #	catalogue #	D1 size	L	L3	L2	D		
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

High-Performance Taps

Victory™ Spiral-Flute HSS-E-PM Taps • Blind Holes

- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.

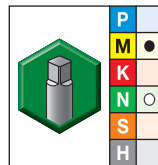
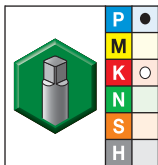


Shank Tolerance

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



■ GT31 • Form C Semi-Bottoming Chamfer • Through Coolant • Metric DIN 371 and 376 • For Steel and Stainless Steel

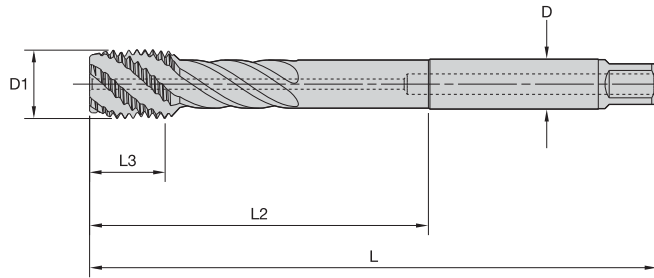


- first choice
- alternate choice

grade GP6520 TiCN		grade GM6515 TiN+CrC/C		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
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

High-Performance Taps

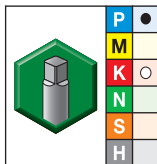
- GP6520 TiCN for steel and cast iron.



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



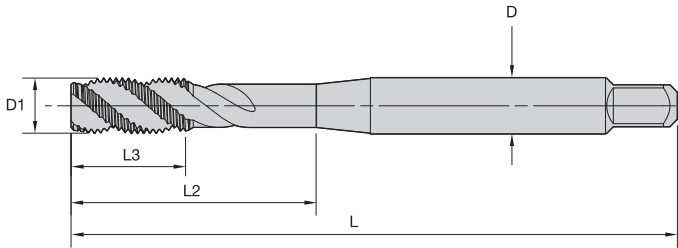
- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	class of fit
order #	catalogue #	D1 size	L	L3	L2	D		
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

High-Performance Taps

Victory™ Spiral-Flute HSS-E-PM Taps • Threading Close to the Bottom in a Blind Hole

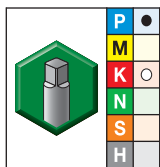
- GP6520 TiCN for steel.



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



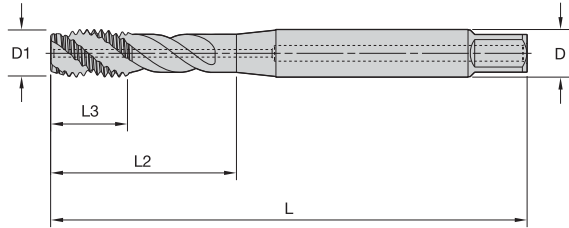
■ GT32 • Form E Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Steel



- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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.

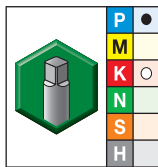


Shank Tolerance

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



- GT33 • Form E Bottoming Chamfer • Through Coolant • Metric DIN 371, 374, and 376 • For Steel



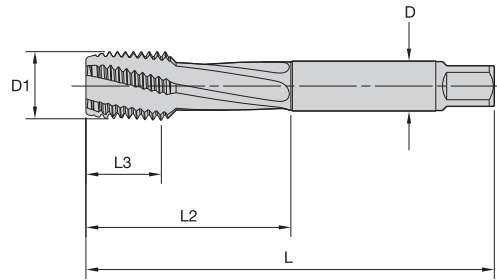
- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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

High-Performance Taps

Victory™ Spiral-Flute HSS-E-PM Taps • Blind Holes

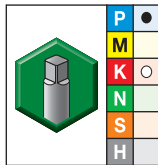
- GP6520 TiCN for steel and cast iron.



Shank Tolerance	
D mm	tolerance h6
12-18	+0, -0,011
20-30	+0, -0,013
32-36	+0, -0,016



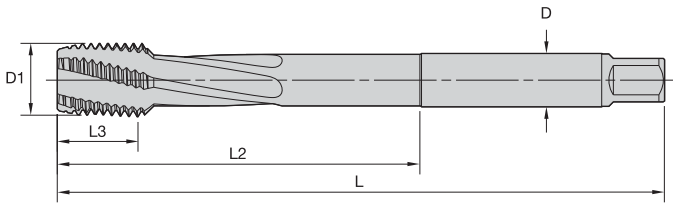
■ GT50 • Form C Semi-Bottoming Chamfer • Larger Sizes • Metric DIN 376 • For Steel and Cast Iron



- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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.

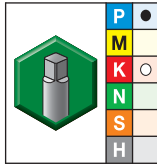


Shank Tolerance

D mm	tolerance h6
12-18	+0, -0,011
20-30	+0, -0,013
32-36	+0, -0,016



- GT50 • Form C Semi-Bottoming Chamfer • Larger Sizes • Metric Extra Long • For Steel and Cast Iron



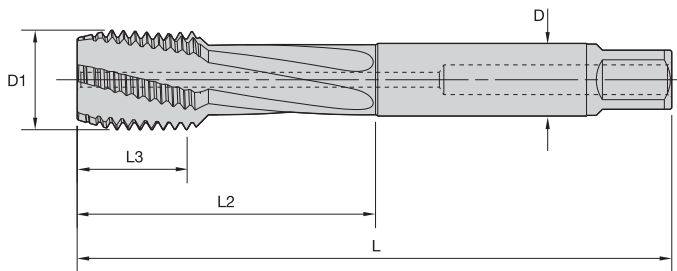
- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	class of fit
order #	catalogue #	D1 size	L	L3	L2	D		
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

High-Performance Taps

Victory™ Spiral-Flute HSS-E-PM Taps • Blind Holes

- GP6520 TiCN for steel and cast iron.

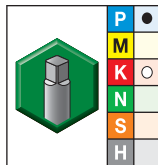


Shank Tolerance

D mm	tolerance h6
12-18	+0, -0,011
20-30	+0, -0,013
32-36	+0, -0,016



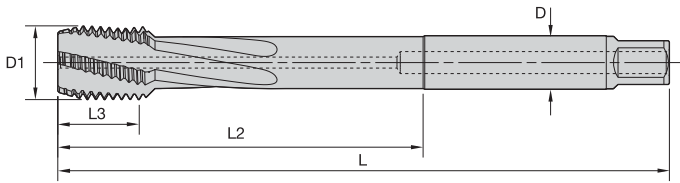
- GT51 • Form C Semi-Bottoming Chamfer • Through Coolant • Larger Sizes • Metric DIN 376 • For Steel and Cast Iron



- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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.

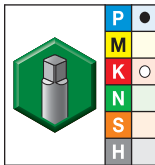


Shank Tolerance

D mm	tolerance h6
12-18	+0, -0,011
20-30	+0, -0,013
32-36	+0, -0,016



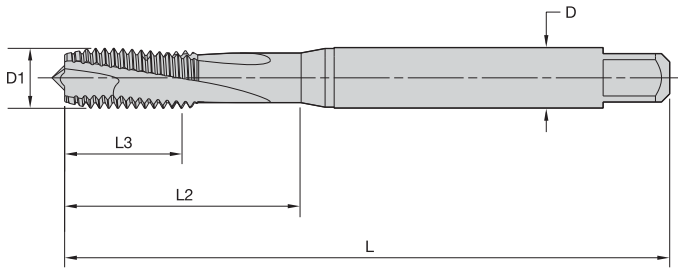
- GT51 • Form C Semi-Bottoming Chamfer • Through Coolant • Larger Sizes • Metric Extra Long • For Steel and Cast Iron



- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	class of fit
order #	catalogue #	D1 size	L	L3	L2	D		
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

- WS32MG TiCN for nickel and nickel alloys.

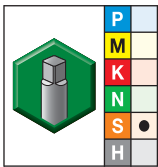


Shank Tolerance

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



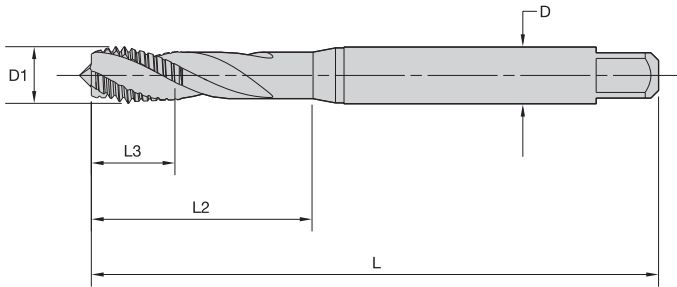
■ GT12 • Form C Semi-Bottoming Chamfer • Metric DIN 371 and 376 • For Nickel and Nickel Alloys



- first choice
- alternate choice

grade WS32MG TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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.

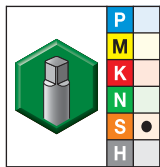


Shank Tolerance

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



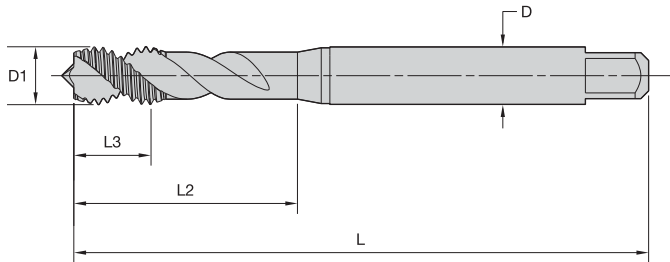
■ GT16 • Form C Semi-Bottoming Chamfer • Metric DIN 371 • For Titanium and Titanium Alloys



- first choice
- alternate choice

grade WN35MG TiN/DLC		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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.

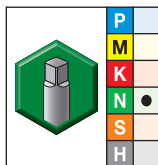


Shank Tolerance

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



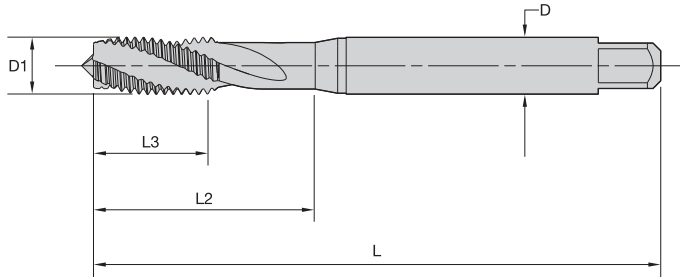
■ GT80 • Form C Semi-Bottoming Chamfer • Metric DIN 371 and 376 • For Aluminium



- first choice
- alternate choice

grade WN48EG DLC		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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

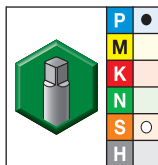
- WP31MG TiN
for steel 32–44 HRC.



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



■ GT02 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel



- first choice
- alternate choice

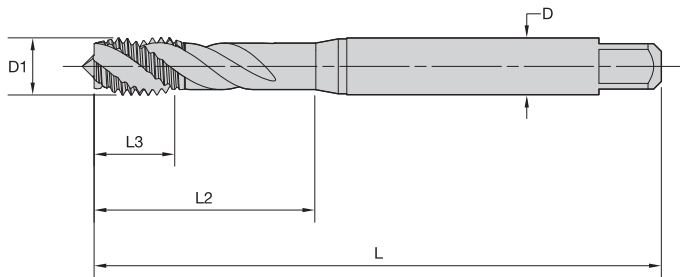
grade WP31MG TiN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
4152638	GT025001	M3 X 0,5	56	11	18	3,5	3	DIN 371	6H
4152639	GT025002	M4 X 0,7	63	13	21	4,5	3	DIN 371	6H
4152640	GT025003	M5 X 0,8	70	15	25	6,0	3	DIN 371	6H
4152641	GT025004	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

High-Performance Taps

High-Performance Taps

Victory™ Spiral-Flute HSS-E-PM Taps • Blind Holes 3 x D

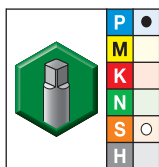
- WH36MG TiAlN/MoS₂ for steel
32–44 HRC (3 x D).



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



■ GT04 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel

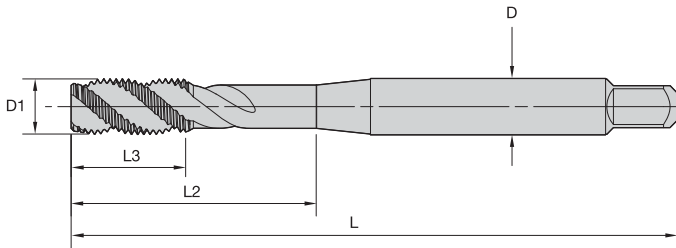


- first choice
- alternate choice

grade WH36MG TiN+MoS ₂		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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

High-Performance Taps

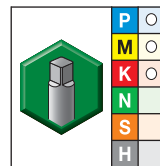
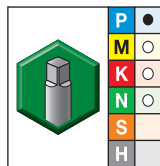
- WU41EG TiN.
- WP49EG oxide.



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-SFT • Form C Semi-Bottoming Chamfer • Machine Screw and Fractional • DIN 371 and 376

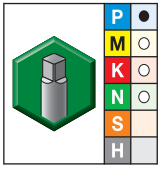


- first choice
- alternate choice

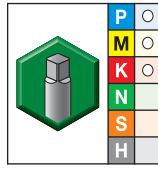
grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5472587	VTSFT6005	5387487	VTSFT6005	4 - 40	56	8	18	3,5	2	DIN 371	2B
5472589	VTSFT6007	5387489	VTSFT6007	5 - 40	56	9	20	4,0	2	DIN 371	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)



grade WU41EG
TiN

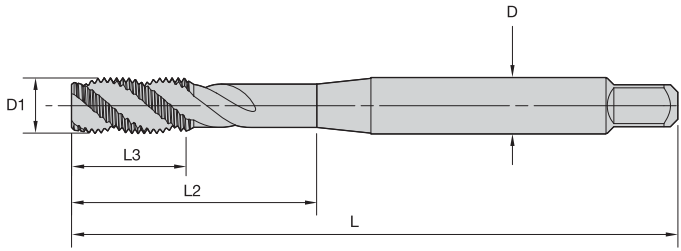


grade WP49EG
Oxide

- first choice
- alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
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

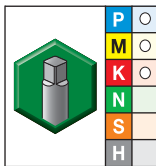
• WP49EG oxide



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

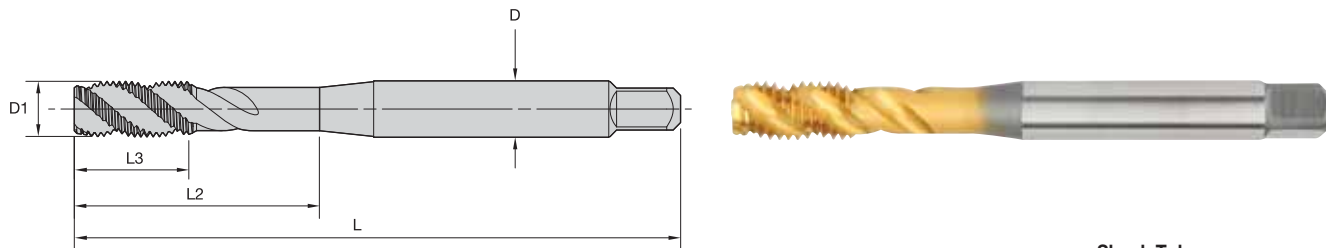
grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
5387488	VTSFT6006	4 - 40	56	8	18	3,5	2	DIN 371	3B
5387641	VTSFT6009	6 - 32	56	9	20	4,0	2	DIN 371	3B
5387644	VTSFT6012	8 - 32	63	11	21	4,5	3	DIN 371	3B
5387647	VTSFT6015	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

Multipurpose Taps

VariTap™ Spiral-Flute HSS-E Taps • Blind Holes



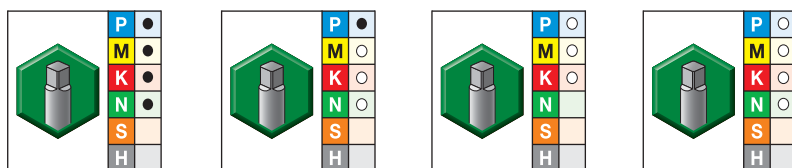
- WP42EG TiCN
- WU41EG TiN
- WP49EG oxide
- WU40EG bright



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 DIN 371, 374, and 376



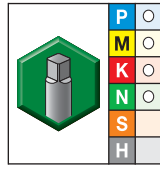
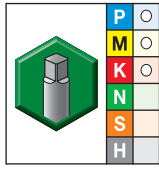
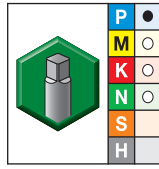
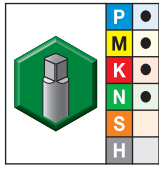
- first choice
- alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions				number of flutes	dimension standard	class of fit	
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2				D
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)

Multipurpose Taps

(VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 – continued)



● first choice
○ alternate choice

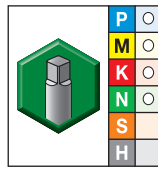
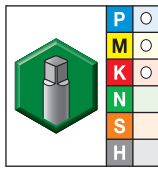
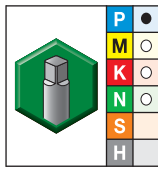
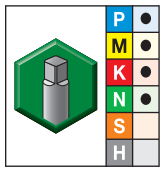
grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions				number of flutes	dimension standard	class of fit	
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5368741	VTSFT6518	5368740	VTSFT6518	5368742	VTSFT6518	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)

Multipurpose Taps

VariTap™ Spiral-Flute HSS-E Taps • Blind Holes

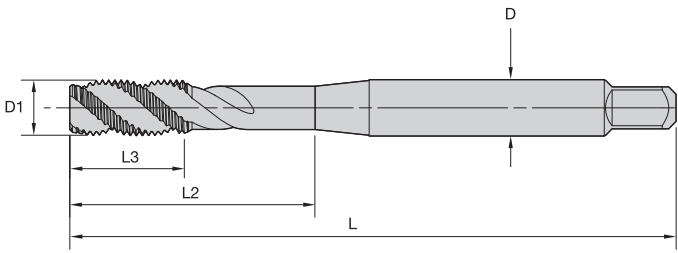
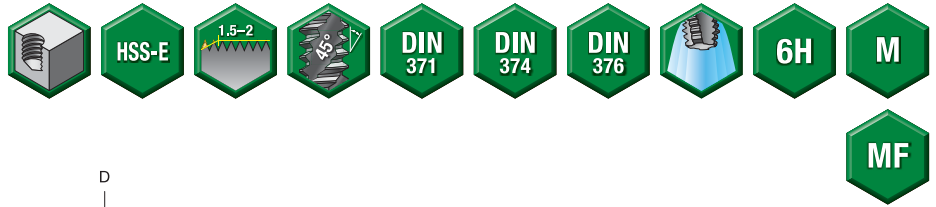
(VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 — continued)



● first choice
○ alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions				number dimension class of flutes standard of fit			
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
-	-	-	-	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	

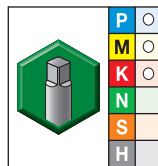
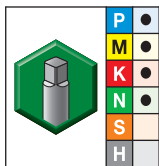
- WP42EG TiCN
- WP49EG oxide



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

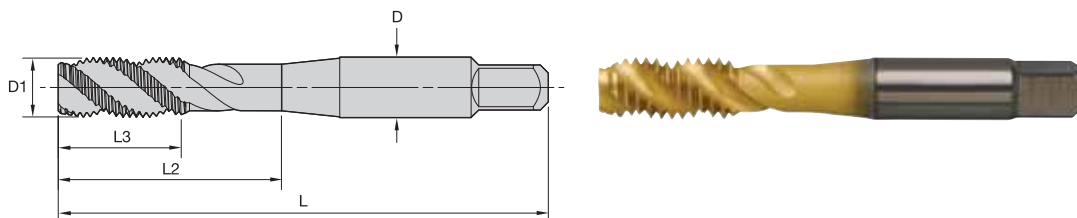


- first choice
- alternate choice

grade WP42EG TiCN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
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

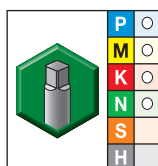
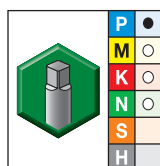
Multipurpose Taps

- 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



- first choice
- alternate choice

grade WU41EG TiN		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	tap class
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
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

Tap into the power of the original.



WIDIA™ VariTap™

A heritage of hard work, innovation, and excellence. That's what makes an original.

Built on a 140-year legacy of providing the industry with the highest quality performance in taps, dies, and gages. Our history propels us to keep delivering the most advanced solutions.

The WIDIA VariTap is the next application of our commitment to innovation.

- Extensive range of sizes, fits, styles, and coatings, equipped with optimised geometry, offering the largest portfolio solution of multipurpose taps available.
- Capable of working with a wide variety of materials.
- Long and consistent tool life leading to lower inventory costs.
- Unique spiral-point geometry provides low tapping torque, while pushing chips ahead of the tap in through holes.
- Superior thread finish.

To learn more about the unmatched benefits of WIDIA VariTap, call 800.979.4342, contact your local Authorised Distributor, or visit widia.com/varitap.

WIDIA 

Solutions for Through and Blind Hole Applications •

WIDIA-GTD™

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.

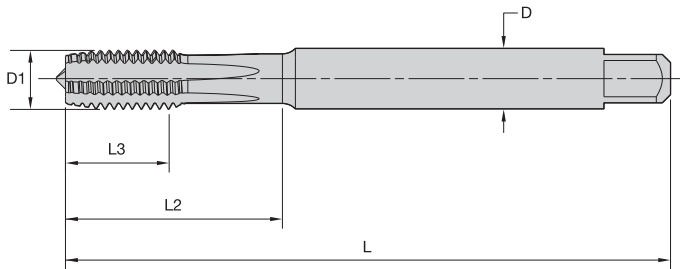


High-Performance Taps

Victory™ Straight-Flute Carbide Taps • Blind and Through Holes



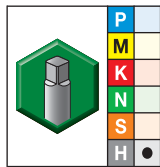
- WH16PG TiAlN/MoS₂ for steel 55–63 HRC.



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



■ GX10 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel

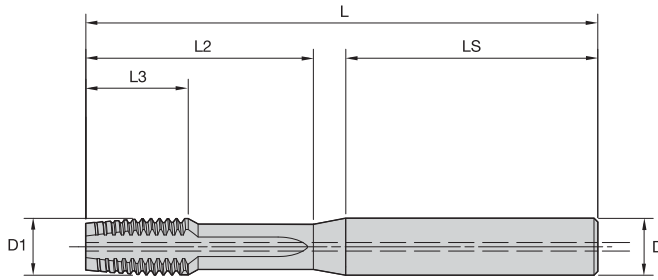


- first choice
- alternate choice

grade WH16PG TiAlN+MoS ₂		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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

High-Performance Taps

• WK12PG TiCN for cast iron.

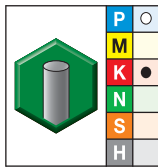


Shank Tolerance

D	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-16	+0, -0,011



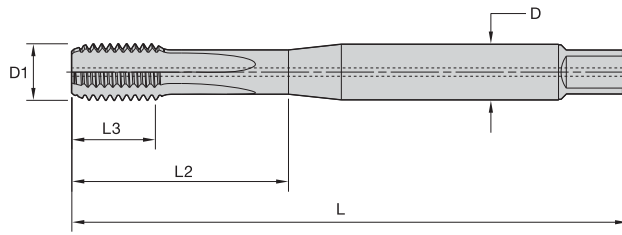
■ GX35 • Form E Bottoming Chamfer • Through Coolant M6 and Larger • Metric • For Cast Iron



● first choice
○ alternate choice

grade WK12PG TiCN		metric dimensions						number of flutes	class of fit
order #	catalogue #	D1 size	L	L3	L2	LS	D		
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

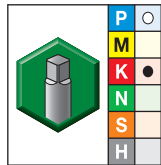
- WK12PG TiCN for cast iron.



Shank Tolerance	
D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-16	+0, -0,011



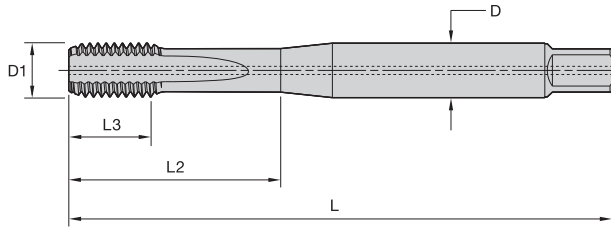
- GX35 • Form E Bottoming Chamfer • Through Coolant • Metric • For Cast Iron



- first choice
- alternate choice

grade WK12PG TiCN		metric dimensions					number of flutes	class of fit
order #	catalogue #	D1 size	L	L3	L2	D		
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	GX35510	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

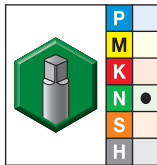
• WN14PG TiN + CrC/C
for aluminium.



Shank Tolerance	
D	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-16	+0, -0,011



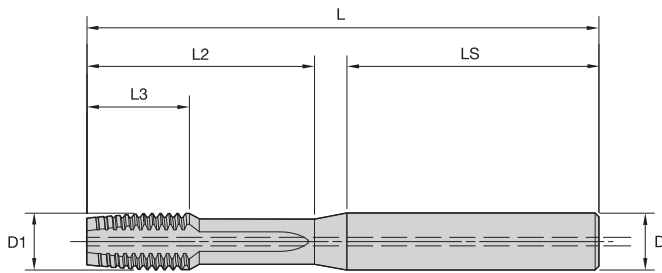
■ GX47 • Form E Bottoming Chamfer • Through Coolant • Metric • For Aluminium



- first choice
- alternate choice

grade WN14PG TiN+CrC/C		metric dimensions					number of flutes	class of fit
order #	catalogue #	D1 size	L	L3	L2	D		
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

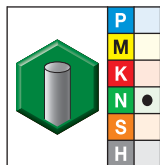
- WN14PG TiN + Cr/C for aluminium.



Shank Tolerance	
D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-16	+0, -0,011



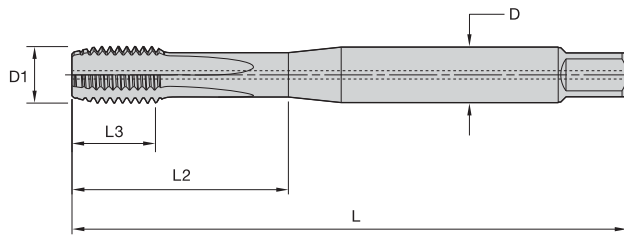
- GX47 • Form E Bottoming Chamfer • Through Coolant • Metric • For Aluminium



- first choice
- alternate choice

grade WN14PG TiN+Cr/C		metric dimensions						number of flutes	class of fit
order #	catalogue #	D1 size	L	L3	L2	LS	D		
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

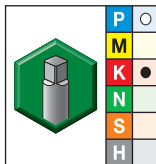
- WK12PG TiCN for cast iron.



Shank Tolerance	
D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-16	+0, -0,011



- GX50 • Form C Semi-Bottoming Chamfer • Through Coolant M6 and Larger • Metric • For Cast Iron



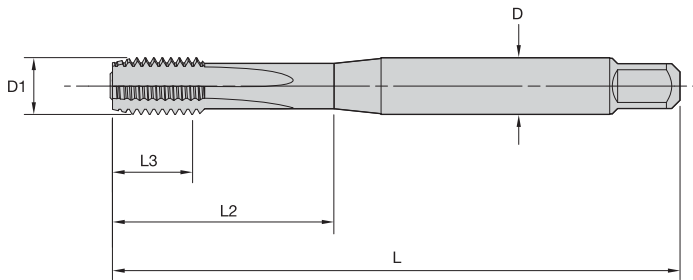
- first choice
- alternate choice

grade WK12PG TiCN		metric dimensions					number of flutes	class of fit
order #	catalogue #	D1 size	L	L3	L2	D		
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

High-Performance Taps

Victory™ Straight-Flute HSS-E-PM Taps • Through and Blind Holes

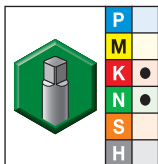
- GP6520 TiCN for cast iron and cast aluminium.



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



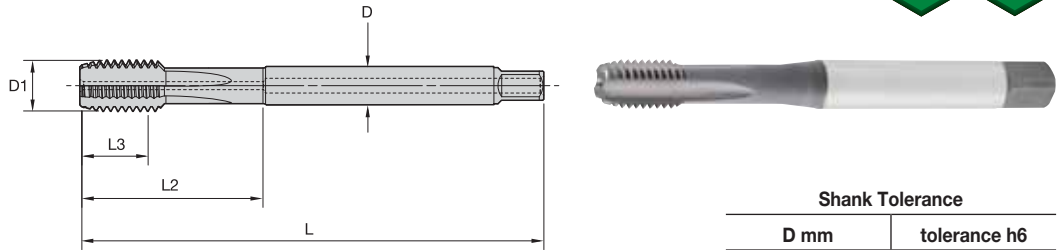
- GT40 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium



- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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

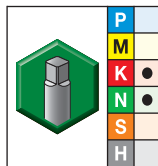
- GP6520 TiCN for cast iron and cast aluminium.



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



- GT41 • Form C Semi-Bottoming Chamfer • Through Coolant • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium



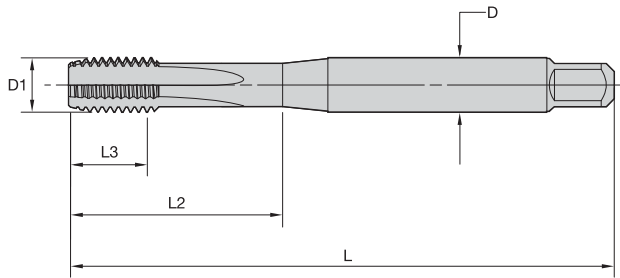
- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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

High-Performance Taps

Victory™ Straight-Flute HSS-E-PM Taps • Threading Close to the Bottom in Blind Holes

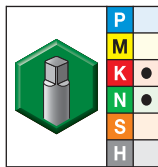
- GP6520 TiCN for cast iron and cast aluminium.



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



■ GT42 • Form E Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium

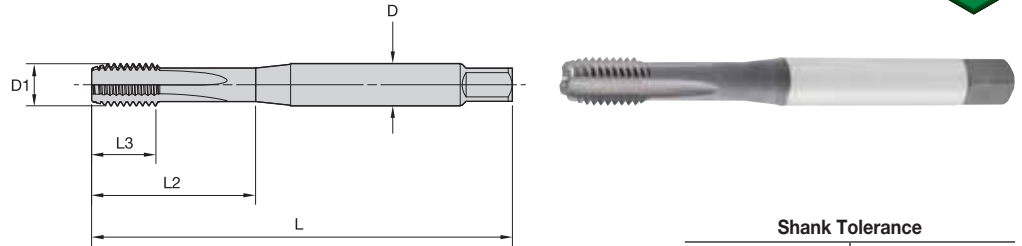


- first choice
- alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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

High-Performance Taps

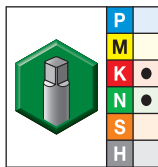
- GP6520 TiCN for cast iron and cast aluminium.



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



- GT43 • Form E Bottoming Chamfer • Through Coolant • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium



- first choice
- alternate choice

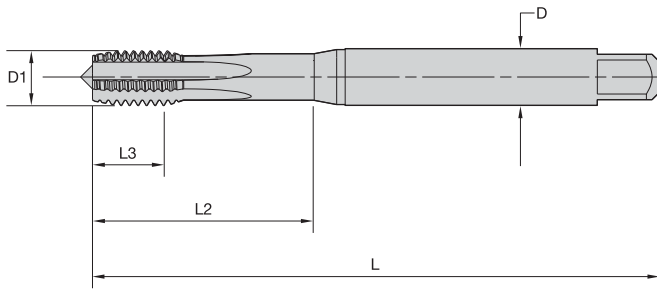
grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
4154283	GT435001	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4154284	GT435002	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4154285	GT435003	M8 X 1,25	90	13	35	8,0	4	DIN 371	6HX
4154286	GT435004	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

High-Performance Taps

Victory™ Straight-Flute HSS-E-PM Taps • Blind and Through Holes



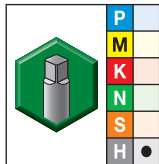
- WS32MG TiCN for steel 44–55 HRC.



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

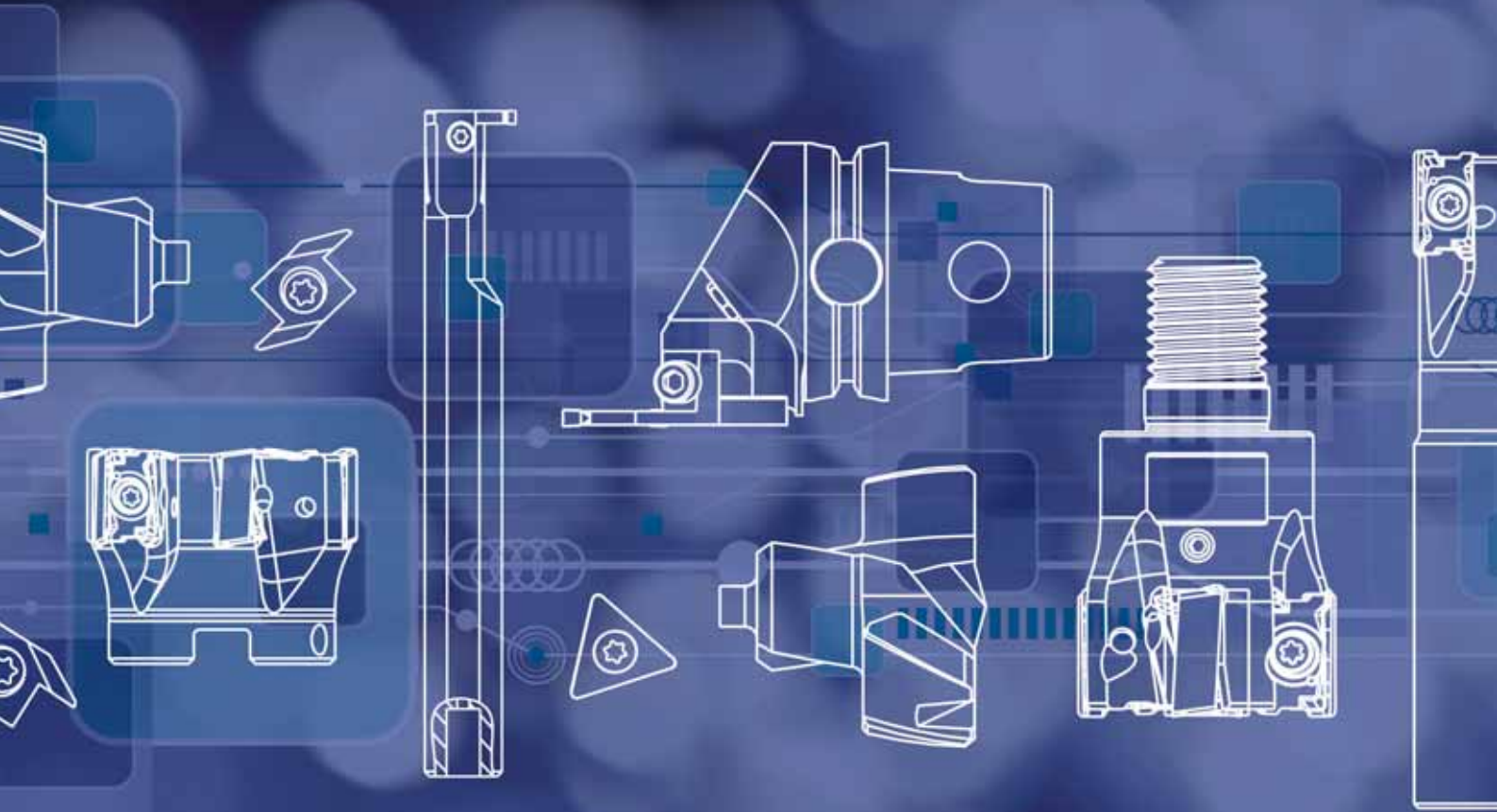


■ GT06 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel



- first choice
- alternate choice

grade WS32MG TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
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



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01

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Solutions for Forming Threads in Through and Blind Hole Applications •

WIDIA-GTD™

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

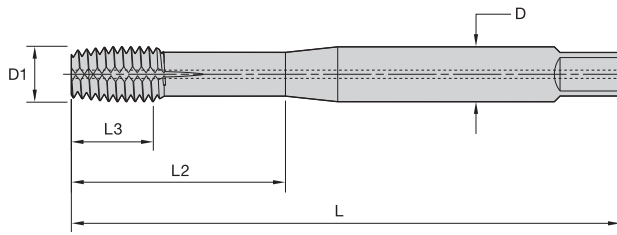
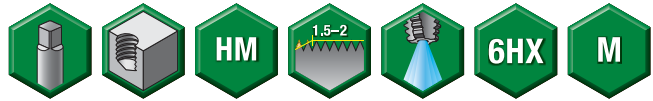
- Manufactured from powdered metal high-speed steel coated for thread forming in steel, stainless steel, and aluminium.
- High hardness provides superior wear resistance.
- Offer performance advantages over conventional high-speed steel taps.
- Long tap life at up to 50% higher tapping speed than HSS taps.



High-Performance Taps

Victory™ Solid Carbide Forming Taps • Blind Holes

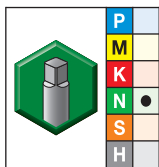
- WN14PG TiN + CrC/C for aluminium.



Shank Tolerance	
D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-16	+0, -0,011



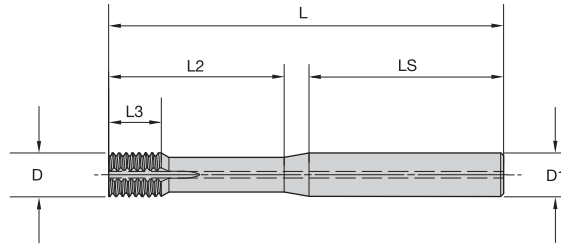
■ GX49 • Form E Bottoming Entry Taper • Through Coolant • Metric • For Aluminium



- first choice
- alternate choice

grade WN14PG TiN+CrC/C		metric dimensions					number of lube grooves	class of fit
order #	catalogue #	D1 size	L	L3	L2	D		
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

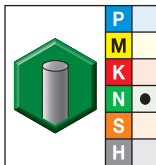
• WN14PG TiN + CrC/C for aluminium.



Shank Tolerance	
D	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-16	+0, -0,011



■ GX49 • Form E Bottoming Entry Taper • Through Coolant • Metric • For Aluminium



● first choice
○ alternate choice

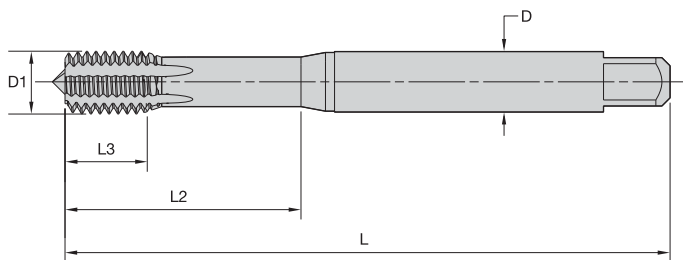
grade WN14PG TiN+CrC/C		metric dimensions						number of lube grooves	class of fit
order #	catalogue #	D1 size	L	L3	L2	LS	D		
5551169	GX492908	M6 X 1	70	8	24	42	6,0	2	6HX
5551170	GX492909	M8 X 1,25	80	10	32	43	8,0	2	6HX
5551171	GX492911	M10 X 1,5	90	12	40	44	10,0	3	6HX
5551173	GX492915	M12 X 1,5	100	14	48	46	12,0	3	6HX
5551172	GX492914	M12 X 1,75	100	14	48	46	12,0	3	6HX

High-Performance Taps

Victory™ Forming Taps HSS-E-PM • Blind and Through Holes



- WP31MG TiN for steel.
- WN38MG DLC for aluminium.

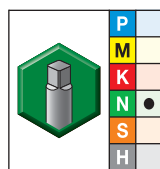
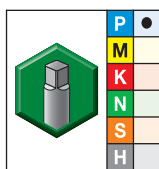


Shank Tolerance

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



GT22 • Form C Semi-Bottoming Entry Taper • Metric DIN 2174 • For Steel and Aluminium

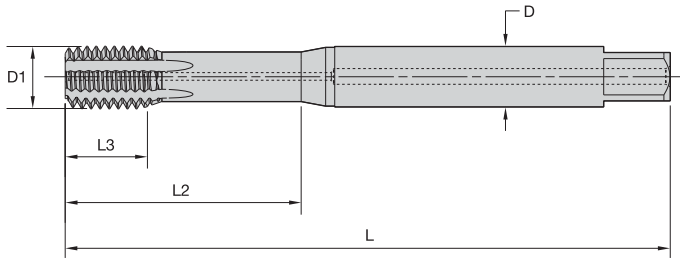


- first choice
- alternate choice

grade WP31MG TiN		grade WN38MG DLC		metric dimensions					dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D		
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

High-Performance Taps

- WP31MG TiN for steel.
- WN38MG DLC for aluminium.

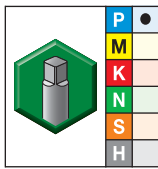


Shank Tolerance

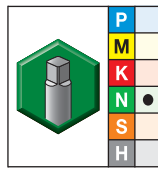
D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052



■ **GT23 • Form C Semi-Bottoming Entry Taper • Through Coolant • Metric DIN 2174 • For Steel and Aluminium**



grade WP31MG
TiN



grade WN38MG
DLC

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	metric dimensions					dimension standard	class of fit
				D1 size	L	L3	L2	D		
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 •
WIDIA-GTD™



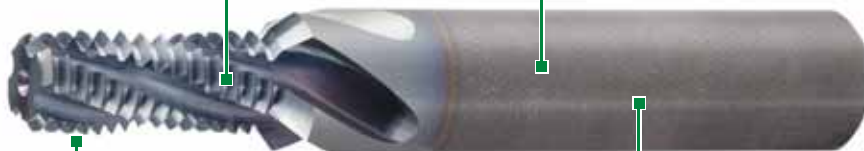
Thread Mills

Our solid thread mills are designed to be the highest quality thread milling solution.

- Cut up to 63 HRC.
- Improved overall thread quality.

Optimised flute design
Better chip evacuation.

Carbide substrate
Higher heat resistance,
higher speed.



Various multilayer coatings
Extremely high wear resistance,
longer tool life.

Cylindrical h6 shank
Low runout, higher
quality threads.

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	hole	operation	coolant	grade	shank
		(inch and metric)					
	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

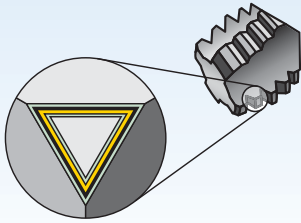
Victory GTM Series HP Solid Carbide Thread Mills • Inch

- ★ Good
- ★★ Better
- ★★★ Best

GTM Series Solid Thread Milling • Inch	series	size range	hole	operation	coolant	grade	shank
		(inch and metric)					
	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		page(s)	recommended cutting parameters
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		
★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★	★	★	★			T69	T77
★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★			T70	T77
					★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★							T72	T77
★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★					★ ★ ★	★ ★ ★	T74	T78
										★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	T76	T78

P				M	K		N			S				H		page(s)	recommended cutting parameters
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		
★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★			T70	T77
					★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★							T72	T77
★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★	★ ★ ★					★ ★ ★	★ ★ ★	T74	T78

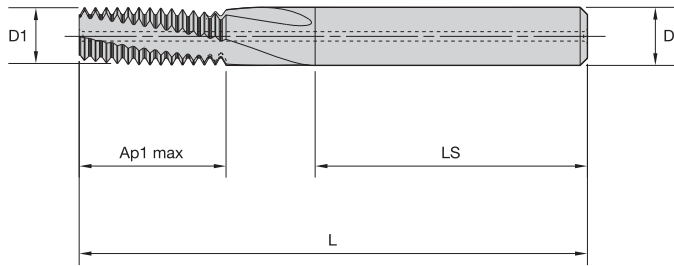


Coatings are designed for optimised tapping performance in specific materials.

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		Material Group																		
				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																			

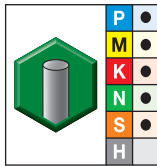


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-18	+0, -0,011
20-30	+0, -0,013



■ GTM11 • Through Coolant • Metric and Metric Fine



grade WU13PV
TiAlN

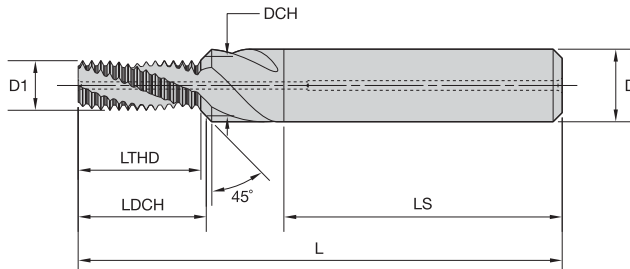
- first choice
- alternate choice

order #	catalogue #	D1 size	metric dimensions					cutting edges
			D1	Ap1 max	L	LS	D	
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

High-Performance Thread Mills

High-Performance Thread Mills

Victory™ Solid Carbide Thread Mills • Blind and Through Holes

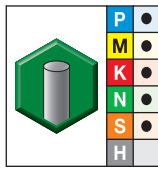


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-18	+0, -0,011
20-30	+0, -0,013



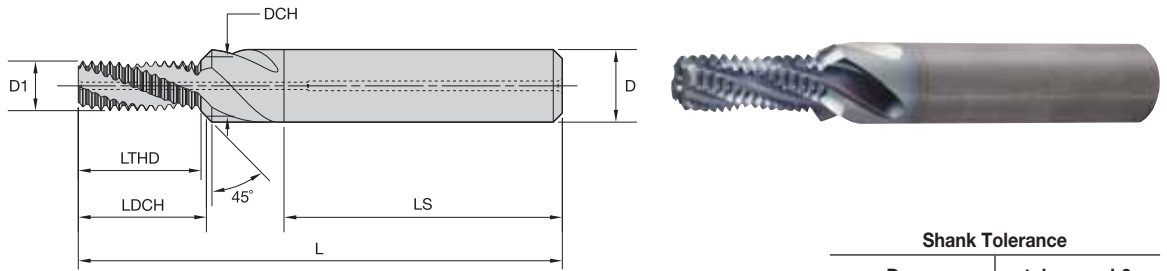
■ GTM21 • Through Coolant • Inch UNC and UNF



- first choice
- alternate choice

grade WU12PV TiCN		metric dimensions								cutting edges
order #	catalogue #	D1 TPI	D1	DCH	LTHD	LDCH	L	LS	D	
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

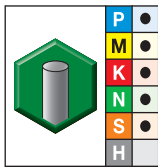
High-Performance Thread Mills



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



■ GTM21 • Through Coolant • Metric and Metric Fine



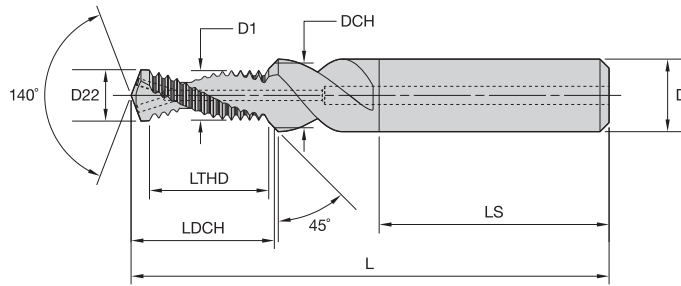
- first choice
- alternate choice

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

High-Performance Thread Mills

High-Performance Thread Mills

Victory™ Solid Carbide Thread Mills • Blind and Through Holes

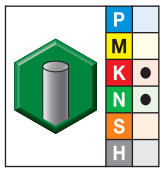


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-18	+0, -0,011
20-30	+0, -0,013



■ GTM31 • Through Coolant • Inch UNC and UNF



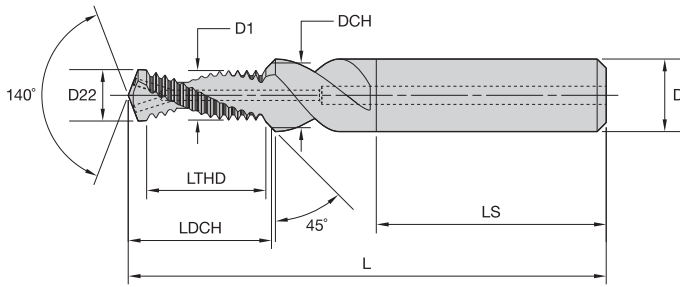
- first choice
- alternate choice

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

High-Performance Thread Mills

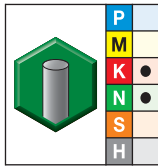


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-18	+0, -0,011
20-30	+0, -0,013

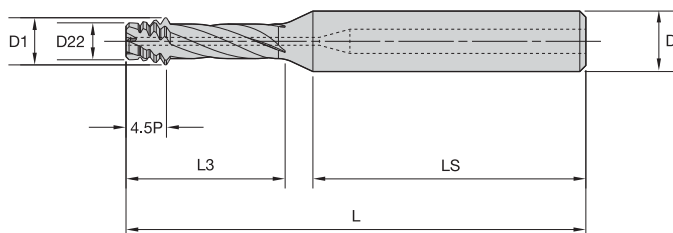


■ GTM31 • Through Coolant • Metric and Metric Fine



- first choice
- alternate choice

grade WU12PV TiCN		metric dimensions									cutting edges
order #	catalogue #	D1 size	D1	D22	DCH	LTHD	LDCH	L	LS	D	
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

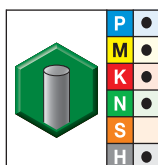


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-18	+0, -0,011
20-30	+0, -0,013

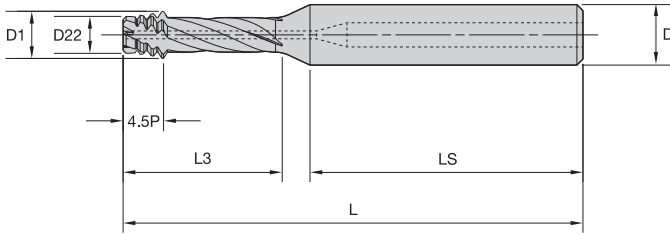


■ GTM41 • Through Coolant • Right Hand • Inch UNC and UNF



● first choice
○ alternate choice

grade WU16PV TiAlN+MoS ₂		metric dimensions							cutting edges
order #	catalogue #	D1 TPI	D1	D22	L3	L	LS	D	
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

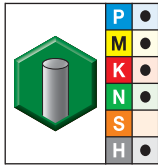


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-18	+0, -0,011
20-30	+0, -0,013



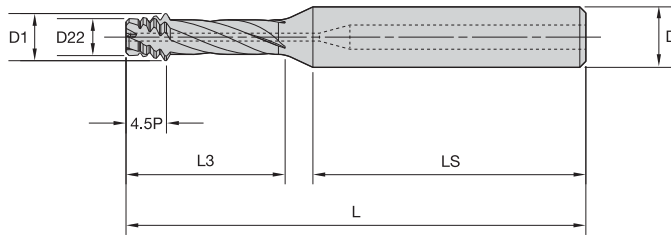
■ GTM41 • Through Coolant • Right Hand • Metric and Metric Fine



● first choice
○ alternate choice

grade WU16PV TiAlN+MoS ₂		metric dimensions							cutting edges
order #	catalogue #	D1 size	D1	D22	L3	L	LS	D	
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

High-Performance Thread Mills

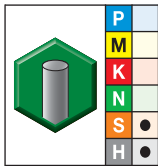


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8-10	+0, -0,009
12-18	+0, -0,011
20-30	+0, -0,013





■ GTM41 • Through Coolant • Left Hand • Metric and Metric Fine




- first choice
- alternate choice

grade WU16PV TiAlN+MoS ₂		metric dimensions							cutting edges
order #	catalogue #	D1 size	D1	D22	L3	L	LS	D	
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

													
		Cutting Speed – vc Range – m/min			Feed/Tooth by Diameter			Cutting Speed – vc Range – m/min			Feed/Tooth by Diameter		
Material Group		min	Starting Value	max		<10mm	>10mm	min	Starting Value	max		<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

												
		Cutting Speed – vc Range – m/min			Drilling Recommended Feed by Diameter			Milling Feed/Tooth by Diameter				
Material Group		min	Starting Value	max		<6mm	6–10mm	10–16mm		<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%.

■ Carbide Taps • Metric



Material Group	 Through Holes						 Blind Holes				
	Tap Style	Grade	Range – m/min			Tap Style	Grade	Range – m/min			
			min	Starting Value	max			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
	N4	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				
		Tap Style	Grade	Range – m/min			Tap Style	Grade	Range – m/min		
				min	Starting Value	max			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

Index by Order Number



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1016538	SM820 K9	C36	1099440	SKSP343 K9	C46-47	1137789	512.153	C23-24	1656890	463300800RT TIALN-RT	L116
1016544	SM837 K9	C37, C39	1099444	SKDP453 K9	C43-45, C73	1137987	513.018	C28-30, C60	1656893	463301000.. UNCOATED	L116
1016546	SM840 K9	C36-37	1099446	SKRN100300 K9	C45	1137996	513.019	C22, C26-27	1656895	463301000RT TIALN-RT	L116
1016548	SM841 K9	C37-39, C65	1099447	SKRN160400 K9	C45	1138003	513.020	C34	1656898	463301200.. UNCOATED	L116
1016602	SKTP343 K9	C48	1099451	ICSN332 K9	C9	1138029	513.025	C20-22, C25-27, C29, C60	1656900	463301200RT TIALN-RT	L116
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1016626	SKDP343 K9	C43-45	1099614	MS1933	C78-79	1138064	513.038	C25-27	1656903	463301500RT TIALN-RT	L116
1016628	SKCP453 K9	C42, C67	1099615	MS1939	C67, C69-70	1138071	513.060	C23	1656906	463301800.. UNCOATED	L116
1016644	IWSN433 K9	C19, C59	1099631	SRS5	C45	1138195	514.018	C22	1656908	463301800RT TIALN-RT	L116
1016648	ITSN323 K9	C16, C58	1099640	MS1034	D79	1138315	170.004	C34	1656909	463302000.. UNCOATED	L116
1016674	ISSN433 K9	C12-15	1099643	MS1154	C45	1138319	515.022	C20-22, C25-27, C29, C60	1656910	463302000RT TIALN-RT	L116
1016678	ICSN433 K9	C8-10, C56	1099644	MS1157	C67	1138328	515.028	C25-27	1656913	463302500RT TIALN-RT	L116
1016680	IDSN433 K9	C11, C56-57	1099645	MS1160	C45, Q10, Q13, Q16, Q19	1138413	170.023	I4	1656916	463303000RT TIALN-RT	L116
1016682	IDSN443 K9	C11	1099646	MS1200	D74-76, D78	1138438	170.025	G20-24, I4, J20-23, J28-31	1656950	465101000.. UNCOATED	L117
1017226	IVSN322 K9	C17-18, C58	1108062	515.018	C20-30, C60-61	1138446	170.026	J36	1656952	465101200.. UNCOATED	L117
1017228	SKVN343 K9	C48-49	1108063	513.023	C20-30, C60-61	1138465	170.028	G4-8	1656953	465101200CT TICN-CT	L117
1017248	IRSN44 K9	C12	1108065	511.023	C20-22, C25-30, C60-61	1147002	ICSN846 K9	C9	1656954	465101200CT TICN-CT	L117
1017276	ITSN433 K9	C16	1108068	512.112	C20-22, C60	1147828	511.022	C60	1656955	465101500.. UNCOATED	L117
1017282	IVSN432 K9	C17	1121087	552.240	C33-34	1175225	193.281	Q10, Q13, Q16, Q19	1656956	465101500CT TICN-CT	L117
1017294	ITSN534 K9	C16	1121055	551.316	C31, C62-64	1243898	513.123	C34	1656957	465101500RT TIALN-RT	L117
1017298	ICSN533 K9	C56	1121063	551.332	C32	1243928	551.129	C34	1656959	465101800CT TICN-CT	L117
1018413	CM109	D79	1121078	551.333	C35	1243929	551.130	C34	1656960	465101800RT TIALN-RT	L117
1018569	CM80	D76	1121086	551.317	C31-34, C62, C64	1274022	ICSN643 K9	C8-10	1656972	465102000.. UNCOATED	L117
1018571	CM81	D74, D76	1121094	557.111	C31, C33-35, C62, C64	1274659	IRSN84 K9	C12	1656976	465102000CT TICN-CT	L117
1020577	CKM7	C36-37	1121102	557.125	C32-33	1274800	ISSN443 K9	C12-15	1657000	490604002CW TICN-CW	L65
1020581	CKM9	C36-39	1121205	552.232	C63-64	1274805	ISSN543 K9	C12-15	1657001	490604002RT TIALN-RT	L65
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2008122	12251355000 W	D104	2012698	M270BF10 TN2505	J76	2018653	12148060800 W	D106	2021361	12391024000 W	J53
2008135	12251356000 W	D104	2012700	M270BF10 TN2510	J76	2018673	12148067200 W	I10-11	2021374	12391050200 W	J52
2008138	12251358000 W	D104	2012718	M270BF12 TN2505	J76	2018679	12148068700 W	C68, C74, C77	2021375	12391050400 W	J46
2008141	12251213200 W	D104	2012720	M270BF12 TN2510	J76	2018703	12148080000 W	C72, C74	2021376	12391050600 W	J46
2008144	12250110400 W	D106	2012728	M270BF16 TN2505	J76	2018805	12148094300 W	D106	2021378	12391051000 W	J52
2008147	12250110300 W	D106	2012730	M270BF16 TN2510	J76	2018807	12148094400 W	D106	2021379	12391051200 W	J52
2008150	12251783700 W	D102	2012748	M270BF20 TN2505	J76	2018809	12148094500 W	D106	2021419	12393040200 W	H5
2008153	12251783600 W	D102	2012758	M270BF25 TN2505	J76	2018811	12148094600 W	D106	2021420	12393040400 W	H5
2008156	12251223200 W	D104	2012760	M270BF25 TN2510	J76	2018813	12148094700 W	D106	2021421	12393040800 W	H5
2008159	12251233200 W	D104	2012778	M270BF32 TN2505	J76	2019104	12148574100 W	D106, I10-11, I13-14	2021422	12393050800 W	H6
2008329	12749723200 W	I13-14	2012780	M270BF32 TN2510	J76	2019118	12148574900 W	D106	2021423	12393050200 W	H6
2008424	SCMW09T308 SPOG00	B70	2013677	SNMT1205AZR31 TN2510	F55	2019287	12148596200 W	D102-103	2021424	12393060800 W	H5, H7
2008521	12250110900 W	D106	2014082	TCMT1102042 TT115	B81	2020663	SNMT1205AZR31 TN7535	F55	2021434	12393080200 W	H4
2008876	123567320 THM	D97	2014890	DCGT11T304AL3 HCK10	B156	2020673	SNMT1205AZR31 TN7525	F55	2021435	12393080400 W	H4
2008931	123567330 THM	D97	2015018	12147548500 W	I4	2020677	SNMT1205AZR31 TN7535	F55	2021436	12393080600 W	H4
2009080	123567340 THM	D97	2015081	TPGA110204 THM	B91	2020683	SNKT1205AZR31 TN7525	F55	2021437	12393083200 W	H4
2009385	123567360 THM	D97	2015242	XNKT1205AZER11 TN7525	F55	2020685	SNKT1205AZR31 TN450	F55	2021438	12393083400 W	H4
2009482	123567380 TN8025	D97	2015244	XNKT1205AZER11 TT125	F55	2020691	SNKT1205AZER20 TN7535	F54	2021439	12393083600 W	H4
2009504	123567380 THM	D97	2015246	XNKT1205AZER11 THM	F55	2020693	SNKT1205AZER20 TN450	F54	2021625	12251221900 W	D104
2009562	123568080 TTM	D105	2015264	XNKT1205AZR12 TN7525	F55	2020695	SNMT1505AZR31 TN7535	F59	2021626	12251221600 W	D104
2009671	123506599 THM	I5	2015266	XNKT1205AZR12 TT125	F55	2020701	SNMT1505AZR31 TN7525	F59	2021627	12251763500 W	D103
2009686	123506600 THM	I6	2015526	12748551100 W	I10-11, I13-14	2020703	SNMT1505AZR31 TN450	F59	2021629	12251332000 W	D104
2009711	123506601 THM	I5	2015527	12748551200 W	I10-11, I13-14	2020705	SNKT1505AZR31 TN7535	F59	2021631	12251762300 W	D103
2010027	CCMT12040441 THM	B31	2015754	12251763000 W	D103	2020711	SNKT1505AZR31 TN7525	F59	2021634	12251212500 W	D104
2010047	E06JSCFP04 WG	C67	2015782	12251765500 W	D103	2020713	SNKT1505AZR31 TN450	F59	2021635	12251222500 W	D104
2010061	CCMT12040841 THM	B31	2015792	12251768400 W	D103	2020727	RDMW0802MOT TN7535	J44	2021636	12251762500 W	D103
2010068	E08KSCLCR06 WG	C68	2015814	12251784400 W	D102	2020735	RDMW1003MOT TN7535	J49	2021637	12251762400 W	D103
2010090	E10MSTFCL11 WG	C77	2015816	12251784500 W	D102	2020741	RDMW1204MOTX TN7535	J55	2021640	12251343000 W	D104
2010111	E12QSDQCRO7 WG	C72	2015816	12251784500 W	D102	2020749	RDMW1605MOTX TN7535	J61	2021641	12251344000 W	D104
2010120	E12QSTFCL11 WG	C77	2015839	12251786500 W	D102	2020757	RDMT0802MOT TN7535	J43	2021718	12250110600 W	D106
2010139	E16RSCLCRO9 WG	C68	2015842	12251788500 W	D102	2020763	RDMT1204MOTX TN7525	J55	2021719	12250110500 W	D106
2010148	E16RSDQCLO7 WG	C72	2016502	12299510400 W	I4	2020767	RDMT1605MOTX TN7525	J60	2021720	12250110800 W	D106
2010157	E16RSDUCRO7 WG	C74	2016514	12299515500 W	I4	2020771	RCMT1606M043M TN7525	J65	2021721	12250110700 W	D106
2010174	E16RSTFCR16 WG	C77	2016516	12299515600 W	I4	2020775	RDHT1204MOTX TN7525	J54	2021722	12250111000 W	D106
2010175	CNMG12040422 TT115	B37	2016518	12299515700 W	I4	2020781	RCMT1606MOTX TN7535	J65	2021723	12251234000 W	D104
2010184	E20SSCLCRO9T3 WG	C68	2016520	12299515800 W	I4	2020783	RDHT1606MOTX TN7535	J65	2021743	12251368000 W	D104
2010193	E20SSDUCL11 WG	C74	2016524	12299520400 W	I4	2021331	12391010000 W	J42	2021798	123568160 TTM	D105
2010215	E25TSCLCLO9 WG	C68	2016526	12299525500 W	I4	2021332	12391010400 W	J42	2021804	123567320 TN8025	D97
2010224	E25TSCLCRO9T3 WG	C68	2016528	12299525600 W	I4	2021333	12391010600 W	J42	2021836	123567440 TPC35	D99
2010233	E25STFCL16 WG	C77	2016530	12299525700 W	I4	2021334	12391011000 W	J42	2021873	123567350 THM	D97
2011507	DCMX11T302R18 THM	B50	2016532	12299525800 W	I4	2021335	12391011400 W	J42	2021925	123506602 THM	I6
2012231	LNJX400924E95 TTR	B64	2016544	12299526000 W	I4	2021336	12391011600 W	J47	2021947	CCMT0602042 TT115	B30
2012416	RCMT1606MOTX TN2510	J65	2016547	12299530400 W	I4	2021337	12391012000 W	J47	2022079	CPGT04T1043 TN35	B45
2012418	RCMT1606MOTX TN7525	J65	2016551	12299535600 W	I4	2021338	12391012400 W	J47	2022082	CPGT04T1043 TTR	B45
2012426	RDHT0802MOT TN7525	J43	2016555	12299535800 W	I4	2021339	12391012800 W	J47	2022221	DNMG11040822 TT115	B53
2012446	RDHT1003MOT TN7525	J48	2016562	12299546000 W	I4	2021340	12391013200 W	J47	2022257	CCGT060202AL3 HCK10	B155
2012462	RDHT1605MOTX TT125	J60	2017822	123567330 TN8025	D97	2021341	12391013800 W	J58	2022258	CCGT060202AL3 HWK15	B155
2012480	RDHW1003MOMH TN2510	J48	2017912	123567730 TN8025	D100	2021342	12391020000 W	J53	2022259	CCGT060204AL3 HCK10	B155
2012484	RDHW1204MOMH TN2510	J54	2017973	123568080 THM	D105	2021343	12391020200 W	J53	2022260	CCGT060204AL3 HWK15	B155
2012518	RDMT0802MOT TN7525	J43	2017976	123568100 THM	D105	2021344	12391020400 W	J53	2022261	CCGT09T304AL3 HCK10	B155
2012534	RDMT1003MOT TN7525	J49				2021345	12391020600 W	J53	2022262	CCGT09T304AL3 HWK15	B155
2012564	RDMW0802M0 TN2510	J44									
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2022324	CGGT120404AL3 HWK15	B155	2023618	E16RSTFLC 16 WG	C77	2028555	SPUN120308 THM	B80	2030358	XPHT160420 TN7535	G48, H9
2022325	CGGT120408AL3 HCK10	.....	B155	2023621	.....	E20SSCLCR09 WG	.....	C68	2028560	.....	SPUN120312 THM	.....	B80	2030359	.....	XPHT160424 TN7535	.....	G48, H9
2022326	CGGT120408AL3 HWK15	.....	B155	2023622	.....	E20SSDQCL11 WG	.....	C72	2028562	.....	SPUN120412 THM	.....	B80	2030360	.....	XPHT160425 TN7535	.....	G48, H9
2022327	DCGT070202AL3 HCK10	.....	B156	2023623	.....	E20SSDQCR11 WG	.....	C72	2028565	.....	SPUN150412 THM	.....	B80	2030361	.....	XPHT160425 TN7525	.....	G48, H9
2022328	DCGT070202AL3 HWK15	.....	B156	2023624	.....	E20SSDUCR11 W	.....	C74	2028567	.....	SPUN150412 TTR	.....	B80	2030373	.....	XPHT160432 TN7535	.....	G48, H9
2022329	DCGT070204AL3 HCK10	.....	B156	2023625	.....	E20SSTFLC 16 WG	.....	C77	2028568	.....	SPUN190412 THM	.....	B80	2030374	.....	XPHT160432 TN450	.....	G48, H9
2022330	DCGT070204AL3 HWK15	.....	B156	2023626	.....	E20SSTFCR16 WG	.....	C77	2028579	.....	TCMT110202 THM	.....	B81	2030375	.....	XPHT160440 TN7535	.....	G48, H9
2022331	DCGT11T304AL3 HWK15	.....	B156	2023629	.....	E25TSDUCL11 W	.....	C74	2028587	.....	TCMT110204 THM	.....	B81	2030378	.....	XPHT160412MR TN7535	.....	G49, H9
2022332	DCGT11T308AL3 HCK10	.....	B156	2023630	.....	E25TSDUCR11 W	.....	C74	2028589	.....	TCMT110204 TTR	.....	B81	2030400	.....	SDMT1506PDRMH TN7535	.....	G60
2022335	MDHW120408 THM	.....	I15	2023631	.....	E25TSTFCR16 WG	.....	C77	2028607	.....	TCMT16T304 THM	.....	B81	2030414	.....	SDMT1506PDRMH TN7525	.....	G60
2022370	SNKT1205AZR20 TN7525	.....	F54	2023632	.....	E32USCLCR12 WG	.....	C68	2028624	.....	TCMT16T308 THM	.....	B81	2030417	.....	SDMT1204PDRMH TN7535	.....	G56
2022371	SNKT1205AZR20 TTI25	.....	F54	2023638	.....	SCGT120408AL3 HWK15	.....	B156	2028627	.....	TCMT16T308 TTR	.....	B81	2030419	.....	SDMT1204PDRMH TN7525	.....	G56
2022373	SNKT1205AZR21 TN7525	.....	F54	2024450	.....	SDJCL1616H11 W	.....	C44	2028660	.....	TCMT220408 THM	.....	B81	2030420	.....	SDMT1506PDRML TN7535	.....	G59
2022374	SNKT1205AZR21 TTI25	.....	F54	2024559	.....	VCGT110302AL3 HWK15	.....	B157	2028668	.....	TCMW110204 THM	.....	B83	2030434	.....	SDMT1506PDRML TN7525	.....	G59
2022375	SNKT1205AZR21 THM	.....	F54	2024561	.....	VCGT110304AL3 HWK15	.....	B157	2028670	.....	TCMW16T304 THM	.....	B83	2030437	.....	SDMT1204PDRML TN7535	.....	G55
2022446	12250110100 W	.....	D106	2025073	.....	12146011800 W	.....	Q10, Q13, Q16, Q19	2028806	.....	TPUN110304 THM	.....	B93	2030439	.....	SDMT1204PDRML TN7525	.....	G55
2022447	12250110200 W	.....	D106	2025074	.....	12147548600 W	.....	I4	2028814	.....	TPUN110308 THM	.....	B93	2031018	.....	E06JSCFPL04 WG	.....	C67
2022483	DCGT11T308AL3 HWK15	.....	B156	2025731	.....	12147562300 W	.....	I4	2028821	.....	TPUN160304 THM	.....	B93	2031019	.....	E08KSCFCLO6 WG	.....	C66
2022484	VCGT160404AL3 HCK10	.....	B157	2027339	.....	CCMT090308 TTR	.....	B30	2028830	.....	TPUN160308 THM	.....	B93	2031020	.....	E08KSCCL06 WG	.....	C68
2022485	VCGT160404AL3 HWK15	.....	B157	2027432	.....	CCMT09T308 THM	.....	B30	2028832	.....	TPUN160312 THM	.....	B93	2031021	.....	E10MSCLCR06	.....	C68
2022487	VCGT160408AL3 HCK10	.....	B157	2027465	.....	CCMT09T312 TTR	.....	B30	2028833	.....	TPUN220412 THM	.....	B93	2031022	.....	E10MSCFL06 WG	.....	C68
2022488	VCGT160408AL3 HWK15	.....	B157	2027472	.....	CCMT120408 THM	.....	B30	2028843	.....	TPUN220412 TTR	.....	B93	2031023	.....	E12QSDQL07 WG	.....	C72
2022489	VCGT160412AL3 HWK15	.....	B157	2027472	.....	CCMT120408 THM	.....	B30	2028847	.....	TPUN220412 TTR	.....	B93	2031024	.....	E12QSTFCR11 WG	.....	C77
2022547	12251763100 W	.....	D103	2027484	.....	CCMT120408 TTR	.....	B30	2029040	.....	XPHT160408 TN2510	.....	G48, H9	2031025	.....	E16RSDQCR07 WG	.....	C72
2022548	12251764000 W	.....	D103	2027507	.....	CCMW060204 THM	.....	B34	2029042	.....	XPHT160408 TN7525	.....	G48, H9	2031026	.....	E20SSCLCLO9 WG	.....	C68
2022549	12251764100 W	.....	D103	2027509	.....	CCMW090304 THM	.....	B34	2029043	.....	XPHT160408 TN7535	.....	G48, H9	2031027	.....	CCMT060204 THM	.....	C68
2022550	12251764400 W	.....	D103	2027511	.....	CCMW09T304 THM	.....	B34	2029047	.....	XPHT160412 TN2510	.....	G48, H9	2031028	.....	E25TSCLCLO9T3 WG	.....	C68
2022551	12251764500 W	.....	D103	2027512	.....	CCMW09T308 THM	.....	B34	2029048	.....	XPHT160412 TTI25	.....	G48, H9	2031029	.....	E25TSCLCR09 WG	.....	C68
2022552	12251765200 W	.....	D103	2027524	.....	CCMW120404 THM	.....	B34	2029050	.....	XPHT160412 SPTM00	.....	G48, H9	2031658	.....	CCMT060202 THM	.....	B30
2022553	12251765300 W	.....	D103	2027525	.....	CCMW120408 THM	.....	B34	2029056	.....	XPHT160412MR TN2510	.....	G49, H9	2031665	.....	CCMT060204 TTI15	.....	B30
2022555	12251766200 W	.....	D103	2027567	.....	CNMGI120408 THM	.....	B37	2029058	.....	XPHT160412MR TN7525	.....	G49, H9	2031666	.....	CCMT060204 THM	.....	B30
2022556	12251766300 W	.....	D103	2027768	.....	DCMT070204 THM	.....	B47	2029060	.....	XPHT160416 TN2510	.....	G48, H9	2031668	.....	CCMT060204 TTR	.....	B30
2022557	12251766400 W	.....	D103	2027804	.....	DCMT11T304 TTI15	.....	B47	2029062	.....	XPHT160416 TN7525	.....	G48, H9	2031693	.....	CCMT090304 THM	.....	B30
2022558	12251766500 W	.....	D103	2027805	.....	DCMT11T304 THM	.....	B47	2029064	.....	XPHT160420 TN7525	.....	G48, H9	2031695	.....	CCMT090304 TTR	.....	B30
2022559	12251768500 W	.....	D103	2027807	.....	DCMT11T304 TTR	.....	B47	2029072	.....	XPHT160440 TN7525	.....	G48, H9	2031706	.....	CCMT090308 THM	.....	B30
2022560	12251783000 W	.....	D102	2027843	.....	DCMT11T308 THM	.....	B47	2029074	.....	XPNT160412 TN2510	.....	G49, H9	2031723	.....	CCMT090304 THM	.....	B30
2022561	12251783100 W	.....	D102	2027868	.....	DCMT11T312 THM	.....	B47	2029221	.....	12146010000	.....	Q10, Q13, Q16, Q19	2031733	.....	CCMW060202 THM	.....	B34
2022562	12251784000 W	.....	D102	2027887	.....	DCMT150404 THM	.....	B47	2029222	.....	12146012600 W	.....	D102-103	2031734	.....	CCMW090302 THM	.....	B34
2022563	12251784100 W	.....	D102	2027908	.....	DCMT150408 THM	.....	B47	2029223	.....	12146012700 W	.....	D102-103	2031737	.....	DCMW150408 THM	.....	B50
2022564	12251785200 W	.....	D102	2027910	.....	DCMT150408 TTR	.....	B47	2029225	.....	12146021100 W	.....	H5	2031786	.....	TPGA110208 THM	.....	B91
2022565	12251785300 W	.....	D102	2027932	.....	DCMT150412 THM	.....	B47	2029226	.....	12146021100 W	.....	H5	2031794	.....	XPHT160404ALP THM-U	.....	G47, H8
2022566	12251785400 W	.....	D102	2027965	.....	DCMT150416 THM	.....	B47	2029478	.....	12148000600	.....	F44-45, G44-46, G54, H4-5, J46-47, J52-53	2031797	.....	XPHT160408ALP THM-U	.....	G47, H8
2022567	12251785500 W	.....	D102	2027966	.....	DCMW070204 THM	.....	B50	2029488	.....	12148007500	.....	F52-53, F58, G58, J58-59, J64, Q10, Q13, Q16, Q19	2031799	.....	XPHT160412ALP THM-U	.....	G47, H8
2022568	12251786400 W	.....	D102	2027967	.....	DCMW11T304 THM	.....	B50	2029535	.....	12148036000 W	.....	D104	2031803	.....	XPHT160432 TN7525	.....	G48, H9
2022569	12251788400 W	.....	D102	2028115	.....	RCMT060200 THM	.....	B65	2029542	.....	12148040900 W	.....	D106	2031825	.....	12147676800 W	.....	I4
2022648	12299535500 W	.....	I4	2028129	.....	RCMT080300 THM	.....	B65	2029543	.....	12148041000 W	.....	D106	2031826	.....	12147676900 W	.....	I4
2022649	12299535700 W	.....	I4	2028143	.....	RCMT10T300 THM	.....	B65	2029544	.....	12148041100 W	.....	D102-103, D106	2031827	.....	12147677000 W	.....	I4
2022650	12299536000 W	.....	I4	2028145	.....	RCMT10T300 TTR	.....	B65	2029545	.....	12148041200 W	.....	D106	2031888	.....	E10MSTFCR11 WG	.....	C77
2022652	12299545800 W	.....	I4	2028157	.....	RCMT120400 THM	.....	B65	2029546	.....	12148041300 W	.....	D102-104	2031953	.....	12148574000 W	.....	D106
2022787	123568081 THM	.....	D105	2028170	.....	RCMT1606M043 THM	.....	B65	2029559	.....	12148046000 W	.....	D106	2032252	.....	12748605300 W	.....	I13-14
2022789	123568140 THM	.....	D105	2028196	.....	RCMX2507M0T TTR	.....	B66	2029560	.....	12148050000	.....	I10-11, I13-14	2033475	.....	12749726100 W	.....	I10-11
2022790	123568160 THM	D105	2028225	SCMT090304 TTR	B68	2029564	12148051200 W	D106	2050081	MS211	D74-76, D78
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2022854	CGGT09T302AL3 HWK15	B155	2028270	SCMT09T308 THM	B68	2029559	12148046000 W	D106	2055461	12748701000	F7, F15, F20, F26, F32, F38
2022858	CGGT09T308AL3 HWK15	.....	B155	2028272	.....	SCMT09T308 TTR	.....	B68	2029560	.....	12148050000	.....	I10-11, I13-14	2065591	.....	12399010800 W	.....	I10
2022859	CGGT120402AL3 HWK15	.....	B155	2028286	.....	SCMT120408 THM	.....	B68	2029564	.....	12148041300 W	.....	D102-104	2067140	.....	RCMT1606M043M TN7535	.....	J65
2022861	DCGT11T302AL3 HWK15	.....	B156	2028289	.....	SCMT120408 TTR	.....	B68	2029598	.....	12148086600 W	.....	J42	2067470	.....	M270BD016A16L155 W	.....	J72
2023597	E06JSCPL04 WG	.....	C70	2028295	.....	SCMT120412 TTI15	.....	B68	2029599	.....	12148086800	.....	J70-72	2067540	.....	12399011400 W	.....	I10
2023598	E06JSCPLPR04 WG	C70	2028296	SCMT120412 THM	B68	2029604	12148093000	J70-73, J86-88, J92-94	2067541	12399013400 W	I10
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2627983	323002-000050 K30F-TICN	M4	2759486	7S2SS	P40	2759833	7F4-2438A	P35	2760027	7F3-1563A	P33
2627984	323002-000060 K30F-TICN	M4	2759489	7S2SE	P41	2759840	7F4-2375T	P35	2760034	7F3-1535A	P33
2627985	323002-000080 K30F-TICN	M4	2759491	7S2.5SS	P40	2759843	7F4-2375A	P35	2760035	7F3-1531T	P33
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2628500	423037-000100 K30F-DCHP	M8	2759621	7FZ-0438A	P28	2759911	7F4-2008T	P34	2760121	7F2-1281T	P31
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2639023	M2701F20R4 TN2525	J90	2759703	7F7-3563T	P37	2759921	7F4-1969A	P34	2760137	7F2-1250A	P31
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2651320	524149-000100 K10F-DCL	L130	2759739	7F6-3125A	P37	2759936	7F4-1890A	P34	2760159	7F2-1188T	P31
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2759472	7S4SS	P40	2759789	7F5-2656T	P36	2759985	7F3-1719T	P33	2760214	7F2-1047T	P31
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2759475	7S4SE	P41	2759802	7F5-2563A	P36	2759991	7F3-1688T	P33	2760222	7F2-1031A	P31
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2759477	7S3TM	P44	2759811	7F4-2563T	P35	2759996	7F3-1656T	P33	2760226	7F2-1016T	P31
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2760247	7F2-0969T	P31	2760481	7F0-0547A	P29	2957430	RDMT1204MOTX TN6525	J55	2964248	TDS301A04400 WU25PD	076
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2760256	7F1-0953A	P30	2760492	7F0-0516A	P29	2957535	RCMT1606MOTX TN6525	J65	2964251	TDS301A04650 WU25PD	076
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2760262	7F1-0938T	P30	2760718	56-2017	P40-41, P44-45	2957537	RCMT1606M043M TN6540	J65	2964273	TDS301A04760 WU25PD	076
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2760280	7F1-0891A	P30	2891178	7F0-0630A	P29	2957543	M270BR20 TN6540	J77	2964279	TDS301A05200 WU25PD	077
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2760287	7F1-0866T	P30	2895961	7S2TS	P44	2957547	HPGT06T3DZERLD TN6525	F46	2964281	TDS301A05400 WU25PD	077
2760290	7F1-0859T	P30	2895963	7S7SL	P41	2957548	HPGT06T3DZFRDL TN6501	F46	2964282	TDS301A05500 WU25PD	077
2760292	7F1-0859A	P30	2895971	7F4-2087A	P34	2957549	HPGT06T3DZERGD3W TN6510	F47	2964293	TDS301A05550 WU25PD	077
2760296	7F1-0844T	P30	2895976	7F2-1254T	P31	2957552	HPPT06T3DZENG TN6540	F47	2964294	TDS301A05560 WU25PD	077
2760300	7F1-0828T	P30	2907270	7F0-0509A	P29	2957583	HPPT06T3DZENG TN6520	F47	2964295	TDS301A05600 WU25PD	077
2760302	7F1-0828A	P30	2907272	7F2-1231A	P31	2957584	HPGT06T3DZERGD3W TN6525	F47	2964296	TDS301A05700 WU25PD	077
2760303	7F1-0827T	P30	2940716	7F1-0866A	P30	2957585	HPGT06T3DZERLD TN6520	F46	2964297	TDS301A05800 WU25PD	077
2760305	7F1-0827A	P30	2952333	123567360 TN7525	D97	2957586	HPPT06T3DZENG TN6525	F47	2964298	TDS301A05900 WU25PD	077
2760310	7F1-0813T	P30	2952335	123567460 TN7525	D99	2957587	HPGT06T3DZERLD TN6540	F46	2964299	TDS301A05950 WU25PD	077
2760315	7F1-0813A	P30	2952336	123567480 TN7525	D99	2957588	HPGT06T3DZENG TN6525	F47	2964300	TDS301A06000 WU25PD	077
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2760328	7F1-0787T	P30	2952341	123568080 TN7525	D105	2962745	12250023200 W	D102	2964315	TDS301A06400 WU25PD	077
2760330	7F1-0787A	P30	2952342	123568100 TN7525	D105	2962751	12250025200 W	D102	2964316	TDS301A06500 WU25PD	077
2760331	7F1-0781T	P30	2952343	123568120 TN7525	D105	2964133	XPHT160408 TN6510	G48, H9	2964317	TDS301A06600 WU25PD	077
2760335	7F1-0781A	P30	2952344	123568140 TN7525	D105	2964136	XPHT160408ALP TN6501	G47, H8	2964318	TDS301A06700 WU25PD	077
2760338	7F1-0768T	P30	2952345	123568160 TN7525	D105	2964141	XPNT160412 TN6525	G49, H9	2964319	TDS301A06750 WU25PD	077
2760341	7F1-0766T	P30	2952350	123567360 TN7535	D97	2964142	XPHT160412MR TN6540	G49, H9	2964320	TDS301A06800 WU25PD	077
2760344	7F1-0766A	P30	2952351	123567380 TN7535	D97	2964163	XPHT160408ERGE TN6520	G48, H8	2964321	TDS301A06900 WU25PD	077
2760359	7F1-0748T	P30	2952352	123567460 TN7535	D99	2964164	XPHT160408 TN6540	G48, H9	2964322	TDS301A07000 WU25PD	077
2760361	7F1-0748A	P30	2952353	123567480 TN7535	D99	2964165	XPHT160412 TN6540	G48, H9	2964333	TDS301A07100 WU25PD	077
2760362	7F1-0734T	P30	2952354	123567702 TN7535	D100	2964166	XPHT160416 TN6540	G48, H9	2964334	TDS301A07140 WU25PD	077
2760365	7F1-0734A	P30	2952355	123567703 TN7535	D100	2964167	XPHT160412 TN6520	G48, H9	2964335	TDS301A07200 WU25PD	077
2760371	7F1-0719T	P30	2952356	123567704 TN7535	D100	2964168	XPHT160408 TN6520	G48, H9	2964336	TDS301A07300 WU25PD	077
2760377	7F1-0709T	P30	2952357	123567720 TN7535	D100	2964169	XPHT160412 TN6510	G48, H9	2964337	TDS301A07400 WU25PD	077
2760380	7F1-0709A	P30	2952358	123567721 TN7535	D100	2964170	XPHT160408ERGE TN6540	G48, H8	2964338	TDS301A07500 WU25PD	077
2760381	7F1-0703T	P30	2952359	123567730 TN7535	D100	2964171	XPHT160412ERGE TN6510	G48, H8	2964339	TDS301A07540 WU25PD	077
2760383	7F1-0703A	P30	2952360	123567731 TN7535	D100	2964172	XPHT160408ERGE TN6510	G48, H8	2964340	TDS301A07600 WU25PD	077
2760386	7F0-0689T	P29	2952361	123567740 TN7535	D100	2964173	XPHT160412ERGE TN6520	G48, H8	2964341	TDS301A07700 WU25PD	077
2760390	7F0-0688T	P29	2952363	123568080 TN7535	D105	2964174	XPNT160412 TN6540	G49, H9	2964342	TDS301A07800 WU25PD	077
2760393	7F0-0688A	P29	2952364	123568100 TN7535	D105	2964175	XPHT160412ERGE TN6525	G48, H8	2964353	TDS301A07900 WU25PD	077
2760397	7F0-0672T	P29	2952365	123568120 TN7535	D105	2964176	XPHT160408ERGE TN6525	G48, H8	2964354	TDS301A07940 WU25PD	077
2760399	7F0-0672A	P29	2952366	123568140 TN7535	D105	2964179	XPHT160412ERGE TN6540	G48, H8	2964355	TDS301A08000 WU25PD	077
2760404	7F0-0669A	P29	2952367	123568160 TN7535	D105	2964180	XPHT160412 TN6525	G48, H9	2964356	TDS301A08100 WU25PD	078
2760413	7F0-0656A	P29	2952747	7F4-2016T	P34	2964201	SNKT1205AZER20 TN6540	F54	2964357	TDS301A08200 WU25PD	078
2760415	7F0-0650T	P29	2953284	123567330 TN6030	D97	2964204	SNMT1205AZR31 TN6540	F55	2964358	TDS301A08300 WU25PD	078
2760418	7F0-0641T	P29	2953286	123567340 TN6030	D97	2964205	SNKT1205AZR31 TN6540	F55	2964359	TDS301A08330 WU25PD	078
2760420	7F0-0641A	P29	2953289	123567320 TN6030	D97	2964206	SNMT1205AZR31 TN6525	F55	2964360	TDS301A08400 WU25PD	078
2760424	7F0-0630T	P29	2953291	123567230 TN6030	D98	2964208	SNKT1205AZR31 TN6525	F55	2964361	TDS301A08500 WU25PD	078
2760430	7F0-0625T	P29	2953432	7S7SM	P40	2964222	TDS301A03000 WU25PD	076	2964362	TDS301A08600 WU25PD	078
2760440	7F0-0610A	P29	2953663	123567440 TN6030	D99	2964233	TDS301A03100 WU25PD	076	2964373	TDS301A08700 WU25PD	078
2760441	7F0-0609T	P29	2953666	123567380 TN6030	D97	2964234	TDS301A03200 WU25PD	076	2964374	TDS301A08800 WU25PD	078
2760444	7F0-0609A	P29	2953667	123567240 TN6030	D98	2964235	TDS301A03250 WU25PD	076	2964375	TDS301A08900 WU25PD	078
2760449	7F0-0594T	P29	2953671	123567450 TN6030	D99	2964236	TDS301A03300 WU25PD	076	2964376	TDS301A09000 WU25PD	078
2760452	7F0-0594A	P29	2953672	123567231 TN6030	D98	2964237	TDS301A03400 WU25PD	076	2964377	TDS301A09100 WU25PD	078
2760453	7F0-0591T	P29	2953673	123567350 TN6030	D97	2964238	TDS301A03500 WU25PD	076	2964378	TDS301A09130 WU25PD	078
2760454	7F0-0591A	P29	2953674	123567360 TN6030	D97	2964239	TDS301A03600 WU25PD	076	2964379	TDS301A09200 WU25PD	078
2760458	7F0-0578T	P29	2953675	123567480 TN6030	D99	2964240	TDS301A03700 WU25PD	076	2964380	TDS301A09300 WU25PD	078
2760460	7F0-0578A	P29	2953676	123567241 TN6030	D98	2964241	TDS301A03800 WU25PD	076	2964381	TDS301A09400 WU25PD	078
2760463	7F0-0571A	P29	2953677	123567460 TN6030	D99	2964242	TDS301A03900 WU25PD	076	2964382	TDS301A09500 WU25PD	078
2760466	7F0-0563T	P29	2953678	123567430 TN6030	D99	2964243	TDS301A04000 WU25PD	076	2964393	TDS301A09520 WU25PD	078
2760472	7F0-0563A	P29	2953679	123567420 TN6030	D99	2964244	TDS301A04100 WU25PD	076	2964394	TDS301A09600 WU25PD	078
2760473	7F0-0551T	P29	2957427	RCMT1606MOTX TN6540	J65	2964245	TDS301A04200 WU25PD	076	2964395	TDS301A09700 WU25PD	078
2760477	7F0-0551A	P29	2957428	RDMT1003MOT TN6540	J49	2964246	TDS301A04300 WU25PD	076	2964396	TDS301A09800 WU25PD	078

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2965072	TDS501A16500 WU25PD	083	2968519	TDS503A05950 WU25PD	090	3026653	20MHCO80M	0115	3032728	CDJNR2525M15MN7 WG	C33
2965073	TDS501A16670 WU25PD	083	2968520	TDS503A06100 WU25PD	090	3026654	20MHCO90M	0115	3037596	HNGJ0905ANSNGD TN6540	F28, F34, F40
2965074	TDS501A16800 WU25PD	083	2968521	TDS503A06350 WU25PD	090	3026655	20MHCO100M	0115			
2965075	TDS501A17000 WU25PD	083	2968522	TDS503A06500 WU25PD	090	3026656	20MHCO110M	0115	3044700	7S2SM	P40
2965076	TDS501A17500 WU25PD	083	2968523	TDS503A06750 WU25PD	090	3026657	20MHCO120M	0115	3048459	022804-000020 K30F	L86-87
2965077	TDS501A17800 WU25PD	084	2968524	TDS503A06800 WU25PD	090	3026658	20MHCO130M	0115	3048461	022804-000025 K30F	L86-87
2965078	TDS501A18000 WU25PD	084	2968525	TDS503A07000 WU25PD	090	3026659	20MHCO140M	0115	3048480	022806-000020 K30F	L86
2965079	TDS501A18500 WU25PD	084	2968526	TDS503A07140 WU25PD	090	3026660	20MHCO150M	0115	3048483	022806-000025 K30F	L86
2965080	TDS501A18800 WU25PD	084	2968527	TDS503A07500 WU25PD	090	3026661	20MHCO160M	0115	3048485	322804-000020 K30F-TICN	L86
2965081	TDS501A19000 WU25PD	084	2968528	TDS503A07540 WU25PD	090	3026662	25MHCO30M	0115	3048486	322804-000025 K30F-TICN	L86
2965082	TDS501A19050 WU25PD	084	2968529	TDS503A07800 WU25PD	090	3026663	25MHCO40M	0115	3048488	322806-000020 K30F-TICN	L86
2965083	TDS501A19500 WU25PD	084	2968530	TDS503A07940 WU25PD	090	3026664	25MHCO50M	0115	3048489	322806-000025 K30F-TICN	L86
2965084	TDS501A19800 WU25PD	084	2968531	TDS503A08000 WU25PD	091	3026665	25MHCO60M	0115	3048490	422804-000020 K30F-DCF	L87
2965085	TDS501A20000 WU25PD	084	2968532	TDS503A08330 WU25PD	091	3026666	25MHCO70M	0115	3048491	422804-000025 K30F-DCF	L87
2967699	7F2-1266T	P31	2968533	TDS503A08500 WU25PD	091	3026667	25MHCO80M	0115	3048492	422806-000020 K30F-DCF	L87
2968374	TDS502A11400 WU25PD	088	2968534	TDS503A09000 WU25PD	091	3026668	25MHCO90M	0115	3048503	422806-000025 K30F-DCF	L87
2968375	TDS502A11500 WU25PD	088	2968535	TDS503A09130 WU25PD	091	3026669	25MHCO100M	0115	3053979	7F0-0625A	P29
2968376	TDS502A11600 WU25PD	088	2968536	TDS503A09500 WU25PD	091	3026670	25MHCO120M	0115	3055655	050280-001400 K10F	R9
2968377	TDS502A11700 WU25PD	088	2968537	TDS503A09520 WU25PD	091	3026671	25MHCO140M	0115	3055656	050280-001600 K10F	R9
2968378	TDS502A11800 WU25PD	088	2968538	TDS503A09800 WU25PD	091	3026672	25MHCO160M	0115	3055657	050280-001800 K10F	R9
2968379	TDS502A11900 WU25PD	088	2968539	TDS503A09920 WU25PD	091	3026673	32MHCO60M	0115	3056095	050280-002000 K10F	R9
2968380	TDS502A11910 WU25PD	088	2968540	TDS503A10000 WU25PD	091	3026676	32MHCO70M	0115	3056096	050280-002200 K10F	R9
2968381	TDS502A12000 WU25PD	088	2968541	TDS503A10200 WU25PD	091	3026677	32MHCO80M	0115	3056097	050280-002400 K10F	R9
2968382	TDS502A12300 WU25PD	088	2968542	TDS503A10320 WU25PD	091	3026678	32MHCO90M	0115	3056098	050280-002500 K10F	R9
2968383	TDS502A12500 WU25PD	088	2968543	TDS503A10500 WU25PD	091	3026679	32MHCO100M	0115	3056099	050280-002600 K10F	R9
2968384	TDS502A12700 WU25PD	088	2968544	TDS503A10720 WU25PD	091	3026680	32MHCO110M	0115	3056100	050280-002800 K10F	R9
2968385	TDS502A12800 WU25PD	088	2968545	TDS503A10800 WU25PD	091	3026681	32MHCO120M	0115	3056102	050280-003000 K10F	R9
2968386	TDS502A13000 WU25PD	088	2968546	TDS503A11000 WU25PD	091	3026682	32MHCO130M	0115	3056273	050280-003200 K10F	R9
2968387	TDS502A13500 WU25PD	088	2968547	TDS503A11500 WU25PD	092	3026683	32MHCO140M	0115	3066118	M1200D160Z12HN09	F31
2968388	TDS502A13800 WU25PD	088	2968548	TDS503A11800 WU25PD	092	3026684	32MHCO150M	0115	3066119	M1200D160Z16HN09	F31-32
2968389	TDS502A14000 WU25PD	088	2968549	TDS503A11910 WU25PD	092	3026685	32MHCO160M	0115	3066479	XNGJ0905ANSNGD3W TN6540	F35
2968400	TDS502A14290 WU25PD	088	2968550	TDS503A12000 WU25PD	092	3027222	7F4-2559A	P35	3077292	450280-002000 K10F-DCF	R9
2968401	TDS502A14500 WU25PD	088	2968551	TDS503A12300 WU25PD	092	3029009	S40TCLNLR12MX7 WG	C62	3081507	M1200D080Z06HN09	F31
2968402	TDS502A14800 WU25PD	088	2968552	TDS503A12500 WU25PD	092	3029010	S40TCLNLR12MX7 WG	C62	3081508	M1200D125Z10HN09	F31
2968403	TDS502A15000 WU25PD	088	2968553	TDS503A12700 WU25PD	092	3029011	S40TCLNLR12MN4 WG	C62	3083635	7F0-0689A	P29
2968404	TDS502A15500 WU25PD	088	2968554	TDS503A12800 WU25PD	092	3029012	S40TCLNLR12MN4 WG	C62	3084312	450281-001400 K10F-DCF	R5
2968405	TDS502A15800 WU25PD	088	2968555	TDS503A13000 WU25PD	092	3029143	S40TCLNLR12MN7 WG	C62	3084317	450281-001600 K10F-DCF	R5
2968406	TDS502A15870 WU25PD	088	2968556	TDS503A13500 WU25PD	092	3029144	S40TCLNLR12MN7 WG	C62	3084319	450281-002000 K10F-DCF	R5
2968407	TDS502A16000 WU25PD	088	2968557	TDS503A13800 WU25PD	092	3029151	S40TCLNLR12MX7 WG	C63	3084320	450281-003000 K10F-DCF	R5
2968408	TDS502A16500 WU25PD	088	2968558	TDS503A14000 WU25PD	092	3029152	S40TCLNLR12MX7 WG	C63	3084321	450281-001800 K10F-DCF	R5
2968409	TDS502A16670 WU25PD	088	2968559	TDS503A14290 WU25PD	092	3029153	S40TCLNLR12MN7 WG	C64	3084322	450281-002200 K10F-DCF	R5
2968410	TDS502A16800 WU25PD	088	2968560	TDS503A14500 WU25PD	092	3029154	S40TCLNLR12MX7 WG	C64	3084323	450281-002400 K10F-DCF	R5
2968411	TDS502A17000 WU25PD	088	2968561	TDS503A14800 WU25PD	092	3030017	HNGJ0905ANSNGD TN7535	F33, F39	3084324	450281-002500 K10F-DCF	R5
2968412	TDS502A17500 WU25PD	088	2968562	TDS503A15000 WU25PD	092	3030034	HNGJ0905ANSNGD TN6540	F33, F39	3084325	450281-002600 K10F-DCF	R5
2968413	TDS502A17800 WU25PD	088	2968563	TDS503A15500 WU25PD	092	3032539	7F2-1266A	P31	3084327	450281-002800 K10F-DCF	R5
2968414	TDS502A18000 WU25PD	088	2968564	TDS503A15800 WU25PD	092	3032544	CDJNL2525M15MN7 WG	C33	3084328	450281-003200 K10F-DCF	R5
2968415	TDS502A18500 WU25PD	088	2968565	TDS503A15870 WU25PD	092	3032545	CDJNR3225P15MN7 WG	C33	3084512	450280-001400 K10F-DCF	R9
2968416	TDS502A18800 WU25PD	088	2968566	TDS503A16000 WU25PD	092	3032546	CDJNL3225P15MN7 WG	C33	3084526	450280-001600 K10F-DCF	R9
2968417	TDS502A19000 WU25PD	088	2972689	7F7-3813A	P37	3032549	CRDNN2525M12MN4 WG	C35	3084528	450280-001800 K10F-DCF	R9
2968418	TDS502A19050 WU25PD	088	2986716	7S3SE	P41	3032550	CRDNN3225P12MN4 WG	C35	3084529	450280-002200 K10F-DCF	R9
2968419	TDS502A19500 WU25PD	088	3020185	SDMT1204PDRML TN6540	G55	3032551	CRDNN2525M12MN7 WG	C35	3084530	450280-002400 K10F-DCF	R9
2968420	TDS502A19800 WU25PD	088	3021212	MS1242CG	J23, J31, J36	3032552	CRDNN3225P12MN7 WG	C35	3084531	450280-002500 K10F-DCF	R9
2968421	TDS502A20000 WU25PD	088	3024915	7F2-1141A	P31	3032675	CRSNN3225P12MN4 WG	C35	3084532	450280-002600 K10F-DCF	R9
2968422	TDS503A03000 WU25PD	089	3025376	M1200D063Z07HN09	F31-32	3032676	CRSNN3225P12MN4 WG	C35	3084593	450280-002800 K10F-DCF	R9
2968503	TDS503A03300 WU25PD	089	3025377	M1200D080Z09HN09	F31-32	3032677	CRSNN2525M12MN7 WG	C35	3084594	450280-003000 K10F-DCF	R9
2968504	TDS503A03500 WU25PD	089	3025378	M1200D100Z11HN09	F31-32	3032678	CRSNN2525M12MN7 WG	C35	3084595	450280-003200 K10F-DCF	R9
2968505	TDS503A03700 WU25PD	089	3026450	12MHCO30M	0115	3032679	CRSNN3225P12MN7 WG	C35	3084978	050281-001400 K10F	R5
2968506	TDS503A03800 WU25PD	089	3026451	12MHCO40M	0115	3032680	CRSNN3225P12MN7 WG	C35	3084983	050281-001600 K10F	R5
2968507	TDS503A04000 WU25PD	089	3026452	12MHCO50M	0115	3032691	CCLNR2525M12MX7 WG	C31	3084992	050281-001800 K10F	R5
2968508	TDS503A04200 WU25PD	089	3026643	12MHCO60M	0115	3032692	CCLNR2525M12MX7 WG	C31	3085083	050281-002000 K10F	R5
2968509	TDS503A04370 WU25PD	089	3026644	12MHCO70M	0115	3032713	CCLNR3225P12MX7 WG	C31	3085084	050281-002200 K10F	R5
2968510	TDS503A04500 WU25PD	089	3026645	12MHCO80M	0115	3032715	CCLNR2525M12MN4 WG	C31	3085087	050281-002400 K10F	R5
2968511	TDS503A04700 WU25PD	089	3026646	12MHCO90M	0115	3032716	CCLNR2525M12MN4 WG	C31	3085089	050281-002600 K10F	R5
2968512	TDS503A04760 WU25PD	089	3026647	12MHCO100M	0115	3032717	CCLNR2525M12MN7 WG	C31	3085092	050281-002800 K10F	R5
2968513	TDS503A04800 WU25PD	089	3026648	20MHCO30M	0115	3032719	CCLNR3225P12MN7 WG	C31	3085104	050281-003000 K10F	R5
2968514	TDS503A05000 WU25PD	090	3026649	20MHCO40M	0115	3032723	CCLNR2525M12MF7 WG	C32	3088200	7F2-1016A	P31
2968515	TDS503A05160 WU25PD	090	3026650	20MHCO50M	0115	3032726	CDJNR2525M15MX7 WG	C32	3088746	7F2-1156A	P31
2968516	TDS503A05500 WU25PD	090	3026651	20MHCO60M	0115						

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3093593	M1200D125214HN09	F31-32	3384428	M270TF16R03 TN2525	J90	3477329	70N716006MT ALTIM-MT1	L141	3484680	510201500. UNCOATED	D33
3093594	M1200D063206HN09	F31	3384429	M270TF16R05 TN2525	J90	3484681	510202000. UNCOATED	L124	3548062	SCMT09T308MU TN5120	B69
3093721	HNGJ0905ANSNGD TN7535	F28, F34, F40	3384430	M270TF16R1 TN2525	J90	3484682	510202500. UNCOATED	L124	3558220	CCMT060208MU TN5120	B33
3094667	SDMT1204PDRML TN6520	G55	3384431	M270TF16R2 TN2525	J90	3484683	510203000. UNCOATED	L124	3558297	CCMT120408MU TN5120	B33
3094669	SDMT1204PDRMH TN6520	G56	3384453	M270TF20R05 TN2525	J90	3484684	510205001. UNCOATED	L124	3558306	SCMT090308MU TN5120	B69
3096207	7F2-1063A	P31	3384454	M270TF20R1 TN2525	J90	3484685	510205002. UNCOATED	L124	3562029	606266 W	D32
3096208	7F2-1024A	P31	3396984	MS2085	J11-12	3484686	510208003. UNCOATED	L124	3563900	HNGJ0905ANSNH D TN6520	F28, F34, F40
3099442	7F1-0922A	P30	3403492	70N712005MT ALTIM-MT1	L141	3484687	510210004. UNCOATED	L124	3563901	HNGJ0905ANSNH D TN6525	F28, F34, F40
3101466	70N610004MT ALTIM-MT1	L140	3450355	MS1234CG	G8, G24, G35, J6, J12, J23, J53, J59, J64	3484688	510212005. UNCOATED	L124	3563902	HNGJ0905ANSNH D TN6540	F28, F34, F40
3101467	70N612005MT ALTIM-MT1	L140	3450356	MS2189C	G35	3484689	510214014. UNCOATED	L124	3564083	HNGJ090543ANSNH D TN6520	F28, F34, F40
3104431	7F6-3188N	P37	3462450	47N704002LT TIALN-LT	L9	3484690	510216006. UNCOATED	L124	3564084	HNGJ090543ANSNH D TN6540	F28, F34, F40
3107859	510206002. UNCOATED	L124	3462451	47N704012LT TIALN-LT	L9	3484691	510218018. UNCOATED	L124	3592826	477804002MW ALTIM-MW	L6
3107860	510204001. UNCOATED	L124	3462452	47N704012MT ALTIM-MT	L9	3484692	510220007. UNCOATED	L124	3592827	477805002MW ALTIM-MW	L6
3114699	7F1-0750A	P30	3462453	47N704022LT TIALN-LT	L9	3484693	510303000. UNCOATED	L125	3592828	477806002MW ALTIM-MW	L6
3117962	XNGJ0905ANSNGD3W TN6510	F35	3462454	47N705002LT TIALN-LT	L9	3484694	510304001. UNCOATED	L125	3592829	477807003MW ALTIM-MW	L6
3119541	HNGJ0905ANSNGD TN6520	F28, F34, F40	3462455	47N705012LT TIALN-LT	L9	3484695	510305001. UNCOATED	L125	3592830	477808003MW ALTIM-MW	L6
3121225	193.492	J28-31	3462456	47N705012MT ALTIM-MT	L9	3484696	510306002. UNCOATED	L125	3592831	477809004MW ALTIM-MW	L6
3133084	490607003RT TIALN-RT	L65	3462457	47N706002LT TIALN-LT	L9	3484697	510308003. UNCOATED	L125	3592832	477810004MW ALTIM-MW	L6
3133085	490609004RT TIALN-RT	L65	3462458	47N706002MT ALTIM-MT	L9	3484698	510310004. UNCOATED	L125	3592833	477811004MW ALTIM-MW	L6
3133086	490611005RT TIALN-RT	L65	3462459	47N706012LT TIALN-LT	L9	3484699	510312005. UNCOATED	L125	3592834	477812005MW ALTIM-MW	L6
3133087	490613014RT TIALN-RT	L65	3462460	47N706012MT ALTIM-MT	L9	3484700	510314014. UNCOATED	L125	3592835	477813005MW ALTIM-MW	L6
3133459	MS1294CG	G8, G24, G35, J6, J23, J31	3462461	47N706022LT TIALN-LT	L9	3484701	510316018. UNCOATED	L125	3592836	477814014MW ALTIM-MW	L6
3279755	7F7-3543T	P37	3462462	47N708003LT TIALN-LT	L9	3484702	510318018. UNCOATED	L125	3592837	477815004MW ALTIM-MW	L6
3279914	7S0.5TE	P45	3462463	47N708003MT ALTIM-MT	L9	3484703	510320007. UNCOATED	L125	3592838	477816004MW ALTIM-MW	L6
3279918	7S1.5SE	P41	3462464	47N708013LT TIALN-LT	L9	3484704	510322007. UNCOATED	L126	3592839	477817004MW ALTIM-MW	L6
3279923	7S2.5TM-4MT	P44	3462465	47N708013MT ALTIM-MT	L9	3484705	510324014. UNCOATED	L126	3592840	477818004MW ALTIM-MW	L6
3279924	7S2.5TS	P44	3462466	47N708023LT TIALN-LT	L9	3484706	510326018. UNCOATED	L126	3592841	477819004MW ALTIM-MW	L6
3325040	SDMT1204PDRMH TN6525	G56	3462467	47N708033LT TIALN-LT	L9	3484707	510328013. UNCOATED	L126	3592842	477820007MW ALTIM-MW	L6
3325310	M1200D040203B25HN09	F30	3462468	47N710004LT TIALN-LT	L9	3484708	510330003. UNCOATED	L126	3592843	477821005MW ALTIM-MW	L6
3325311	M1200D040204B25HN09	F30	3462469	47N710004MT ALTIM-MT	L9	3484709	510332018. UNCOATED	L126	3592844	477822007MW ALTIM-MW	L6
3325312	M1200D050204HN09	F31	3462470	47N710014LT TIALN-LT	L9	3484710	510334014. UNCOATED	L126	3592845	477823007MW ALTIM-MW	L6
3325693	M1200D050205HN09	F31-32	3462471	47N710014MT ALTIM-MT	L9	3484711	510336018. UNCOATED	L126	3592846	477824007MW ALTIM-MW	L6
3325694	M1200D100208HN09	F31	3462472	47N710024LT TIALN-LT	L9	3484712	510338013. UNCOATED	L126	3592847	477825008MW ALTIM-MW	L6
3326330	SDMT1204PDRMH TN6540	G56	3462473	47N710034LT TIALN-LT	L9	3484713	510340018. UNCOATED	L126	3592848	477826008MW ALTIM-MW	L6
3330950	HNGJ0905ANENLD TN6525	F33, F39	3462474	47N710034MT ALTIM-MT	L9	3484714	510342018. UNCOATED	L126	3592849	477827008MW ALTIM-MW	L6
3339713	7F1-0960T	P30	3462475	47N712005LT TIALN-LT	L9	3484715	510344014. UNCOATED	L126	3592850	477828008MW ALTIM-MW	L6
3341346	70N606002MT ALTIM-MT1	L140	3462476	47N712015MT ALTIM-MT	L9	3484716	510346016. UNCOATED	L126	3592851	477829008MW ALTIM-MW	L6
3341348	70N608003MT ALTIM-MT1	L140	3462477	47N712015LT TIALN-LT	L9	3484717	510348016. UNCOATED	L126	3592852	477830008MW ALTIM-MW	L6
3350935	510316006. UNCOATED	L125	3462478	47N712015MT ALTIM-MT	L9	3484718	510350016. UNCOATED	L126	3592853	477831008MW ALTIM-MW	L6
3353278	RDMW0802MT TN6540	J44	3462479	47N712025LT TIALN-LT	L9	3484719	510352016. UNCOATED	L126	3592854	477832008MW ALTIM-MW	L6
3353279	RDMW1003MOT TN6540	J49	3462480	47N712035LT TIALN-LT	L9	3484720	510354016. UNCOATED	L126	3592855	477833008MW ALTIM-MW	L6
3353281	RDMW1204MOTX TN6540	J55	3462481	47N712035MT ALTIM-MT	L9	3484721	510356016. UNCOATED	L126	3592856	477834008MW ALTIM-MW	L6
3374385	M270TF10R05 TN2510	J90	3462482	47N712045LT TIALN-LT	L10	3484722	510358016. UNCOATED	L126	3592857	477835008MW ALTIM-MW	L6
3374387	M270TF12R05 TN2510	J90	3462483	47N712045MT ALTIM-MT	L10	3484723	510360016. UNCOATED	L126	3592858	477836008MW ALTIM-MW	L6
3374388	M270TF12R1 TN2510	J90	3462484	47N716006LT TIALN-LT	L10	3484724	510362016. UNCOATED	L126	3592859	477837008MW ALTIM-MW	L6
3374389	M270TF16R03 TN2510	J90	3462485	47N716006MT ALTIM-MT	L10	3484725	510364016. UNCOATED	L126	3592860	477838008MW ALTIM-MW	L6
3374390	M270TF16R05 TN2510	J90	3462486	47N716016LT TIALN-LT	L10	3484726	510366016. UNCOATED	L126	3592861	477839008MW ALTIM-MW	L6
3374391	M270TF16R1 TN2510	J90	3462487	47N716016MT ALTIM-MT	L10	3484727	510368016. UNCOATED	L126	3592862	477840008MW ALTIM-MW	L6
3374392	M270TF16R2 TN2510	J90	3462488	47N716026LT TIALN-LT	L10	3484728	510370016. UNCOATED	L126	3592863	477841008MW ALTIM-MW	L6
3375713	M270TF20R03 TN2510	J90	3462489	47N716026MT ALTIM-MT	L10	3484729	510372016. UNCOATED	L126	3592864	477842008MW ALTIM-MW	L6
3375714	M270TF20R05 TN2510	J90	3462490	47N720007LT TIALN-LT	L10	3484730	510374016. UNCOATED	L126	3592865	477843008MW ALTIM-MW	L6
3375716	M270TF20R2 TN2510	J90	3462491	47N720007MT ALTIM-MT	L10	3484731	510376016. UNCOATED	L126	3592866	477844008MW ALTIM-MW	L6
3378676	SDMT1506PDRMH TN6540	G60	3462492	47N720017LT TIALN-LT	L10	3484732	510378016. UNCOATED	L126	3592867	477845008MW ALTIM-MW	L6
3378677	SDMT1506PDRML TN6540	G59	3462493	47N720017MT ALTIM-MT	L10	3484733	510380016. UNCOATED	L126	3592868	477846008MW ALTIM-MW	L6
3380486	12146111000	F15, F20, F26, F32, F38	3462494	47N720027LT TIALN-LT	L10	3484734	510382016. UNCOATED	L126	3592869	477847008MW ALTIM-MW	L6
3380487	12146111100	F26, F32, F38, G24	3462495	47N720027MT ALTIM-MT	L10	3484735	510384016. UNCOATED	L126	3592870	477848008MW ALTIM-MW	L6
3382203	12146034500	F5-7, F12-15, F20, F26, F30, F32, F38	3474583	49N604002MW ALTIM-MW	L60	3484736	510386016. UNCOATED	L126	3592871	477849008MW ALTIM-MW	L6
3382204	12146101000	F26	3474584	49N605002MW ALTIM-MW	L60	3484737	510388016. UNCOATED	L126	3592872	477850008MW ALTIM-MW	L6
3382206	12146107000	F15, F20, F26, F32, F38, G24	3474585	49N606002MW ALTIM-MW	L60	3484738	510390016. UNCOATED	L126	3592873	477851008MW ALTIM-MW	L6
3384424	M270TF10R05 TN2525	J90	3474587	49N608003MW ALTIM-MW	L60	3484739	510392016. UNCOATED	L126	3592874	477852008MW ALTIM-MW	L6
3384426	M270TF12R05 TN2525	J90	3474589	49N610004MW ALTIM-MW	L60	3484740	510394016. UNCOATED	L126	3592875	477853008MW ALTIM-MW	L6
			3474591	49N612005MW ALTIM-MW	L60	3484741	510396016. UNCOATED	L126	3592876	477854008MW ALTIM-MW	L6
			3474593	49N614014MW ALTIM-MW	L60	3484742	510398016. UNCOATED	L126	3592877	477855008MW ALTIM-MW	L6
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			3474596	49N620007MW ALTIM-MW	L60	3484745	510404016. UNCOATED	L126	3592880	477858008MW ALTIM-MW	L6
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3849217	TDM1980UPM WU25PD	P14	3850976	TDM1002UPM WU25PD	P11	3870086	CTFP2525M16 WG	C38	3878423	PDJNL3225P15 WG	C23
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3849229	TDM2099UPM WU25PD	P14	3850988	TDM1270UPM WU25PD	P12	3871510	CRDPN2525M06V WG	C40	3879316	PDJNL4025M15 WG	C23
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3850905	TDM080R5SCF12M WG	P7	3850990	TDM1310UPM WU25PD	P12	3871512	CRDPN3232P09V WG	C40	3879318	PDJNR2020K15 WG	C23
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3899674	TDD108Z12000 WU20PD	0111	3899799	TDD106Z12500 WU20PD	0107	3900636	TDD105Z08000 WU20PD	0105	3950607	SDMX120416RMH TN6540	G56
3899675	TDD108Z12304 WU20PD	0111	3899800	TDD106Z12700 WU20PD	0107	3900637	TDD105Z08334 WU20PD	0105	3950609	SDMX120416RMH TN7535	G56
3899676	TDD108Z12500 WU20PD	0111	3899801	TDD106Z13000 WU20PD	0107	3900638	TDD105Z08433 WU20PD	0105	3950614	SDMX120412RMH TN6520	G56
3899677	TDD108Z12700 WU20PD	0111	3899803	TDD106Z03175 WU20PD	0106	3900639	TDD105Z08500 WU20PD	0105	3954298	G50MTTB1026KM40	C84
3899678	TDD108Z13000 WU20PD	0111	3899804	TDD106Z03500 WU20PD	0106	3900640	TDD105Z08733 WU20PD	0105	3954299	G60MTTB1226KM40	C84
3899683	TDD105Z04039 WU20PD	0104	3899805	TDD106Z03571 WU20PD	0106	3900641	TDD105Z09000 WU20PD	0105	3954300	G80MTTB1564KM63	C84
3899684	TDD105Z04300 WU20PD	0104	3899806	TDD106Z03800 WU20PD	0106	3900642	TDD105Z09347 WU20PD	0105	3954301	G100MTTB2066KM63	C84
3899685	TDD105Z04500 WU20PD	0104	3899807	TDD106Z03970 WU20PD	0106	3900643	TDD105Z09500 WU20PD	0105	3954332	HNGJ0704ANFNLDJ THM-U	F8, F16, F21
3899686	TDD105Z04623 WU20PD	0104	3899808	TDD106Z04000 WU20PD	0106	3900644	TDD105Z09525 WU20PD	0105	3954414	HNGJ0704ANFNLDJ TN6501	F8, F16, F21
3899687	TDD105Z04763 WU20PD	0104	3899809	TDD106Z04039 WU20PD	0106	3900645	TDD105Z09750 WU20PD	0105	3954416	XNGJ0704ANFNLDJ3W TN6501	F17
3899688	TDD105Z05000 WU20PD	0104	3899810	TDD106Z04300 WU20PD	0106	3900647	TDD105Z10000 WU20PD	0105	3954418	HNGJ0704ANENLD TN6505	F8, F16, F21
3899689	TDD105Z05159 WU20PD	0104	3899811	TDD106Z04500 WU20PD	0106	3900648	TDD105Z10200 WU20PD	0105	3954419	HNGJ0704ANENLD TN6510	F8, F16, F21
3899690	TDD105Z05410 WU20PD	0104	3899812	TDD106Z04623 WU20PD	0106	3900649	TDD105Z10320 WU20PD	0105	3954420	HNGJ0704ANENLD TN6520	F8, F16, F21
3899691	TDD105Z05500 WU20PD	0104	3899813	TDD106Z04763 WU20PD	0106	3900650	TDD105Z10500 WU20PD	0105	3954421	HNGJ0704ANENLD TN6525	F8, F16, F21
3899692	TDD105Z05558 WU20PD	0104	3899814	TDD106Z05000 WU20PD	0106	3900651	TDD105Z10716 WU20PD	0105	3954422	XNGJ0704ANENLD3W TN6510	F17
3899693	TDD105Z05800 WU20PD	0104	3899815	TDD106Z05159 WU20PD	0106	3900652	TDD105Z11000 WU20PD	0105	3954425	XNGJ0704ANENLD3W TN6520	F17
3899694	TDD105Z06000 WU20PD	0104	3899816	TDD106Z05410 WU20PD	0106	3900653	TDD105Z11113 WU20PD	0105	3954426	XNGJ0704ANENLD3W TN6525	F17
3899695	TDD105Z06200 WU20PD	0104	3899818	TDD106Z05500 WU20PD	0106	3900654	TDD105Z11500 WU20PD	0105	3954427	XNGJ0704ANENLD3W TN6540	F17
3899696	TDD105Z06350 WU20PD	0104	3899819	TDD106Z05558 WU20PD	0106	3900656	TDD105Z12000 WU20PD	0105	3954428	HNGJ070432ANENLD TN6510	F8, F16, F21
3899697	TDD105Z06500 WU20PD	0104	3899820	TDD106Z05800 WU20PD	0106	3900657	TDD105Z12304 WU20PD	0105	3954429	HNGJ070432ANENLD TN6525	F8, F16, F21
3899698	TDD105Z06628 WU20PD	0104	3899821	TDD106Z06000 WU20PD	0106	3900658	TDD105Z12500 WU20PD	0105	3954430	HNGJ070432ANENLD TN6540	F8, F16, F21
3899699	TDD105Z06746 WU20PD	0104	3899822	TDD106Z06200 WU20PD	0106	3900659	TDD105Z12700 WU20PD	0105	3954432	XNGJ0704ANFNLDJ3W THM-U	F17
3899700	TDD105Z06800 WU20PD	0105	3899823	TDD106Z06350 WU20PD	0106	3900660	TDD105Z13000 WU20PD	0105	3954473	HNPJ0704ANSNGD TN6520	F9, F17, F22
3899701	TDD105Z06909 WU20PD	0105	3899824	TDD106Z06500 WU20PD	0106	3903943	M270HF10 TN6540	J95	3954475	HNPJ0704ANSNGD TN7535	F9, F17, F22
3899702	TDD105Z07000 WU20PD	0105	3899825	TDD106Z06528 WU20PD	0106	3903944	M270HF10 TN2505	J95	3954477	XNGJ0704ANSNHD TN6510	F9, F17, F22
3899708	TDD107Z03000 WU20PD	0108	3899826	TDD106Z06746 WU20PD	0106	3903945	M270HF12 TN6540	J95	3954478	HNPJ0704ANSNHD TN6520	F9, F17, F22
3899709	TDD107Z03175 WU20PD	0108	3899827	TDD106Z06800 WU20PD	0107	3903946	M270HF12 TN2505	J95	3954479	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899710	TDD107Z03500 WU20PD	0108	3899828	TDD106Z06909 WU20PD	0107	3903947	M270HF13 TN6540	J95	3954480	HNPJ0704ANSNHD TN7535	F9, F17, F22
3899712	TDD107Z03800 WU20PD	0108	3899829	TDD106Z07000 WU20PD	0107	3903948	M270HF13 TN2505	J95	3954481	XNGJ0704ANFNLDJ3W THM-U	F17
3899733	TDD107Z03970 WU20PD	0108	3899888	PCKNL323P16 WG	C21	3903949	M270HF16 TN6540	J95	3954482	HNPJ0704ANSNHD TN6520	F9, F17, F22
3899734	TDD107Z04000 WU20PD	0108	3899889	PCKNR323P16 WG	C21	3903950	M270HF16 TN2505	J95	3954483	HNPJ0704ANSNHD TN7535	F9, F17, F22
3899735	TDD107Z04039 WU20PD	0108	3899890	SDJCR1212F07 WG	C44	3903953	M270HF20 TN6540	J95	3954484	HNPJ0704ANSNHD TN7535	F9, F17, F22
3899737	TDD107Z04500 WU20PD	0108	3899891	SDJCL1212F07 WG	C44	3903954	M270HF20 TN2505	J95	3954485	HNPJ0704ANSNHD TN7535	F9, F17, F22
3899739	TDD107Z04763 WU20PD	0108	3899892	SDJCL1010E07 WG	C44	3926514	M270TD010A10L120	J87, J93	3954486	HNPJ0704ANSNHD TN6520	F9, F17, F22
3899740	TDD107Z05000 WU20PD	0108	3900153	PCLNL1616H09 WG	C22	3926515	M270TD012A12L140	J87, J93	3954487	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899743	TDD107Z05500 WU20PD	0108	3900154	PCLNR1616H09 WG	C22	3926516	M270TD016A16L160	J87, J93	3954488	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899744	TDD107Z05558 WU20PD	0108	3900155	PDNNL3225P15 WG	C24	3926517	M270TD020A20L180	J87, J93	3954489	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899745	TDD107Z05800 WU20PD	0108	3900156	PDNNR3225P15 WG	C24	3926518	M270TD010A10L120C	J88, J94	3954490	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899746	TDD107Z06000 WU20PD	0108	3900157	PSBNL2525M12 WG	C25	3926519	M270TD010A10L150C	J88, J94	3954491	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899748	TDD107Z06350 WU20PD	0108	3900158	PSBNR2525M12 WG	C25	3926520	M270TD012A12L120C	J88, J94	3954492	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899749	TDD107Z06500 WU20PD	0108	3900159	PSBNL5050725 WG	C25	3926521	M270TD012A12L160C	J88, J94	3954493	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899750	TDD107Z06528 WU20PD	0108	3900160	PSDNN3225P15 WG	C26	3926522	M270TD016A16L140C	J88, J94	3954494	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899751	TDD107Z06746 WU20PD	0108	3900161	PSDNN323P15 WG	C26	3926543	M270TD016A16L180C	J88, J94	3954495	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899753	TDD107Z06909 WU20PD	0108	3900162	PTGNL4040T27 WG	C29	3926544	M270TD020A20L150C	J88, J94	3954496	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899754	TDD107Z07000 WU20PD	0108	3900163	PTGNR323P16 WG	C29	3926545	M270TD020A20L200C	J88, J94	3954497	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899763	TDD106Z07145 WU20PD	0107	3900164	PWLNR323P08 WG	C30	3926546	M270TD012M08	J86, J92	3954498	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899764	TDD106Z07500 WU20PD	0105	3900165	PWLN1323P08 WG	C30	3926547	M270TD016M08	J86, J92	3954499	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899765	TDD106Z07541 WU20PD	0107	3900166	PWLN12525M06 WG	C30	3926548	M270TD020M10	J86, J92	3954500	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899766	TDD106Z07938 WU20PD	0107	3900167	PWLN12525M06 WG	C30	3949807	SDMX150612RMM TN6540	G59	3954501	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899767	TDD106Z08000 WU20PD	0107	3900168	SCLCL1212F09 WG	C42	3949809	SDMX150612RMM TN7525	G59	3954502	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899768	TDD106Z08334 WU20PD	0107	3900169	SCLCR1010E06 WG	C42	3949811	SDMX150612RMM TN6540	G60	3954503	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899769	TDD106Z08433 WU20PD	0107	3900170	SCLCR1212F09 WG	C42	3950583	SDMX150612RMM TN7525	G60	3954504	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899770	TDD106Z08500 WU20PD	0107	3900171	SCLCL1010E06 WG	C42	3950584	SDMX150612RMM TN7535	G60	3954505	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899771	TDD106Z08733 WU20PD	0107	3900172	SCLCR1212F06 WG	C42	3950585	SDMX150616RMM TN6540	G60	3954506	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899772	TDD106Z09000 WU20PD	0107	3900173	SCLCL1212F06 WG	C42	3950587	SDMX150616RMM TN7535	G60	3954507	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899782	TDD106Z03000 WU20PD	0106	3900174	SDJCL3225P15 WG	C44	3950588	SDMX120408RMM TN6525	G55	3954508	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899783	TDD106Z09347 WU20PD	0107	3900175	SDJCR3225P15 WG	C44	3950589	SDMX120408RMM TN6540	G55	3954509	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899784	TDD106Z09500 WU20PD	0107	3900176	SDJCL1212F11 WG	C44	3950590	SDMX120408RMM TN7525	G55	3954510	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899785	TDD106Z09525 WU20PD	0107	3900177	SDJCR1212F11 WG	C44	3950591	SDMX120408RMM TN7535	G55	3954511	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899786	TDD106Z09750 WU20PD	0107	3900178	SDNCN1212F11 WG	C45	3950592	SDMX120408RMM TN6540	G56	3954512	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899787	TDD106Z09921 WU20PD	0107	3900179	SDNCN3225P15 WG	C45	3950594	SDMX120408RMM TN7525	G56	3954513	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899788	TDD106Z10000 WU20PD	0107	3900180	SRDCN3225P16 WG	C45	3950595	SDMX120408RMM TN7535	G56	3954514	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899789	TDD106Z10200 WU20PD	0107	3900181	SRDCN3225P12 WG	C45	3950596	SDMX120412RMM TN6525	G55	3954515	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899790	TDD106Z10320 WU20PD	0107	3900182	SRDCN2020K06 WG	C45	3950597	SDMX120412RMM TN6540	G55	3954516	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899791	TDD106Z10500 WU20PD	0107	3900183	SRDCN2525M06 WG	C45	3950599	SDMX120412RMM TN7525	G55	3954517	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899792	TDD106Z10716 WU20PD	0107	3900184	STFCR1212F11 WG	C48	3950600	SDMX120412RMM TN7535	G55	3954518	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899793	TDD106Z11000 WU20PD	0107	3900612	TDD105Z07145 WU20PD	0105	3950601	SDMX120412RMM TN6525	G56	3954519	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899794	TDD106Z11113 WU20PD	0107	3900633	TDD105Z07500 WU20PD	0105	3950603	SDMX120412RMM TN6540	G56	3954520	HNPJ0704ANSNHD TN6540	F9, F17, F22
3899795	TDD106Z11500 WU20PD	0107	3900634	TDD105Z07541 WU20PD	0105	3950605	SDMX120412RMM TN7525	G56			

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4051244	TDS503A03455	WU25PD089	4051314	TDS503A19800	WU25PD092	4118452	WMTS094I2BP02PT	WU25PTD19	4138509	GTM115019	WU13PVT69
4051245	TDS503A03900	WU25PD .....089	4051315	TDS503A20000	WU25PD .....092	4118583	WMTS094I2BP04PT	WU10PT .....D19	4138510	GTM115020	WU13PV .....T69
4051246	TDS503A04100	WU25PD .....089	4052411	WOEJ080412SRMH	TN6525.....J7	4118584	WMTS094I2BP04PT	WU25PT .....D19	4138511	GTM115021	WU13PV .....T69
4051247	TDS503A04300	WU25PD .....089	4056186	M370D025202M12W008	.....J4	4118585	WMTS125I3P03PT	WU10PT .....D19	4138512	GTM115022	WU13PV .....T69
4051248	TDS503A04400	WU25PD .....089	4056187	M370D032204M16W008	.....J4	4118586	WMTS125I3P03PT	WU25PT .....D19	4138513	GTM115023	WU13PV .....T69
4051249	TDS503A04600	WU25PD .....089	4056188	M370D042205M16W008	.....J4	4118587	WMTS125I3P08PT	WU10PT .....D19	4138514	GTM215001	WU12PV .....T71
4051250	TDS503A04650	WU25PD .....089	4056189	M370D025203A25W008L150	.....J5	4118588	WMTS125I3P08PT	WU25PT .....D19	4138515	GTM215002	WU12PV .....T71
4051251	TDS503A04900	WU25PD .....090	4056190	M370D028203A25W008L200	.....J5	4118589	WMTS188I5P03PT	WU10PT .....D20	4138516	GTM215003	WU12PV .....T71
4051252	TDS503A05100	WU25PD .....090	4056191	M370D032204A32W008L150	.....J5	4118590	WMTS188I5P03PT	WU25PT .....D20	4138517	GTM215004	WU12PV .....T71
4051253	TDS503A05200	WU25PD .....090	4056192	M370D032204A32W008L200	.....J5	4118591	WMTS188I5P08PT	WU10PT .....D20	4138518	GTM215005	WU12PV .....T71
4051254	TDS503A05300	WU25PD .....090	4056193	M370D040204W008	.....J6	4118592	WMTS188I5P08PT	WU25PT .....D20	4138519	GTM215006	WU12PV .....T71
4051255	TDS503A05400	WU25PD .....090	4056194	M370D052205W008	.....J6	4118593	WMTS250I6P03PT	WU10PT .....D21	4138520	GTM215007	WU12PV .....T71
4051256	TDS503A05550	WU25PD .....090	4056195	M370D063206W008	.....J6	4118594	WMTS250I6P03PT	WU25PT .....D21	4138521	GTM215008	WU12PV .....T71
4051257	TDS503A05600	WU25PD .....090	4067705	47N606002LW TIALN-LW	.....L11	4118595	WMTS250I6P08PT	WU10PT .....D21	4138522	GTM215009	WU12PV .....T71
4051258	TDS503A05700	WU25PD .....090	4067706	47N608003LW TIALN-LW	.....L11	4118596	WMTS250I6P08PT	WU25PT .....D21	4138523	GTM215010	WU12PV .....T71
4051259	TDS503A05900	WU25PD .....090	4067707	47N610004LW TIALN-LW	.....L11	4124297	571810004MT	ALTIN-MT.....L38	4138524	GTM215011	WU12PV .....T71
4051260	TDS503A06100	WU25PD .....090	4067708	47N612005LW TIALN-LW	.....L11	4124298	571812005MT	ALTIN-MT.....L38	4138525	GTM215012	WU12PV .....T71
4051261	TDS503A06200	WU25PD .....090	4067709	47N616006LW TIALN-LW	.....L11	4124299	571814014MT	ALTIN-MT.....L38	4138526	GTM215013	WU12PV .....T71
4051262	TDS503A06300	WU25PD .....090	4067710	47N620007LW TIALN-LW	.....L11	4124300	571816006MT	ALTIN-MT.....L38	4138527	GTM215014	WU12PV .....T71
4051263	TDS503A06400	WU25PD .....090	4068517	WOEJ080412SRMH	TN7535.....J7	4124301	571818018MT	ALTIN-MT.....L39	4138528	GTM215015	WU12PV .....T71
4051264	TDS503A06600	WU25PD .....090	4113563	WMTS300M3P03PT	WU10PT .....D19	4124302	571820007MT	ALTIN-MT.....L39	4138529	GTM215016	WU12PV .....T71
4051265	TDS503A06700	WU25PD .....090	4113564	WMTS300M3P03PT	WU25PT .....D19	4124323	571825008MT	ALTIN-MT.....L39	4138530	GTM215017	WU12PV .....T70
4051266	TDS503A06900	WU25PD .....090	4113565	WMTS300M3P06PT	WU10PT .....D19	4136480	WOEJ080412SRMH	TN6520.....J7	4138531	GTM215018	WU12PV .....T70
4051267	TDS503A07100	WU25PD .....090	4113566	WMTS300M3P03PT	WU10HT .....D19	4136482	M1200HD040204HN07	.....F20	4138532	GTM215019	WU12PV .....T70
4051268	TDS503A07200	WU25PD .....090	4113567	WMTS300M3P06PT	WU25PT .....D19	4136863	M1200HD040205HN07	.....F20	4138533	GTM215020	WU12PV .....T70
4051269	TDS503A07300	WU25PD .....090	4113568	WMTS305M3U03PT	WU10PT .....D18	4136864	M1200HD050204HN07	.....F20	4138534	GTM215021	WU12PV .....T70
4051270	TDS503A07400	WU25PD .....090	4113569	WMTS305M3U03PT	WU25PT .....D18	4136865	M1200HD050205HN07	.....F20	4138535	GTM215022	WU12PV .....T70
4051271	TDS503A07700	WU25PD .....090	4113570	WMTS305M3U06PT	WU10PT .....D18	4136866	M1200HD063204HN07	.....F20	4138536	GTM215023	WU12PV .....T70
4051272	TDS503A07900	WU25PD .....090	4113571	WMTS305M3U06PT	WU25PT .....D18	4136867	M1200HD063206HN07	.....F20	4138537	GTM215024	WU12PV .....T70
4051273	TDS503A08100	WU25PD .....091	4113572	WMTS400M4P03PT	WU10PT .....D19	4136868	M1200HD080205HN07	.....F20	4138538	GTM215025	WU12PV .....T70
4051274	TDS503A08200	WU25PD .....091	4113573	WMTS400M4P03PT	WU10HT .....D19	4136869	M1200HD080208HN07	.....F20	4138539	GTM215026	WU12PV .....T70
4051275	TDS503A08300	WU25PD .....091	4113574	WMTS400M4P06PT	WU25PT .....D19	4136870	M1200HD100206HN07	.....F20	4138540	GTM215027	WU12PV .....T70
4051276	TDS503A08400	WU25PD .....091	4113575	WMTS400M4P06PT	WU10PT .....D20	4136871	M1200HD100209HN07	.....F20	4138541	GTM215028	WU12PV .....T70
4051277	TDS503A08600	WU25PD .....091	4113576	WMTS400M4P06PT	WU25PT .....D20	4136872	M1200HD125208HN07	.....F20	4138542	GTM215029	WU12PV .....T70
4051278	TDS503A08700	WU25PD .....091	4113577	WMTS405M4U03PT	WU10PT .....D18	4136873	M1200HD125212HN07	.....F20	4138543	GTM215030	WU12PV .....T70
4051279	TDS503A08800	WU25PD .....091	4113578	WMTS405M4U03PT	WU25PT .....D18	4136874	M1200HF025202M16HN07	.....F5	4138544	GTM215031	WU12PV .....T70
4051280	TDS503A08900	WU25PD .....091	4113579	WMTS405M4U06PT	WU10PT .....D18	4136875	M1200HF025203M16HN07	.....F5	4138545	GTM315001	WU12PV .....T73
4051281	TDS503A09100	WU25PD .....091	4113580	WMTS405M4U06PT	WU25PT .....D18	4136876	M1200HF032203M16HN07	.....F5	4138546	GTM315002	WU12PV .....T73
4051282	TDS503A09200	WU25PD091	4113892	WOEJ080412SRMH	TN6525.....J7	4136877	M1200HF032204M16HN07F5	4138547	GTM315003	WU12PVT73
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4051285	TDS503A09600	WU25PD091	4116130	WMTS200M2P02PT	WU25PTD19	4136880	M1200HF025202A20HN07L120F6	4138550	GTM315006	WU12PVT73
4051286	TDS503A09700	WU25PD091	4116131	WMTS205M2U02PT	WU10PTD18	4136881	M1200HF025203A20HN07L120F6	4138551	GTM315007	WU12PVT73
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4051288	TDS503A10100	WU25PD091	4116143	WMTS500M5P03PT	WU10PTD20	4136883	M1200HF032204A25HN07L130F6	4138553	GTM315009	WU12PVT73
4051289	TDS503A10300	WU25PD .....091	4116144	WMTS500M5P03PT	WU25PT .....D20	4136884	M1200HF040205HN07	.....F7	4138554	GTM315010	WU12PV .....T73
4051290	TDS503A10400	WU25PD .....091	4116145	WMTS500M5P03PT	WU10HT .....D20	4136885	M1200HF050205HN07	.....F7	4138555	GTM315011	WU12PV .....T73
4051291	TDS503A10600	WU25PD091	4116146	WMTS500M5P06PT	WU10PTD20	4136886	M1200HF063206HN07F7	4138556	GTM315012	WU12PVT73
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4051294	TDS503A11100	WU25PD091	4116149	WMTS505M5U03PT	WU25PTD18	4138392	GTM115002	WU13PVT69	4138559	GTM315015	WU12PVT73
4051295	TDS503A11200	WU25PD .....091	4116150	WMTS505M5U06PT	WU10PT .....D18	4138470	M1200D125208HN07	.....F15	4138560	GTM315016	WU12PV .....T73
4051296	TDS503A11300	WU25PD092	4116151	WMTS505M5U06PT	WU25PTD18	4138471	M1200D125212HN07F15	4138561	GTM315017	WU12PVT72
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4051304	TDS503A16800	WU25PD092	4117256	WMTS605M6U06PT	WU25PTD18	4138499	GTM115009	WU13PVT69	4138569	GTM315030	WU12PVT72
4051305	TDS503A17000	WU25PD092	4117257	WMTS800M8P06PT	WU10PTD21	4138500	GTM115010	WU13PVT69	4138570	GTM315024	WU12PVT72
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4051308	TDS503A18000	WU25PD092	4117260	WMTS800M8P15PT	WU25PTD21	4138503	GTM115013	WU13PVT69	4138573	GTM315027	WU12PVT72
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4051310	TDS503A18800	WU25PD092	4117262	WMTS805M8U06PT	WU25PTD18	4138505	GTM115015	WU13PVT69	4138575	GTM415041	WU16PVT76
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4163465	TDS401A03500	WP20PD 054	4163535	TDS401A08100	WP20PD 056	4164572	DNGP150402	TN10U B52, B130	4165876	TNMG1604084P	TN15M B141
4163466	TDS401A03571	WP20PD 054	4163536	TDS401A08200	WP20PD 056	4164783	CNGP150402	TN15U B130	4165877	TNMG1604084P	TN30M B141
4163467	TDS401A03600	WP20PD 054	4163537	TDS401A08300	WP20PD 056	4164784	DNGP150401	TN10U B52, B130	4165878	TNMG1604124P	TN15M B141
4163468	TDS401A03658	WP20PD 054	4163538	TDS401A08334	WP20PD 056	4164785	DNGP150404	TN10U B52, B130	4165879	TNMG1604124P	TN30M B141
4163469	TDS401A03700	WP20PD 054	4163539	TDS401A08400	WP20PD 056	4164786	CNGP150404	TN15U B130	4165880	TNMG2204044P	TN15M B141
4163470	TDS401A03734	WP20PD 054	4163540	TDS401A08433	WP20PD 056	4164787	DNGP150408	TN10U B52, B130	4165881	TNMG2204044P	TN30M B141
4163471	TDS401A03800	WP20PD 054	4163541	TDS401A08500	WP20PD 056	4164788	DNGP150408	TN15U B130	4165882	TNMG2204084P	TN15M B141
4163472	TDS401A03900	WP20PD 054	4163542	TDS401A08600	WP20PD 056	4164789	TNGP160402	TN10U B140	4165883	TNMG2204084P	TN30M B141
4163473	TDS401A03970	WP20PD 054	4163543	TDS401A08700	WP20PD 056	4164790	TNGP160402	TN15U B140	4165884	TNMG1604044P	TN15M B146
4163474	TDS401A04000	WP20PD 054	4163544	TDS401A08733	WP20PD 056	4164791	TNGP160404	TN10U B140	4165885	TNMG1604044P	TN30M B146
4163475	TDS401A04039	WP20PD 054	4163545	TDS401A08800	WP20PD 056	4164792	TNGP160404	TN15U B140	4165886	TNMG1604084P	TN15M B146
4163476	TDS401A04090	WP20PD 054	4163546	TDS401A08900	WP20PD 056	4164793	TNGP160408	TN10U B140	4165887	TNMG1604084P	TN30M B146
4163477	TDS401A04100	WP20PD 054	4163547	TDS401A09000	WP20PD 056	4164794	VNGP160402	TN10U B96, B145	4165888	WNMG0804044P	TN15M B148
4163478	TDS401A04200	WP20PD 054	4163548	TDS401A09100	WP20PD 056	4164795	VNGP160401	TN10U B96, B145	4165889	WNMG0804044P	TN30M B148
4163479	TDS401A04217	WP20PD 054	4163549	TDS401A09129	WP20PD 056	4164796	VNGP160401	TN15U B145	4165890	WNMG0804084P	TN15M B148
4163480	TDS401A04300	WP20PD 055	4163550	TDS401A09200	WP20PD 056	4164797	VNGP220404	TN10U B96, B145	4165891	WNMG0804084P	TN30M B148
4163481	TDS401A04366	WP20PD 055	4163551	TDS401A09300	WP20PD 056	4164798	VNGP220404	TN15U B145	4165892	WNMG0804124P	TN30M B148
4163482	TDS401A04400	WP20PD 055	4163552	TDS401A09347	WP20PD 056	4164799	VNGP220408	TN10U B96, B145	4165948	CNMG0903086P	TN10P B127
4163483	TDS401A04500	WP20PD 055	4163553	TDS401A09400	WP20PD 056	4164800	VNGP220408	TN15U B145	4165949	CNMG0903086P	TN20P B127
4163484	TDS401A04600	WP20PD 055	4163554	TDS401A09500	WP20PD 056	4165244	CCMT0602021P	TN10P B123	4165950	CNMG0903086P	TN15M B127
4163485	TDS401A04623	WP20PD 055	4163555	TDS401A09525	WP20PD 056	4165245	CCMT0602021P	TN20K B123	4165951	WNMG0903086P	TN30M B127
4163486	TDS401A04700	WP20PD 055	4163556	TDS401A09600	WP20PD 056	4165470	CNMA120404	TN20K B125	4165952	CNMG1204046P	TN10P B127
4163487	TDS401A04763	WP20PD 055	4163557	TDS401A09700	WP20PD 056	4165471	CNMA120408	TN20K B125	4165963	CNMG1204046P	TN20P B127
4163488	TDS401A04800	WP20PD 055	4163558	TDS401A09800	WP20PD 056	4165472	CNMA120412	TN20K B125	4165964	CNMG1204046P	TN15M B127
4163489	TDS401A04852	WP20PD 055	4163559	TDS401A09900	WP20PD 056	4165830	CNMG1204044P	TN15M B126	4165965	CNMG1204046P	TN30M B127
4163490	TDS401A04900	WP20PD 055	4163560	TDS401A09921	WP20PD 057	4165831	CNMG1204044P	TN30M B126	4165966	CNMG1204086P	TN10P B127
4163491	TDS401A05000	WP20PD 055	4163978	CCGT0602021P	TN10U B122	4165832	CNMG1204084P	TN15M B126	4165967	CNMG1204086P	TN20P B127
4163492	TDS401A05100	WP20PD 055	4163979	CCGT0602021P	TN15U B122	4165833	CNMA120416	TN20K B36, B125	4165968	CNMG1204086P	TN30P B127
4163493	TDS401A05106	WP20PD 055	4163980	CCGT0602041P	TN10U B122	4165834	CNMA160612	TN20K B36, B125	4165969	CNMG1204086P	TN15M B127
4163494	TDS401A05159	WP20PD 055	4163981	CCGT0602041P	TN15U B122	4165835	CNMA160616	TN20K B36, B125	4165970	CNMG1204086P	TN30M B127
4163495	TDS401A05200	WP20PD 055	4163982	CCGT0602081P	TN10U B122	4165836	CNMA190612	TN20K B36, B125	4165971	CNMG1204126P	TN10P B127
4163496	TDS401A05300	WP20PD 055	4164493	CCGT09T3021P	TN10U B122	4165837	CNMA190616	TN20K B36, B125	4165972	CNMG1204126P	TN20P B127
4163497	TDS401A05400	WP20PD 055	4164494	CCGT09T3021P	TN15U B122	4165838	DNMA150408	TN20K B130	4165973	CNMG1204126P	TN30P B127
4163498	TDS401A05410	WP20PD 055	4164495	CCGT09T3011P	TN10U B122	4165839	DNMA150412	TN20K B130	4165974	CNMG1204126P	TN15M B127
4163499	TDS401A05500	WP20PD 055	4164496	CCGT09T3011P	TN15U B122	4165840	DNMA150608	TN20K B130	4165975	CNMG1204126P	TN30M B127
4163500	TDS401A05558	WP20PD 055	4164497	CCGT09T3041P	TN10U B122	4165841	DNMA150612	TN20K B130	4165976	CNMG1204126P	TN20P B127
4163501	TDS401A05600	WP20PD 055	4164498	CCGT09T3041P	TN15U B122	4165842	SNMA120408	TN20K B134	4165977	CNMG1606126P	TN30P B127
4163502	TDS401A05616	WP20PD 055	4164499	CCGT09T3081P	TN10U B122	4165843	SNMA120412	TN20K B134	4165978	CNMG1606126P	TN15M B127
4163503	TDS401A05700	WP20PD 055	4164500	CCGT09T3081P	TN15U B122	4165844	SNMA150612	TN20K B71, B134	4165979	CNMG1606126P	TN30M B127
4163504	TDS401A05800	WP20PD 055	4164501	DCGT0702011P	TN10U B129	4165845	SNMA190612	TN20K B71, B134	4165980	TNMG1906126P	TN20P B127
4163505	TDS401A05900	WP20PD 055	4164502	DCGT0702011P	TN15U B129	4165846	TNMA160408	TN20K B140	4165981	CNMG1906126P	TN30P B127
4163506	TDS401A05954	WP20PD 055	4164523	DCGT11T3011P	TN10U B129	4165847	TNMA160412	TN20K B140	4165982	CNMG1906126P	TN15M B127
4163507	TDS401A06000	WP20PD 055	4164524	DCGT11T3011P	TN15U B129	4165848	TNMA220408	TN20K B140	4165983	CNMG1906126P	TN30M B127
4163508	TDS401A06100	WP20PD 055	4164525	DCGT1504081P	TN10U B129	4165849	VNMA160408	TN20K B145	4165984	DNMG1104086P	TN10P B132
4163509	TDS401A06200	WP20PD 055	4164526	TCGT1102011P	TN10U B138	4165850	VNMA060408	TN20K B147	4165985	TNMG1104086P	TN20P B132
4163510	TDS401A06300	WP20PD 055	4164527	TCGT1102011P	TN15U B138	4165851	WNMA080408	TN20K B147	4165986	DNMG1104086P	TN30M B132
4163511	TDS401A06350	WP20PD 055	4164528	TCGT1102041P	TN10U B138	4165852	WNMA080412	TN20K B147	4165987	DNMG1504046P	TN10P B132
4163512	TDS401A06400	WP20PD 055	4164529	TCGT1102041P	TN15U B138	4165853	CNMG1204084P	TN30M B126	4165988	DNMG1504046P	TN20P B132
4163513	TDS401A06500	WP20PD 055	4164530	TCGT16T3021P	TN10U B138	4165854	CNMG1204124P	TN15M B126	4165989	DNMG1504046P	TN15M B132
4163514	TDS401A06528	WP20PD 055	4164531	TCGT16T3041P	TN10U B138	4165855	CNMG1204124P	TN30M B126	4165990	DNMG1504046P	TN30M B132
4163515	TDS401A06600	WP20PD 055	4164532	TCGT16T3041P	TN15U B138	4165856	CNMG1606124P	TN15M B126	4165991	DNMG1504086P	TN10P B132
4163516	TDS401A06630	WP20PD 055	4164543	TCGT16T3081P	TN10U B138	4165857	CNMG1606124P	TN30M B126	4165992	DNMG1504086P	TN20P B132
4163517	TDS401A06700	WP20PD 055	4164544	VBGT1103021P	TN10U B144	4165858	CNMG1906124P	TN15M B126	4165993	DNMG1504086P	TN30P B132
4163518	TDS401A06746	WP20PD 055	4164545	VBGT1103021P	TN15U B144	4165859	CNMG1906124P	TN30M B126	4165994	DNMG1504086P	TN15M B132
4163519	TDS401A06800	WP20PD 055	4164546	VBGT1103011P	TN10U B144	4165860	DNMG1504044P	TN15M B131	4165995	DNMG1504086P	TN30M B132
4163520	TDS401A06900	WP20PD 056	4164547	VBGT1103011P	TN15U B144	4165861	DNMG1504044P	TN30M B131	4165996	DNMG1504126P	TN10P B132
4163521	TDS401A07000	WP20PD 056	4164548	VBGT1103041P	TN10U B144	4165862	DNMG1504084P	TN15M B131	4165997	DNMG1504126P	TN20P B132
4163522	TDS401A07100	WP20PD 056	4164549	VBGT1604021P	TN10U B144	4165863	DNMG1504084P	TN30M B131	4166171	CNMG1204042P	TN10P B126
4163523	TDS401A07145	WP20PD 056	4164550	VBGT1604021P	TN15U B144	4165864	DNMG1506044P	TN15M B131	4166172	CNMG1204042P	TN20P B126
4163524	TDS401A07200	WP20PD 056	4164551	VBGT1604011P	TN10U B144	4165865	DNMG1506044P	TN30M B131	4166242	CCMT0602021P	TN15M B123
4163525	TDS401A07300	WP20PD 056	4164552	VBGT1604041P	TN10U B144	4165866	DNMG1506084P	TN15M B131	4166243	CNMG1204042P	TN20K B126
4163526	TDS401A07400	WP20PD 056	4164563	VBGT1604041P	TN15U B144	4165867	DNMG1506084P	TN30M B131	4166244	CNMG1204042P	TN15M B126
4163527	TDS401A07500	WP20PD 056	4164564	CNGP120402	TN10U B35, B124	4165868	DNMG1506124P	TN15M B131	4166245	CNMG1204042P	TN30M B126
4163528	TDS401A07541	WP20PD 056	4164565	CNGP120401	TN10U B35, B124	4165869	DNMG1506124P	TN30M B131	4166246	DNMG1204022P	TN10U B126
4163529	TDS401A07600	WP20PD 056	4164566	CNGP120404	TN10U B35, B124	4165870	SNMG1204084P	TN15M B135	4166247	CNMG1204042P	TN15U B126
4163530	TDS401A07700	WP20PD 056	4164567	CNGP120404	TN15U B124	4165871	SNMG1204084P	TN30M B135	4166248	CNMG1204082P	TN10P B126
4163531	TDS401A07800	WP20PD 056	4164568	CNGP120408	TN10U B35, B124	4165872	SNMG1204124P	TN15M B135	4166249	CNMG1204082P	TN20P B126
4163532	TDS401A07900	WP20PD 056	4164569	CNGP120408	TN15U B124	4165873	SNMG1204124P	TN30M B135	4166250	CNMG1204082P	TN20K B126
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4166595	VBMT1604041P TN15M	B144	4166809	SNMG1204086P TN20P	B136	4167087	TNMG1604086P TN10P	B142	4167231	TDS20A12800 WP20PD	051
4166596	VBMT1604041P TN30M	B144	4166810	SNMG1204086P TN30P	B136	4167088	TNMG1604086P TN20P	B142	4167232	TDS20A12900 WP20PD	051
4166597	VBMT1604041P TN10U	B144	4166811	SNMG1204086P TN15M	B136	4167089	TNMG1604086P TN30P	B142	4167233	TDS20A13000 WP20PD	051
4166598	VBMT1604041P TN15U	B144	4166812	SNMG1204086P TN30M	B136	4167090	TNMG1604086P TN15M	B142	4167234	TDS20A13096 WP20PD	051
4166599	VBMT1604081P TN10P	B144	4166813	SNMG1204126P TN10P	B136	4167091	TNMG1604086P TN30M	B142	4167235	TDS20A13100 WP20PD	051
4166600	VBMT1604081P TN20P	B144	4166814	SNMG1204126P TN20P	B136	4167092	TNMG1604126P TN10P	B142	4167236	TDS20A13200 WP20PD	052
4166601	VBMT1604081P TN20K	B144	4166815	SNMG1204126P TN30P	B136	4167113	TNMG1604126P TN20P	B142	4167237	TDS20A13300 WP20PD	052
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4166603	VBMT1604081P TN30M	B144	4166817	SNMG1204126P TN30M	B136	4167115	TNMG1604126P TN30M	B142	4167239	TDS20A13500 WP20PD	052
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4166605	VBMT1604081P TN15U	B144	4166819	SNMG1906126P TN30P	B136	4167117	TNMG2204046P TN20P	B142	4167241	TDS20A13700 WP20PD	052
4166623	CCMT1204081P TN30M	B123	4166820	SNMG1906126P TN15M	B136	4167118	TNMG2204046P TN15M	B142	4167242	TDS20A13800 WP20PD	052
4166624	CCMT1204081P TN10U	B123	4166821	SNMG1906126P TN30M	B136	4167119	TNMG2204046P TN30M	B142	4167243	TDS20A13891 WP20PD	052
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4166627	DCMT0702041P TN10P	B129	4166824	TNMG1604046P TN15M	B142	4167122	TNMG2204086P TN30P	B142	4167246	TDS20A14100 WP20PD	052
4166628	DCMT0702041P TN20P	B129	4166825	DNMG1506042P TN10P	B131	4167123	TNMG2204086P TN15M	B142	4167247	TDS20A14200 WP20PD	052
4166629	DCMT0702041P TN20K	B129	4166826	DNMG1506042P TN20P	B131	4167124	TNMG2204086P TN30M	B142	4167248	TDS20A14288 WP20PD	052
4166630	DCMT0702041P TN15M	B129	4166827	DNMG1506042P TN20K	B131	4167125	VNMG1604086P TN10P	B147	4167249	TDS20A14300 WP20PD	052
4166631	DCMT0702041P TN30M	B129	4166828	DNMG1506042P TN15M	B131	4167126	VNMG1604086P TN20P	B147	4167250	TDS20A14400 WP20PD	052
4166632	DCMT0702041P TN10U	B129	4166829	DNMG1506042P TN10U	B131	4167127	VNMG1604086P TN15M	B147	4167251	TDS20A14500 WP20PD	052
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4166634	DCMT11T3021P TN10U	B129	4166831	DNMG1506082P TN10P	B131	4167129	VNMG0604086P TN10P	B149	4167253	TDS20A14684 WP20PD	052
4166635	DCMT11T3021P TN15U	B129	4166832	DNMG1506082P TN20P	B131	4167130	VNMG0604086P TN20P	B149	4167254	TDS20A14700 WP20PD	052
4166636	DCMT11T3041P TN10P	B129	4166833	DNMG1506082P TN20K	B131	4167131	VNMG0604086P TN15M	B149	4167255	TDS20A14800 WP20PD	052
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4166638	DCMT11T3041P TN20K	B129	4166835	DNMG1506082P TN10U	B131	4167133	VNMG0804086P TN10P	B149	4167257	TDS20A15000 WP20PD	052
4166639	DCMT11T3041P TN15M	B129	4166836	DNMG1506082P TN15U	B131	4167134	VNMG0804086P TN20P	B149	4167258	TDS20A15083 WP20PD	052
4166640	DCMT11T3041P TN30M	B129	4166837	DNMG1506122P TN10P	B131	4167135	VNMG0804086P TN30P	B149	4167259	TDS20A15100 WP20PD	052
4166641	DCMT11T3041P TN10U	B129	4166838	DNMG1506122P TN20P	B131	4167136	VNMG0804086P TN15M	B149	4167260	TDS20A15200 WP20PD	052
4166642	DCMT11T3041P TN15U	B129	4166839	DNMG1506122P TN20K	B131	4167137	VNMG0804086P TN30M	B149	4167261	TDS20A15300 WP20PD	052
4166643	DCMT11T3081P TN10P	B129	4166840	DNMG1506122P TN15M	B131	4167138	VNMG0804126P TN10P	B149	4167262	TDS20A15400 WP20PD	052
4166644	DCMT11T3081P TN20P	B129	4166841	DNMG1506122P TN30M	B131	4167139	VNMG0804126P TN20P	B149	4167263	TDS20A15479 WP20PD	052
4166645	DCMT11T3081P TN20K	B129	4166842	DNMG1506122P TN10U	B131	4167140	VNMG0804126P TN30P	B149	4167264	TDS20A15500 WP20PD	052
4166646	DCMT11T3081P TN15M	B129	4166843	SNMG0903082P TN10P	B135	4167141	VNMG0804126P TN15M	B149	4167265	TDS20A15600 WP20PD	052
4166647	DCMT11T3081P TN30M	B129	4166844	SNMG0903082P TN20P	B135	4167142	VNMG0804126P TN30M	B149	4167266	TDS20A15700 WP20PD	052
4166648	DCMT11T3081P TN10U	B129	4166845	SNMG0903082P TN20K	B135	4167196	TDS20A10000 WP20PD	051	4167267	TDS20A15800 WP20PD	052
4166649	DCMT11T3121P TN10P	B129	4166846	SNMG0903082P TN10U	B135	4167198	TDS20A10100 WP20PD	051	4167268	TDS20A15875 WP20PD	052
4166650	DCMT11T3121P TN20K	B129	4166847	SNMG1204082P TN10P	B135	4167199	TDS20A10200 WP20PD	051	4167269	TDS20A15900 WP20PD	052
4166651	DCMT11T3121P TN15M	B129	4166848	SNMG1204082P TN20P	B135	4167200	TDS20A10300 WP20PD	051	4167270	TDS20A16000 WP20PD	052
4166652	DCMT11T3121P TN10U	B129	4166849	SNMG1204082P TN20K	B135	4167201	TDS20A10320 WP20PD	051	4167271	TDS20A16100 WP20PD	052
4166653	DCMT1504041P TN10P	B129	4166850	SNMG1204082P TN15M	B135	4167202	TDS20A10400 WP20PD	051	4167272	TDS20A16200 WP20PD	052
4166654	DCMT1504041P TN20P	B129	4166851	SNMG1204082P TN10U	B135	4167203	TDS20A10500 WP20PD	051	4167273	TDS20A16271 WP20PD	052
4166655	DCMT1504041P TN20K	B129	4166852	TNMG1604042P TN10P	B141	4167204	TDS20A10600 WP20PD	051	4167274	TDS20A16300 WP20PD	052
4166656	DCMT1504081P TN10P	B129	4166853	TNMG1604042P TN20P	B141	4167205	TDS20A10700 WP20PD	051	4167275	TDS20A16400 WP20PD	052
4166657	DCMT1504081P TN20P	B129	4166854	TNMG1604042P TN15M	B141	4167206	TDS20A10716 WP20PD	051	4167276	TDS20A16500 WP20PD	053
4166658	DNMG1504126P TN15M	B132	4166855	TNMG1604042P TN20K	B141	4167207	TDS20A10800 WP20PD	051	4167277	TDS20A16600 WP20PD	053
4166659	DNMG1504126P TN30M	B132	4166856	TNMG1604042P TN15M	B141	4167208	TDS20A10900 WP20PD	051	4167278	TDS20A16670 WP20PD	053
4166676	DNMG1506046P TN10P	B132	4166857	TNMG1604042P TN30M	B141	4167209	TDS20A11000 WP20PD	051	4167279	TDS20A16700 WP20PD	053
41666768	DNMG1506046P TN20P	B132	4166858	TNMG1604042P TN10U	B141	4167210	TDS20A11100 WP20PD	051	4167280	TDS20A16800 WP20PD	053
41666769	DNMG1506046P TN15M	B132	4166859	TNMG1604042P TN15U	B141	4167211	TDS20A11113 WP20PD	051	4167281	TDS20A16900 WP20PD	053
4166770	DNMG1506046P TN30M	B132	4166860	TNMG1604082P TN10P	B141	4167212	TDS20A11200 WP20PD	051	4167282	TDS20A17000 WP20PD	053
4166771	DNMG1506086P TN10P	B132	4166861	TNMG1604082P TN20P	B141	4167213	TDS20A11300 WP20PD	051	4167283	TDS20A17100 WP20PD	053
4166772	DNMG1506086P TN20P	B132	4166862	TNMG1604082P TN20K	B141	4167214	TDS20A11400 WP20PD	051	4167284	TDS20A17200 WP20PD	053
4166793	DNMG1506086P TN30P	B132	4166863	TNMG1604122P TN20P	B141	4167215	TDS20A11500 WP20PD	051	4167285	TDS20A17300 WP20PD	053
4166794	DNMG1506086P TN15M	B132	4166864	TNMG1604122P TN15M	B141	4167216	TDS20A11509 WP20PD	051	4167286	TDS20A17400 WP20PD	053
4166795	DNMG1506086P TN30M	B132	4166865	TNMG1604082P TN10U	B141	4167217	TDS20A11600 WP20PD	051	4167287	TDS20A17463 WP20PD	053
4166796	DNMG1506126P TN10P	B132	4166866	TNMG1604082P TN15U	B141	4167218	TDS20A11700 WP20PD	051	4167288	TDS20A17500 WP20PD	053
4166797	DNMG1506126P TN20P	B132	4166867	TNMG1604122P TN20P	B141	4167219	TDS20A11800 WP20PD	051	4167289	TDS20A17600 WP20PD	053
4166798	DNMG1506126P TN30P	B132	4166868	TNMG1604122P TN20K	B141	4167220	TDS20A11900 WP20PD	051	4167290	TDS20A17700 WP20PD	053
4166799	DNMG1506126P TN15M	B132	4166869	TNMG1604122P TN15M	B141	4167221	TDS20A11908 WP20PD	051	4167291	TDS20A17800 WP20PD	053
4166800	DNMG1506126P TN30M	B132	4166870	TNMG1604122P TN30M	B141	4167222	TDS20A12000 WP20PD	051	4167292	TDS20A17859 WP20PD	053
4166801	DNMG1906126P TN30P	B132	4166871	TNMG1604122P TN10U	B141	4167223	TDS20A12100 WP20PD	051	4167293	TDS20A17900 WP20PD	053
4166802	SNMG0903086P TN10P	B136	4166872	TNMG1604122P TN20P	B141	4167224	TDS20A12200 WP20PD	051	4168738	CCMT060204FP WM15CT	B31
4166803	SNMG0903086P TN20P	B136	4166873	TNMG1604122P TN15M	B141	4167225	TDS20A12300 WP20PD	051	4168739	CCMT060208FP WM15CT	B31
4166804	SNMG1204046P TN10P	B136	4166874	TNMG1604082P TN10U	B141	4167226	TDS20A12304 WP20PD	051	4168740	CCMT09T304FP WM15CT	B31
4166805	SNMG1204046P TN20P	B136	4166875	TNMG1604082P TN15U	B141	4167227	TDS20A12400 WP20PD	051	4168741	CCMT09T308FP WM15CT	B31
4166806	SNMG1204046P TN15M	B136	4166876	TNMG1604122P TN10P	B141	4167228	TDS20A12500 WP20PD	051	4168742	CCMT120404FP WM15CT	B31
4166807	SNMG1204046P TN30M	B136	4166877	TNMG1604122P TN20K	B141	4167229	TDS20A12600 WP20PD	051	4168763	CCMT120408FP WM15CT	B31

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4168765 DCMT111304FP WM15CT B48	4168835 TPMT110208FP WM25CT B92	4169382 DNMG110404UF WM25CT B60	4169463 SNMG190612UR WM25CT B75
4168766DCMT1110208FP WM15CT B48	4168836 TPMT16T304FP WM25CT B92	4169383 DNMG110408UF WM25CT B60	4169464 SNMG190612UR WM25CT B75
4168767SCMT09T304FP WM15CT B68	4168837 TPMT16T308FP WM25CT B92	4169384 DNMG150404UF WM25CT B60	4169465 TNMG160408UR WM25CT B89
4168768SCMT09T308FP WM15CT B68	4168838 TPMT16T312FP WM25CT B92	4169385 DNMG150408UF WM25CT B60	4169466 TNMG160412UR WM25CT B89
4168769SCMT120408FP WM15CT B68	4168839 WPMT06T304FP WM25CT B105	4169386 DNMG150412UF WM25CT B60	4169467 TNMG160416UR WM25CT B89
4168770TCMT110204FP WM15CT B82	4168840 WPMT06T308FP WM25CT B105	4169387 DNMG150604UF WM25CT B60	4169468 TNMG220408UR WM25CT B89
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4168772TCMT16T304FP WM15CT B82	4168893 CCMT060204MP WM15CT B32	4169389 DNMG150612UF WM25CT B60	4169470 TNMG220416UR WM25CT B89
4168773TCMT16T308FP WM15CT B82	4168894 CCMT09T304MP WM15CT B32	4169390 SNMG120404UF WM25CT B74	4169471 TNMG270612UR WM25CT B89
4168774VBMT110304FP WM15CT B94	4168895 CCMT09T308MP WM15CT B32	4169391 SNMG120408UF WM25CT B74	4169472 TNMG270616UR WM25CT B89
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4168778CCMT060202FP WM25CT B31	4168899 SCMT09T304MP WM15CT B69	4169395 TNMG160412UF WM25CT B88	4169476 WNMG080408UR WM25CT B104
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4168833TPMT090208FP WM25CT B92	4169380 CNMG120408UF WM25CT B42	4169461 SNMG150612UR WM25CT B75	4169533 WMTS805M8U06PT WP25CT D18

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4169575	WMTS805M8U15PT WP25CT	D18	4169984	VBMT160408 WP15CT	B94	4170057	SNMG120408MR WP35CT	B73
4169576	WMTC094N00CM13 WU25PT	D14	4169985	VBMT160412 WP15CT	B94	4170058	DNMG120412MR WP35CT	B73
4169577	WMTC094N00CMW13 WU25PT	D16	4169989	SNMG120408UR WP35CT	B75	4170059	TNMG160404MR WP35CT	B86
4169578	WMTC094R05CM13 WU25PT	D15	4169990	SNMG120412UR WP35CT	B75	4170060	TNMG160408MR WP35CT	B86
4169579	WMTC094R05CMW13 WU25PT	D17	4169991	SNMG150612UR WP35CT	B75	4170061	TNMG160412MR WP35CT	B86
4169580	WMTC094R12CM13 WU25PT	D15	4169992	SNMG150616UR WP35CT	B75	4170062	TNMG220404MR WP35CT	B86
4169581	WMTC094R12CMW13 WU25PT	D17	4169993	CCMT120408FP WP15CT	B31	4170063	TNMG220408MR WP35CT	B86
4169582	WMTC125N00CM17 WU25PT	D14	4169994	CCMT120412FP WP15CT	B31	4170064	TNMG220412MR WP35CT	B86
4169583	WMTC125N00CMW17 WU25PT	D16	4169995	DCMT070204FP WP15CT	B48	4170065	TNMG220416MR WP35CT	B86
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4169585	WMTC125R05CMW17 WU25PT	D17	4169997	DCMT11T304FP WP15CT	B48	4170067	WNMG080408MR WP35CT	B102
4169586	WMTC015L05CM08 WU25PT	D15	4169998	DCMT11T308FP WP15CT	B48	4170068	WNMG080412MR WP35CT	B102
4169587	WMTC125R12CMW17 WU25PT	D17	4169999	DCMT11T312FP WP15CT	B48	4170083	CCMT060208FP WK20CT	B31
4169588	WMTC015N00CM08 WU25PT	D14	4170000	DCMT150404FP WP15CT	B48	4170084	CCMT09T304FP WK20CT	B31
4169589	WMTC015N00CMW08 WU25PT	D16	4170001	DCMT150408FP WP15CT	B48	4170085	CCMT09T308FP WK20CT	B31
4169590	WMTC015R05CM08 WU25PT	D15	4170002	SCMT09T304FP WP15CT	B68	4170086	CCMT120404FP WK20CT	B31
4169591	WMTC015L05CM08 WU25PT	D14	4170003	SCMT09T308FP WP15CT	B68	4170087	CCMT120408FP WK20CT	B31
4169592	WMTC015R12CM08 WU25PT	D15	4170004	SCMT120408FP WP15CT	B68	4170088	CCMT120412FP WK20CT	B31
4169593	WMTC020N00CM08 WU25PT	D14	4170005	SCMT120412FP WP15CT	B68	4170089	DCMT070204FP WK20CT	B48
4169594	WMTC020N00CMW08 WU25PT	D16	4170006	TCMT110204FP WP15CT	B82	4170090	DCMT11T304FP WK20CT	B48
4169595	WMTC020R05CM08 WU25PT	D15	4170007	TCMT110208FP WP15CT	B82	4170091	TCMT11T308FP WK20CT	B48
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4169603	WMTC030N00CMW17 WU25PT	D16	4170015	CPMT060202FP WP15CT	B46	4170099	TCMT16T304FP WK20CT	B82
4169604	WMTC030R05CM17 WU25PT	D15	4170016	CPMT060204FP WP15CT	B46	4170100	TCMT16T308FP WK20CT	B82
4169605	WMTC030R05CMW17 WU25PT	D17	4170017	CPMT060208FP WP15CT	B46	4170101	TCMT16T312FP WK20CT	B82
4169606	WMTC030L05CM17 WU25PT	D14	4170018	CPMT09T304FP WP15CT	B46	4170102	TCMT220408FP WK20CT	B82
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4169612	WMTC040N00CM17 WU25PT	D14	4170024	SPMT09T308FP WP15CT	B79	4170108	CPMT09T308FP WK20CT	B46
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4169614	WMTC040R05CM17 WU25PT	D15	4170026	TPMT110204FP WP15CT	B92	4170110	SPMT09T304FP WK20CT	B79
4169615	WMTC040L05CM17 WU25PT	D14	4170027	TPMT110208FP WP15CT	B92	4170111	SPMT09T308FP WK20CT	B79
4169616	WMTC040R12CM17 WU25PT	D15	4170028	TPMT16T304FP WP15CT	B92	4170112	TPMT090208FP WK20CT	B92
4169617	WMTC040L12CM17 WU25PT	D14	4170029	TPMT16T308FP WP15CT	B92	4170113	TPMT110204FP WK20CT	B92
4169618	CCMT060202FP WP15CT	B31	4170030	WPMT06T304FP WP15CT	B105	4170114	TPMT110208FP WK20CT	B92
4169619	CCMT060204FP WP15CT	B31	4170031	WPMT06T308FP WP15CT	B105	4170115	TPMT16T304FP WK20CT	B92
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4169621	CCMT09T308FP WP15CT	B31	4170033	SNMG190612UR WP35CT	B75	4170119	WMTR1885PPC WU10PT	D26
4169622	CCMT120404FP WP15CT	B31	4170034	SNMG190616UR WP35CT	B75	4170120	WMTR1885PPC WU25PT	D26
4169623	CCMT120408FP WP15CT	B31	4170035	TNMG160408UR WP35CT	B89	4170121	WMTR2506PPC WU10PT	D26
4169624	CNMG120408UR WP35CT	B43	4170036	TNMG220408UR WP35CT	B89	4170122	WMTR2506PPC WU25PT	D26
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4170192	WMTR805M8UPC WU25PT	D25						4170193	WMTR805M8UPC WP10CT	D25
4170193	WMTR805M8UPC WU10HT	D26						4170194	WMTR805M8UPC WP25CT	D25
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4170267	CPMT09T312MP WK20CT	B46	4170380	SCMW120408 WK20CT	B70	4170520	SNMG190612UR WP25CT	B75	4170788	TPMR160312 WP35CT	B92
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4170372	CCMW09T308 WK20CT	B34	4170512	DNMG150412UR WP25CT	B62	4170651	SPMR120304 WP35CT	B78	4170983	CNMG160612RH WP15CT	B41
4170373	CCMW120404 WK20CT	B34	4170513	DNMG150608UR WP25CT	B62	4170652	SPMR120308 WP35CT	B78	4170984	CNMG160616RH WP15CT	B41
4170374	CCMW120408 WK20CT	B34	4170514	DNMG150612UR WP25CT	B62	4170752	RCMT10T3M0 WP35CT	B65	4170985	CNMG190608RH WP15CT	B41
4170375	DCMW070204 WK20CT	B50	4170515	DNMG150616UR WP25CT	B62	4170783	SPMR120312 WP35CT	B78	4170986	CNMG190612RH WP15CT	B41
4170376	DCMW11T304 WK20CT	B50	4170516	SNMG120408UR WP25CT	B75	4170784	TPMR110304 WP35CT	B92	4170987	CNMG190616RH WP15CT	B41

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5402196	VTSFT6554 WU40EG	T39	5402286	VTSFT6541 WP49EG	T40	5415549	XDCT110408PDERML WK15CM	G9	5417013	VSM11D020Z03M10XD11	G4, G15
5402197	VTSFT6555 WP49EG	T39	5402287	VTSFT6541 WU40EG	T40	5416316	VSM11D040Z04S016XD11	G8, G15	5417015	VSM11D025Z04M12XD11	G4, G15
5402198	VTSFT6555 WU40EG	T39	5402288	VTSFT6542 WU41EG	T40	5416317	VSM11D040Z06S016XD11	G8, G15	5417017	VSM11D032Z04M16XD11	G4, G15
5402199	VTSFT6556 WP49EG	T39	5402289	VTSFT6542 WP49EG	T40	5416318	VSM11D050Z05S022XD11	G8, G15	5417019	VSM11D040Z06M16XD11	G4, G15
5402200	VTSFT6556 WU40EG	T39	5402290	VTSFT6542 WU40EG	T40	5416340	VSM11D063Z06S022XD11	G8, G15	5417053	XDCT110408PDFRALP WN25PM	G11
5402201	VTSFT6557 WP42EG	T39	5402291	VTSFT6543 WP49EG	T40	5416341	VSM11D063Z09S022XD11	G8, G15	5417054	XDCT110404PDFRALP WN25PM	G11
5402202	VTSFT6557 WP49EG	T39	5402292	VTSFT6543 WU40EG	T40	5416342	VSM11D080Z08S027XD11	G8, G15	5419648	WOEJ120712SRMM WP25PM	J13
5402203	VTSFT6557 WU40EG	T39	5402293	VTSFT6544 WP49EG	T40	5416345	VSM11D100Z09S032XD11	G8, G15	5419649	WOEJ120712SRMM WU35PM	J13
5402204	VTSFT6558 WU40EG	T39	5402294	VTSFT6544 WU40EG	T40	5416347	VSM11D125Z011S040XD11	G8, G15	5419790	WOEJ120712SRMM WP20CM	J13
5402205	VTSFT6559 WU40EG	T39	5408066	GT405057 GP6520	T52	5416454	VSM11D012Z01B16XD11	G5, G15	5419791	WOEJ120712SRMM WP35CM	J13
5402206	VTSFT6560 WP42EG	T39	5408067	GT405058 GP6520	T52	5416455	VSM11D016Z02B16XD11	G5, G15	5423874	A25RWMTER0316M W	D35
5402207	VTSFT6560 WP49EG	T39	5408068	GT405059 GP6520	T52	5416457	VSM11D020Z02B20XD11	G5, G15	5423875	A32SWMTER0319M W	D35
5402208	VTSFT6560 WU40EG	T39	5408069	GT415021 GP6520	T53	5416458	VSM11D020Z03B20XD11	G5, G15	5423876	A25RWMTER0416M W	D35
5402209	VTSFT6561 WU40EG	T39	5408400	GT415022 GP6520	T53	5416459	VSM11D025Z03B25XD11	G5, G15	5423877	A32SWMTER0419M W	D35
5402210	VTSFT6562 WP49EG	T39	5408401	GT415023 GP6520	T53	5416480	VSM11D025Z04B25XD11	G5, G15	5423878	A25RWMTER0519M W	D35
5402211	VTSFT6562 WU40EG	T39	5408402	GT425010 GP6520	T54	5416481	VSM11D030Z04B25XD11	G5, G15	5423879	A40TWMTER0522M W	D35
5402212	VTSFT6563 WU40EG	T39	5408403	GT425011 GP6520	T54	5416482	VSM11D032Z04B32XD11	G5, G15	5423880	A32SWMTER0619M W	D35
5402213	VTSFT6564 WU40EG	T39	5408404	GT425012 GP6520	T54	5416483	VSM11D032Z05B32XD11	G5, G15	5423881	A40TWMTER0622M W	D35
5402214	VTSFT6564 WP49EG	T39	5408405	GT435010 GP6520	T55	5416632	VSM11D012Z01A16XD11L100	G6, G15	5423882	A32SWMTER0622M W	D35
5402215	VTSFT6565 WU40EG	T39	5408406	GT435011 GP6520	T55	5416633	VSM11D016Z02A16XD11L100	G6, G15	5423883	A40TWMTER0522M W	D35
5402216	VTSFT6566 WU40EG	T39	5408407	GT435012 GP6520	T55	5416634	VSM11D020Z02A20XD11L110	G6, G15	5423884	A25RWMTER0416M W	D35
5402217	VTSFT6567 WP49EG	T39	5415250	XDPT110416PDSRMM WK15CM	G10	5416635	VSM11D020Z03A20XD11L110	G6, G15	5423885	A32SWMTER0419M W	D35
5402218	VTSFT6567 WU40EG	T39	5415253	XDPT110416PDSRMM WP35CM	G10	5416636	VSM11D025Z04A25XD11L120	G6, G15	5423886	A32SWMTER0519M W	D35
5402219	VTSFT6568 WU40EG	T39	5415254	XDPT110416PDSRMM WP25PM	G10	5416637	VSM11D025Z04A25XD11L200	G6, G15	5423887	A40TWMTER0522M W	D35
5402220	VTSFT6569 WP49EG	T39	5415255	XDPT110408PDSRMM WK15CM	G10	5416638	VSM11D032Z03A32XD11L130	G6, G15	5423888	A25RWMTER0416M W	D35
5402221	VTSFT6569 WU40EG	T39	5415256	XDPT110408PDSRMM WU35PM	G10	5416639	VSM11D032Z05A32XD11L130	G6, G15	5423889	A32SWMTER0519M W	D35
5402222	VTSFT6570 WU40EG	T39	5415257	XDPT110408PDSRMM WP35CM	G10	5416700	VSM11D016Z02A16XD11L170	G7, G15	5423890	A40TWMTER0622M W	D35
5402223	VTSFT6571 WP49EG	T40	5415312	XDPT110412PDSRMM WU35PM	G10	5416701	VSM11D018Z02A16XD11L170	G7, G15	5423730	HNGJ0905ANSNGD WK15CM	F28, F34, F40
5402224	VTSFT6571 WU40EG	T40	5415313	XDPT110412PDSRMM WP35PM	G10	5416702	VSM11D020Z02A20XD11L170	G7, G15	5423731	HNPJ0905ANSNGD WK15CM	F27, F34, F40
5402225	VTSFT6572 WU40EG	T40	5415313	XDPT110412PDSRMM WP35CM	G10	5416703	VSM11D020Z03A20XD11L170	G7, G15	5423732	HNPJ0905ANSNGD WK15CM	F27, F34, F40
5402226	VTSFT6573 WU40EG	T40	5415314	XDPT110412PDSRMM WP25PM	G10	5416704	VSM11D022Z03A20XD11L170	G7, G15	5423733	XNGJ0704ANENLD3W WK15CM	F17
5402227	VTSFT6525 WP49EG	T38	5415314	XDPT110412PDSRMM WP25PM	G10	5416705	VSM11D025Z03A25XD11L210	G7, G15	5423734	HNPJ0704ANSNGD WK15CM	F17, F22
5402228	VTSFT6525 WU40EG	T38	5415315	XDPT110408PDSRMM WK15CM	G10	5416706	VSM11D025Z04A25XD11L210	G7, G15	5423735	HNPJ0704ANSNGD WK15CM	F17, F22
5402229	VTSFT6526 WP49EG	T38	5415317	XDPT110408PDSRMM WU35PM	G10	5416638	VSM11D032Z03A32XD11L130	G6, G15	5427381	XNKT1205AZER11 WK15CM	F55
5402250	VTSFT6526 WU40EG	T38	5415317	XDPT110408PDSRMM WU35PM	G10	5416639	VSM11D032Z05A32XD11L130	G6, G15	5427382	SNMT1205AZR31 WK15CM	F55
5402251	VTSFT6527 WP49EG	T38	5415318	XDPT110408PDSRMM WP35CM	G10	5416707	VSM11D018Z02A16XD11L170	G7, G15	5427383	SNKT1205AZR21 WK15CM	F54
5402252	VTSFT6527 WU40EG	T38	5415318	XDPT110408PDSRMM WP35CM	G10	5416708	VSM11D020Z02A20XD11L170	G7, G15	5427384	SNKT1205AZR31 WK15CM	F55
5402253	VTSFT6528 WP49EG	T39	5415319	XDPT110408PDSRMM WP25PM	G10	5416709	VSM11D020Z03A20XD11L170	G7, G15	5427385	SNKT1505AZR31 WK15CM	F59
5402254	VTSFT6528 WU40EG	T39	5415360	XDPT110412PDSRMM WK15CM	G10	5416701	VSM11D018Z02A16XD11L170	G7, G15	5427386	SNMT1505AZR31 WK15CM	F59
5402255	VTSFT6529 WP49EG	T39	5415362	XDPT110412PDSRMM WP35CM	G10	5416702	VSM11D020Z02A20XD11L170	G7, G15	5427387	HPGT06T3DZENG WK15CM	F47
5402256	VTSFT6529 WU40EG	T39	5415364	XDPT110416PDSRMM WK15CM	G10	5416703	VSM11D020Z02A20XD11L170	G7, G15	5427388	HPGT06T3DZERG3W WK15CM	F47
5402257	VTSFT6530 WP49EG	T39	5415366	XDPT110416PDSRMM WP35CM	G10	5416704	VSM11D022Z03A20XD11L170	G7, G15	5427389	XPHT160408 WK15CM	G48, H9
5402258	VTSFT6530 WU40EG	T39	5415420	XDCW110404PDFRPPD WDN10U	G11	5416705	VSM11D025Z03A25XD11L210	G7, G15	5427390	XPHT160412MR WK15CM	G49, H9
5402259	VTSFT6531 WU41EG	T39	5415421	XDCW110408PDFRPPD WDN10U	G11	5416706	VSM11D025Z04A25XD11L210	G7, G15	5427391	XPHT160416 WK15CM	G48, H9
5402260	VTSFT6531 WP42EG	T39	5415422	XDPT110431PDSRMM WK15CM	G10	5416707	VSM11D025Z03A25XD11L210	G7, G15	5427392	XPHT160425 WK15CM	G48, H9
5402261	VTSFT6531 WP49EG	T39	5415425	XDPT110431PDSRMM WP35CM	G10	5416708	VSM11D020Z03A20XD11L250	G7, G15	5427393	XPHT160432 WK15CM	G48, H9
5402262	VTSFT6531 WU40EG	T39	5415426	XDPT110431PDSRMM WP25PM	G10	5416709	VSM11D032Z03A32XD11L250	G7, G15	5427394	XPHT160440 WK15CM	G48, H9
5402263	VTSFT6532 WP49EG	T39	5415428	XDPT110404PDSRMM WK15CM	G10	5415547	XDCT110408PDERML WP35CM	G9			
5402264	VTSFT6533 WU41EG	T39	5415450	XDPT110404PDSRMM WP35CM	G10						
5402265	VTSFT6533 WP42EG	T39	5415546	XDCT110408PDERML WU35PM	G9						
5402266	VTSFT6533 WP49EG	T39	5415547	XDCT110408PDERML WP35CM	G9						
5402267	VTSFT6533 WU40EG	T39									
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5402274	VTSFT6537 WP49EG	T39									
5402275	VTSFT6537 WU40EG	T39									
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5402280	VTSFT6539 WP49EG	T39									
5402281	VTSFT6539 WU40EG	T39									
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5427396XPHT160412 WK15CM	G48, H9	5472656VTSP06026 WU41EG	T11	5520843GX495008 WN14PG	T60	5537941TCF340R2SL40ME	Q9
5427398	.....XPHT160420 WK15CM	G48, H9	5472657	.....VTSP06027 WU41EG	T13	5520844	.....GX495010 WN14PG	T60	5537942	.....TCF350R2SL40ME	Q9
5427399	.....XPHT160408ERGE WK15CM	G48, H9	5472658	.....VTSP06028 WU41EG	T11	5522490	.....SDMX120408RMM WS30PM	G55	5537943	.....TCF360R2SL40ME	Q9-10
5427420	.....XPHT160412ERGE WK15CM	G48, H8	5472659	.....VTSP06029 WU41EG	T11	5528973	.....HNGJ0905ANENLD WS30PM	F33, F39	5537944	.....TCF300R3SL32ME	Q11
5427421	.....XPHT160416ERGE WK15CM	G48, H8	5472660	.....VTSP06030 WU41EG	T13	5528974	.....HNGJ0905ANSNGD WS30PM	F28, F34, F40	5537945	.....TCF310R3SL32ME	Q11
5427422	.....SDMT1204PDRMH WK15CM	G56	5472661	.....VTSP06031 WU41EG	T11	5528975	.....HNGJ0704ANENLD WS30PM	F8, F16, F21	5537946	.....TCF320R3SL32ME	Q12-13
5427423	.....SDMT1204PDRML WK15CM	G55	5472662	.....VTSP06032 WU41EG	T11	5528976	.....HNPJ0704ANSNGD WS30PM	F9, F17, F22	5537947	.....TCF330R3SL40ME	Q12
5427424	.....SDMT1506PDRMH WK15CM	G60	5472663	.....VTSP06033 WU41EG	T11	5528978	.....HNGJ0704ANENLD WS30PM	F8, F16, F21	5537948	.....TCF340R3SL40ME	Q12
5427425	.....SDMT1506PDRML WK15CM	G59	5472664	.....VTSP06034 WU41EG	T12	5528979	.....HNGJ0704ANENLD WS30PM	F8, F16, F21	5537949	.....TCF350R3SL40ME	Q12
5427426	.....SDMX150612RMM WK15CM	G60	5472665	.....VTSP06035 WU41EG	T12	5537950	.....TCF360R3SL40ME	Q12-13	5537950	.....TCF360R3SL40ME	Q12-13
5427427	.....SDMX120408RMM WK15CM	G56	5472666	.....VTSP06036 WU41EG	T12	5537951	.....TCF300R4SL32ME	Q14	5537952	.....TCF310R4SL32ME	Q14
5427428	.....SDMX120412RMM WK15CM	G56	5472667	.....VTSP06037 WU41EG	T12	5537953	.....TCF320R4SL32ME	Q15-16	5537953	.....TCF320R4SL32ME	Q15-16
5427441	.....RDMW1204MOTX WK15CM	J55	5472668	.....VTSP06038 WU41EG	T12	5537954	.....TCF330R4SL40ME	Q15	5537954	.....TCF330R4SL40ME	Q15
5427443	.....WOEJ080412SRMM WK15CM	J7	5472669	.....VTSP06039 WU41EG	T12	5528978	.....HPGT06T3DZENGD WS30PM	F47	5537955	.....TCF340R4SL40ME	Q15
5432605	.....TNMG160404UF WS10PT	B88	5472670	.....VTSP06040 WU41EG	T12	5536670	.....XDCT110404PDERML WP35CM	G9	5537956	.....TCF350R4SL40ME	Q15
5432606	.....TNMG160408UF WS10PT	B88	5473198	.....TNMG220412UR WS25PT	B89	5536671	.....XDCT110404PDERML WP25PM	G9	5537957	.....TCF360R4SL40ME	Q15-16
5472587	.....VTSFT6005 WU41EG	T35	5473222	.....TNMG220412UM WS10PT	B88	5537167	.....TCF240R2SL25MD	Q8, Q10	5537958	.....TCF300R3SL32ME	Q17
5472589	.....VTSFT6007 WU41EG	T35	5476633	.....RNPJ10T3MOSMH WU35PM	J25	5537168	.....TCF250R2SL32MD	Q8	5537959	.....TCF310R3SL32ME	Q17
5472600	.....VTSFT6008 WU41EG	T35	5476634	.....RNPJ1204MOSMM WU35PM	J33	5537169	.....TCF260R2SL32MD	Q8	5537960	.....TCF320R5SL32ME	Q18-19
5472601	.....VTSFT6010 WU41EG	T35	5476635	.....RNPJ1204MOSMH WU35PM	J33	5537778	.....TCF120R2SL20MA	Q8	5537961	.....TCF330R5SL32ME	Q18
5472603	.....VTSFT6011 WU41EG	T35	5476636	.....RNPJ1605MOSMM WU35PM	J38	5537779	.....TCF125R2SL20MA	Q8	5537962	.....TCF340R5SL40ME	Q18
5472605	.....VTSFT6013 WU41EG	T35	5512536	.....CNMG190612UR WS25PT	B43	5537820	.....TCF265R2SL32MD	Q8	5537963	.....TCF350R5SL40ME	Q18
5472606	.....VTSFT6014 WU41EG	T35	5512538	.....SNMG190612UR WS25PT	B75	5537821	.....TCF270R2SL32MD	Q8	5537964	.....TCF360R5SL40ME	Q18-19
5472608	.....VTSFT6016 WU41EG	T35	5514978	.....WGMEL2525 W	D37	5537822	.....TCF280R2SL32MD	Q8	5538204	.....CNGG120404FS WS25PT	B35
5472609	.....VTSFT6017 WU41EG	T35	5514979	.....WGMER2525 W	D37	5537823	.....TCF290R2SL32MD	Q8, Q10	5538205	.....CNGG120408FS WS25PT	B35
5472611	.....VTSFT6019 WU41EG	T35	5515020	.....WGMEL3232 W	D37	5537824	.....TCF290R3SL32MD	Q11, Q13	5538206	.....DNGG110402FS WS25PT	B51
5472612	.....VTSFT6020 WU41EG	T35	5515021	.....WGMER3232 W	D37	5537824	.....TCF240R3SL25MD	Q11, Q13	5538207	.....DNGG150404FS WS25PT	B51
5472614	.....VTSFT6022 WU41EG	T35	5517826	.....XDCT110408PDERML WS30PM	G9	5537825	.....TCF250R3SL32MD	Q11	5538208	.....DNGG150408FS WS25PT	B51
5472615	.....VTSFT6023 WU41EG	T35	5517827	.....XDPT110431PDSRMM WS30PM	G10	5537826	.....TCF260R3SL32MD	Q11	5538209	.....DNGG150604FS WS25PT	B51
5472617	.....VTSFT6025 WU41EG	T35	5519572	.....SDMX120412RMM WS30PM	G55	5537827	.....TCF265R3SL32MD	Q11	5538230	.....DNGG150608FS WS25PT	B51
5472618	.....VTSFT6026 WU41EG	T35	5519888	.....XPHT160408ERGE WS30PM	G48, H8	5537828	.....TCF270R3SL32MD	Q11	5538231	.....TNNG160404FS WS25PT	B83
5472620	.....VTSFT6028 WU41EG	T35	5519889	.....XPHT160412ERGE WS30PM	G48, H8	5537829	.....TCF280R3SL32MD	Q11	5538232	.....VNGG160404FS WS25PT	B95
5472621	.....VTSFT6029 WU41EG	T35	5519921	.....XDPT110408PDSRMM WS30PM	G10	5537830	.....TCF290R3SL32MD	Q11, Q13	5538233	.....VNGG160408FS WS25PT	B95
5472623	.....VTSFT6031 WU41EG	T35	5520247	.....RDMT1204MOTX WS30PM	J55	5537831	.....TCF240R4SL25MD	Q14, Q16	5538234	.....WNGG080404FS WS25PT	B99
5472624	.....VTSFT6032 WU41EG	T35	5520248	.....WOEJ080412SRMM WS30PM	J7	5537832	.....TCF250R4SL25MD	Q14	5538235	.....WNGG080408FS WS25PT	B99
5472625	.....VTSFT6033 WU41EG	T35	5520249	.....WOEJ120712SRMM WS30PM	J13	5537833	.....TCF260R4SL25MD	Q14	5538554	.....TCF090305DCV34 WU25CH	Q20
5472626	.....VTSFT6034 WU41EG	T36	5520350	.....RNGJ1204M0EML WS30PM	J32	5537834	.....TCF265R4SL25MD	Q14	5538555	.....TCF090305DCV34 WU40PH	Q20
5472627	.....VTSFT6035 WU41EG	T36	5520351	.....RNGJ1204M0SMM WS30PM	J32	5537835	.....TCF270R4SL25MD	Q14	5538556	.....TCF090305DCV36 WU25CH	Q21
5472628	.....VTSFT6036 WU41EG	T36	5520352	.....RNGJ10T3M0EML WS30PM	J24	5537836	.....TCF280R4SL25MD	Q14, Q16	5538557	.....TCF090305DCV36 WU40PH	Q21
5472629	.....VTSFT6037 WU41EG	T36	5520353	.....RNGJ10T3M0SMM WS30PM	J24	5537837	.....TCF290R4SL25MD	Q14, Q16	5538558	.....TCF080308DPV34 WU25CH	Q22
5472630	.....VTSFT6038 WU41EG	T36	5520354	.....RNGJ1605M0EML WS30PM	J37	5537838	.....TCF240R5SL25MD	Q17, Q19	5538559	.....TCF080308DPV34 WU40PH	Q22
5472631	.....VTSFT6039 WU41EG	T36	5520817	.....GX505004 WK12PG	T51	5537839	.....TCF250R5SL25MD	Q17	5538600	.....TCF080308DPV34 WPK10CH	Q22
5472632	.....VTSFT6040 WU41EG	T36	5520818	.....GX505005 WK12PG	T51	5537840	.....TCF260R5SL25MD	Q17	5538601	.....TCF080308DPV36 WU25CH	Q23
5472633	.....VTSP06005 WU41EG	T11	5520819	.....GX505006 WK12PG	T51	5537841	.....TCF265R5SL25MD	Q17	5538602	.....TCF080308DPV36 WU40PH	Q23
5472634	.....VTSP06006 WU41EG	T13	5520820	.....GX505008 WK12PG	T51	5537842	.....TCF270R5SL25MD	Q17	5538603	.....TCF120405ECV34 WU25CH	Q20
5472635	.....VTSP06007 WU41EG	T11	5520822	.....GX505010 WK12PG	T51	5537843	.....TCF280R5SL25MD	Q17	5538604	.....TCF120405ECV34 WU40PH	Q20
5472636	.....VTSP06008 WU41EG	T11	5520823	.....GX505012 WK12PG	T51	5537844	.....TCF290R5SL25MD	Q17, Q19	5538606	.....TCF120405ECV36 WU25CH	Q21
5472637	.....VTSP06009 WU41EG	T13	5520824	.....GX505014 WK12PG	T51	5537860	.....TCF127R2SL20MA	Q8	5538607	.....TCF120405ECV36 WU40PH	Q21
5472638	.....VTSP06010 WU41EG	T11	5520825	.....GX355006 WK12PG	T48	5537861	.....TCF130R2SL20MA	Q8	5538608	.....TCF100408EPV34 WU25CH	Q22
5472639	.....VTSP06011 WU41EG	T11	5520826	.....GX355007 WK12PG	T48	5537862	.....TCF135R2SL20MA	Q8, Q10	5538609	.....TCF100408EPV34 WU40PH	Q22
5472640	.....VTSP06012 WU41EG	T13	5520827	.....GX355008 WK12PG	T48	5537863	.....TCF120R3SL20MA	Q11	5538610	.....TCF100408EPV36 WPK10CH	Q22
5472641	.....VTSP06013 WU41EG	T11	5520828	.....GX355009 WK12PG	T48	5537864	.....TCF125R3SL20MA	Q11	5538611	.....TCF100408EPV36 WU25CH	Q23
5472644	.....VTSP06014 WU41EG	T11	5520829	.....GX355010 WK12PG	T48	5537866	.....TCF127R3SL20MA	Q11	5538612	.....TCF100408EPV36 WU40PH	Q23
5472645	.....VTSP06015 WU41EG	T13	5520830	.....GX355011 WK12PG	T48	5537867	.....TCF130R3SL20MA	Q11	5538613	.....TCF570R2SL50MH	Q9
5472646	.....VTSP06016 WU41EG	T11	5520831	.....GX355102 WK12PG	T48	5537868	.....TCF135R3SL20MA	Q11, Q13	5538614	.....TCF580R2SL50MH	Q9
5472647	.....VTSP06017 WU41EG	T11	5520833	.....GX355012 WK12PG	T48	5537869	.....TCF120R4SL20MA	Q14	5538615	.....TCF590R2SL50MH	Q9
5472648	.....VTSP06018 WU41EG	T13	5520834	.....GX355121 WK12PG	T48	5537870	.....TCF125R4SL20MA	Q14	5538616	.....TCF600R2SL50MH	Q9
5472649	.....VTSP06019 WU41EG	T11	5520835	.....GX355122 WK12PG	T48	5537871	.....TCF127R4SL20MA	Q14	5538617	.....TCF610R2SL50MH	Q9
5472650	.....VTSP06020 WU41EG	T11	5520836	.....GX355014 WK12PG	T48	5537872	.....TCF130R4SL20MA	Q14	5538618	.....TCF620R2SL50MH	Q9
5472651	.....VTSP06021 WU41EG	T13	5520837	.....GX355141 WK12PG	T48	5537873	.....TCF135R4SL20MA	Q14, Q16	5538619	.....TCF630R2SL50MH	Q9
5472652	.....VTSP06022 WU41EG	T11	5520838	.....GX355142 WK12PG	T48	5537874	.....TCF120R5SL20MA	Q17	5538630	.....TCF640R2SL50MH	Q9
5472653	.....VTSP06023 WU41EG	T11	5520839	.....GX475006 WN14PG	T49	5537875	.....TCF125R5SL20MA	Q17	5538631	.....TCF650R2SL50MH	Q9
5472654	.....VTSP06024 WU41EG	T13	5520840	.....GX475008 WN14PG	T49	5537876	.....TCF127R5SL20MA	Q17	5538632	.....TCF660R2SL50MH	Q9
			5520841	.....GX475010 WN14PG	T49	5537877	.....TCF130R5SL20MA	Q17	5538633	.....TCF670R2SL50MH	Q9
						5537878	.....TCF135R5SL20MA	Q17, Q19	5538634	.....TCF680R2SL50MH	Q9-10
						5537937	.....TCF300R2SL32ME	Q8	5538635	.....TCF570R3SL50MH	Q12
						5537938TCF310R2SL32ME	Q8	5538636TCF580R3SL50MH	Q12
						5537939TCF320R2SL32ME	Q9-10	5538637TCF590R3SL50MH	Q12

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5538638	TCF600R3SL50MH	Q12	5542606	TCF060203BCV36 WU25CH	Q21	5549208	CNGP120408 WU10HT	B35	5559106	D50718018W WP15PE	L90
5538639	TCF610R3SL50MH	Q12	5542607	TCF060203BCV36 WU40PH	Q21	5549209	DNGP150404 WU10HT	B52	5559107	D50720007W WP15PE	L90
5538640	TCF620R3SL50MH	Q12	5542608	TCF050204BPV34 WU25CH	Q22	5549210	DNGP150408 WU10HT	B52	5559108	D51760002W WP15PE	L90
5538641	TCF630R3SL50MH	Q12	5542609	TCF050204BPV34 WU40PH	Q22	5549211	VNGP160401 WU10HT	B96	5559109	D51708003W WP15PE	L90
5538642	TCF640R3SL50MH	Q12	5542620	TCF050204BPV34 WPK10CH	Q22	5549212	VNGP220408 WU10HT	B96	5559110	D51710004W WP15PE	L90
5538643	TCF650R3SL50MH	Q12	5542621	TCF050204BPV36 WU25CH	Q23	5549945	CNGG120404FS WU10HT	B35	5559111	D51712005W WP15PE	L90
5538644	TCF660R3SL50MH	Q12	5542622	TCF050204BPV36 WU40PH	Q23	5549946	CNGG120408FS WU10HT	B35	5559112	D51714014W WP15PE	L90
5538645	TCF670R3SL50MH	Q12	5542623	TCF150406FCV34 WU25CH	Q20	5549947	DNGG110402FS WU10HT	B51	5559113	D51716006W WP15PE	L90
5538646	TCF680R3SL50MH	Q12-13	5542624	TCF150406FCV34 WU40PH	Q20	5549948	DNGG110404FS WU10HT	B51	5559114	D51718018W WP15PE	L90
5538647	TCF570R4SL50MH	Q15	5542625	TCF150406FCV36 WU25CH	Q21	5549949	DNGG110408FS WU10HT	B51	5559115	D51720007W WP15PE	L90
5538648	TCF580R4SL50MH	Q15	5542626	TCF150406FCV36 WU40PH	Q21	5549990	DNGG150402FS WU10HT	B51	5559116	D51804002W WP15PE	L93
5538649	TCF590R4SL50MH	Q15	5542627	TCF120412FPV34 WU25CH	Q22	5549991	DNGG150401FS WU10HT	B51	5559117	D51805002W WP15PE	L93
5538650	TCF600R4SL50MH	Q15	5542628	TCF120412FPV34 WU40PH	Q22	5549992	DNGG150404FS WU10HT	B51	5559118	D51806002W WP15PE	L93
5538651	TCF610R4SL50MH	Q15	5542629	TCF120412FPV34 WPK10CH	Q22	5549993	DNGG150408FS WU10HT	B51	5559119	D51807003W WP15PE	L93
5538652	TCF620R4SL50MH	Q15	5542640	TCF120412FPV36 WU25CH	Q23	5549994	DNGG150412FS WU10HT	B51	5559120	D51808003W WP15PE	L93
5538653	TCF630R4SL50MH	Q15	5542641	TCF120412FPV36 WU40PH	Q23	5549995	DNGG150604FS WU10HT	B51	5559121	D51809004W WP15PE	L93
5538654	TCF640R4SL50MH	Q15	5542642	TCF070304CCV34 WU25CH	Q20	5549996	DNGG150608FS WU10HT	B51	5559122	D51810004W WP15PE	L93
5538655	TCF650R4SL50MH	Q15	5542643	TCF070304CCV34 WU40PH	Q20	5549997	SNGG120408FS WU10HT	B70	5559123	D51820005W WP15PE	L93
5538656	TCF660R4SL50MH	Q15	5542644	TCF070304CCV36 WU25CH	Q21	5549998	TNGG160404FS WU10HT	B83	5559124	D51841014W WP15PE	L93
5538657	TCF670R4SL50MH	Q15	5542645	TCF070304CCV36 WU40PH	Q21	5549999	VNGG160402FS WU10HT	B95	5559125	D51816006W WP15PE	L93
5538658	TCF680R4SL50MH	Q15-16	5542646	TCF070306CPV34 WU25CH	Q22	5550000	VNGG160401FS WU10HT	B95	5559126	D51818018W WP15PE	L93
5538659	TCF570R5SL50MH	Q18	5542647	TCF070306CPV34 WU40PH	Q22	5550001	VNGG160404FS WU10HT	B95	5559127	D51820007W WP15PE	L93
5538660	TCF580R5SL50MH	Q18	5542648	TCF070306CPV34 WPK10CH	Q22	5550002	VNGG160408FS WU10HT	B95	5559128	D51825008W WP15PE	L93
5538661	TCF590R5SL50MH	Q18	5542649	TCF070306CPV36 WU25CH	Q23	5550003	VNGG080404FS WU10HT	B99	5559146	400101001T WP15PE	L82
5538662	TCF600R5SL50MH	Q18	5542650	TCF070306CPV36 WU40PH	Q23	5550004	VNGG080408FS WU10HT	B99	5559147	400101501T WP15PE	L82
5538663	TCF610R5SL50MH	Q18	5544752	WOEJ080412SRMM WP40PM	J7	5550226	TNMG160404UM WS10PT	B88	5559148	400102001T WP15PE	L82
5538664	TCF620R5SL50MH	Q18	5544753	WOEJ080412SRMM WP40PM	J7	5550228	TNMG160408UM WS10PT	B88	5559149	400103002T WP15PE	L82
5538665	TCF630R5SL50MH	Q18	5545063	XDPT110408PDSRMM WP40PM	G10	5550905	HNGJ0704ANENLD WP40PM	F8,	5559160	400104002T WP15PE	L82
5538666	TCF640R5SL50MH	Q18	5545064	XDPT110408PDSRMM WP40PM	G10	5550906	HNPJ0704ANSNGD WP40PM	F9,	5559161	400105002T WP15PE	L82
5538667	TCF650R5SL50MH	Q18	5545065	XDCT110408PDERML WP40PM	G9			F17,	5559162	400106002T WP15PE	L82
5538668	TCF660R5SL50MH	Q18	5548575	CNGG120402FS WS10PT	B35			F22	5559163	400108003T WP15PE	L82
5538669	TCF670R5SL50MH	Q18	5548576	CNGG120401FS WS10PT	B35	5550907	HNPJ0704ANSNHD WP40PM	F9,	5559164	400110004T WP15PE	L82
5538700	TCF680R5SL50MH	Q18-19	5548577	CNGG120404FS WS10PT	B35			F17,	5559165	400112005T WP15PE	L82
5541817	TCF040203ACV34 WU25CH	Q20	5548578	CNGG120408FS WS10PT	B35			F22	5559166	400114005T WP15PE	L82
5541818	TCF040203ACV34 WU40PH	Q20	5548579	CNGG120412FS WS10PT	B35			F40	5559167	400116006T WP15PE	L82
5541819	TCF040203ACV36 WU25CH	Q21	5548670	DNGG110402FS WS10PT	B51	5550908	HNPJ0905ANSNGD WP40PM	F27,	5559168	400118006T WP15PE	L82
5541840	TCF040203ACV36 WU40PH	Q21	5548671	DNGG110404FS WS10PT	B51			F34,	5559169	400120007T WP15PE	L82
5541841	TCF040204APV34 WU25CH	Q22	5548672	DNGG110408FS WS10PT	B51			F40	5559170	450301001T WP15PE	L85
5541842	TCF040204APV34 WU40PH	Q22	5548673	DNGG150402FS WS10PT	B51	5550909	HNPJ0905ANSNHD WP40PM	F28,	5559171	450301501T WP15PE	L85
5541843	TCF040204APV34 WPK10CH	Q22	5548674	DNGG150401FS WS10PT	B51			F34,	5559172	450302001T WP15PE	L85
5541844	TCF040204APV36 WU25CH	Q23	5548675	DNGG150404FS WS10PT	B51			F40	5559173	450302501T WP15PE	L85
5541845	TCF040204APV36 WU40PH	Q23	5548676	DNGG150408FS WS10PT	B51	5551088	SNMT1205AZR31 WP40PM	F55	5559174	450302511T WP15PE	L85
5542002	TCF210608HCV34 WU25CH	Q20	5548677	DNGG150412FS WS10PT	B51	5551152	GX352733 WK12PG	T47	5559175	450303002T WP15PE	L85
5542003	TCF210608HCV34 WU40PH	Q20	5548678	DNGG150604FS WS10PT	B51	5551153	GX352734 WK12PG	T47	5559176	450303502T WP15PE	L85
5542004	TCF210608HCV36 WU25CH	Q21	5548679	DNGG150608FS WS10PT	B51	5551154	GX352735 WK12PG	T47	5559177	450304002T WP15PE	L85
5542005	TCF210608HCV36 WU40PH	Q21	5548680	SNGG120408FS WS10PT	B70	5551155	GX352737 WK12PG	T47	5559178	450304502T WP15PE	L85
5542006	TCF180614HPV34 WU25CH	Q22	5548681	TNGG160404FS WS10PT	B83	5551156	GX352738 WK12PG	T47	5559179	450305002T WP15PE	L85
5542007	TCF180614HPV34 WU40PH	Q22	5548682	TNGG220408FS WS10PT	B83	5551157	GX352739 WK12PG	T47	5559180	450306002T WP15PE	L85
5542008	TCF180614HPV34 WPK10CH	Q22	5548683	VNGG160402FS WS10PT	B95	5551158	GX352740 WK12PG	T47	5559181	450308003T WP15PE	L85
5542009	TCF180614HPV36 WU25CH	Q23	5548684	VNGG160401FS WS10PT	B95	5551159	GX352741 WK12PG	T47	5559182	450310004T WP15PE	L85
5542020	TCF180614HPV36 WU40PH	Q23	5548685	VNGG160404FS WS10PT	B95	5551160	GX352741 WK12PG	T47	5559183	450312005T WP15PE	L85
5542327	RNPJ10T3MOSMM WP40PM	J25	5548686	VNGG160408FS WS10PT	B95	5551161	GX472866 WN14PG	T50	5559184	450316006T WP15PE	L85
5542328	RNPJ10T3MOSMH WP40PM	J25	5548687	VNGG080408FS WS10PT	B99	5551162	GX472867 WN14PG	T50	5559185	450320007T WP15PE	L85
5542329	RNPJ1204MOSMM WP40PM	J33	5548688	VNGG080404FS WS10PT	B99	5551163	GX472868 WN14PG	T50	5560534	DQ1303002T WP15PE	L54
5542340	RNPJ1204MOSMH WP40PM	J33	5549137	CNGP120401 WS10PT	B35	5551164	GX472872 WN14PG	T50	5560535	DQ1304002T WP15PE	L54
5542341	RNPJ1605MOSMM WP40PM	J38	5549138	CNGP120402 WS10PT	B35	5551165	GX472870 WN14PG	T50	5560536	DQ1303002W WP15PE	L54
5542342	RNPJ1605MOSMH WP40PM	J38	5549139	CNGP120404 WS10PT	B35	5551166	GX472874 WN14PG	T50	5560537	DQ1304002W WP15PE	L54
5542343	WOEJ120712SRMM WP40PM	J13	5549190	CNGP120408 WS10PT	B35	5551167	GX472873 WN14PG	T50	5560538	DQ1305002W WP15PE	L54
5542347	TCF180508GCV34 WU25CH	Q20	5549191	CNGP150401 WS10PT	B52	5551168	GX472875 WN14PG	T50	5560539	DQ1306002W WP15PE	L54
5542476	TCF180508GCV34 WU40PH	Q20	5549192	DNGP150402 WS10PT	B52	5551169	GX492908 WN14PG	T61	5560700	DQ1308003W WP15PE	L54
5542477	TCF180508GCV36 WU25CH	Q21	5549193	DNGP150404 WS10PT	B52	5551171	GX492911 WN14PG	T61	5560702	DQ1310004W WP15PE	L54
5542478	TCF180508GCV36 WU40PH	Q21	5549194	DNGP150408 WS10PT	B52	5551172	GX492914 WN14PG	T61	5560703	DQ1312005W WP15PE	L54
5542479	TCF150512GPV34 WU25CH	Q22	5549195	VNGP160401 WS10PT	B96	5551173	GX492915 WN14PG	T61	5560704	DQ1314014W WP15PE	L54
5542600	TCF150512GPV34 WU40PH	Q22	5549196	VNGP160402 WS10PT	B96	5559100	D50708002W WP15PE	L90	5560705	DQ1316006W WP15PE	L54
5542601	TCF150512GPV34 WPK10CH	Q22	5549197	VNGP220404 WS10PT	B96	5559101	D50708003W WP15PE	L90	5560706	DQ1318018W WP15PE	L54
5542602	TCF060203BCV34 WU25CH	Q20	5549198	VNGP220408 WS10PT	B96	5559102	D50710004W WP15PE	L90	5560707	DQ1320007W WP15PE	L54
5542603	TCF150512GPV36 WU25CH	Q23	5549199	VNGP220408 WS10PT	B96	5559103	D50712005W WP15PE	L90	5560708	497604002T WP15PE	L56
5542604	TCF060203BCV34 WU40PH	Q20	5549200	CNGP120402 WU10HT	B35	5559104	D50714014W WP15PE	L90	5560709	497605002T WP15PE	L56
5542605	TCF150512GPV36 WU40PH	Q23	5549207	CNGP120404 WU10HT	B35	5559105	D50716006W WP15PE	L90	5560710	497606002T WP15PE	L56

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5560712	497610004T	WP15PE	5577924	TCF170R2SL25MB	Q8	5578645	TCF420R5SL40MF	Q18	5578838	TCF200R4SL25MC	Q14	
5560713	497612005T	WP15PE	5577925	TCF175R2SL25MB	Q8	5578646	TCF430R5SL40MF	Q18	5578839	TCF205R4SL25MC	Q14	
5560714	497614014T	WP15PE	5577926	TCF180R2SL25MB	Q8	5578647	TCF440R5SL40MF	Q18-19	5578840	TCF210R4SL25MC	Q14	
5560715	497616006T	WP15PE	5577927	TCF185R2SL25MB	Q8, Q10	5578648	TCF450R5SL50MF	Q18-19	5578841	TCF220R4SL25MC	Q14	
5560716	497618018T	WP15PE	5577928	TCF140R3SL25MB	Q11	5578694	TCF460R2SL50MG	Q9	5578842	TCF225R4SL25MC	Q14	
5560717	497620007T	WP15PE	5577929	TCF145R3SL25MB	Q11	5578695	TCF470R2SL50MG	Q9	5578843	TCF230R4SL25MC	Q14, Q16	
5560718	497625008T	WP15PE	5577930	TCF150R3SL25MB	Q11	5578696	TCF480R2SL50MG	Q9	5578844	TCF190R5SL25MC	Q17	
5564335	DDJNL3232P15K06 WG	C11	5577931	TCF155R3SL25MB	Q11	5578697	TCF490R2SL50MG	Q9	5578845	TCF195R5SL25MC	Q17	
5564336	DDJNR3232P15K06 WG	C11	5577932	TCF160R3SL25MB	Q11	5578698	TCF500R2SL50MG	Q9	5578846	TCF200R5SL25MC	Q17	
5564596	W0EJ080412SRMH WP25PM	J7	5577933	TCF165R3SL25MB	Q11	5578699	TCF505R2SL50MG	Q9	5578847	TCF205R5SL25MC	Q17	
5564597	W0EJ080412SRMM WP25PM	J7	5577934	TCF170R3SL25MB	Q11	5578710	TCF510R2SL50MG	Q9	5578848	TCF210R5SL25MC	Q17	
5576751	477704002T	WP15PE	5577935	TCF175R3SL25MB	Q11	5578711	TCF520R2SL50MG	Q9	5578849	TCF220R5SL25MC	Q17	
5576752	477704002W	WP15PE	5577936	TCF180R3SL25MB	Q11	5578712	TCF530R2SL50MG	Q9	5578850	TCF225R5SL25MC	Q17	
5576753	477704001T	WP15PE	5577937	TCF185R3SL25MB	Q11, Q13	5578713	TCF540R2SL50MG	Q9	5578851	TCF230R5SL25MC	Q17, Q19	
5576754	477704002T	WP15PE	5577938	TCF140R4SL25MB	Q14	5578714	TCF550R2SL50MG	Q9	5578866	577C04002T	WP15PE	L24
5576755	477705002T	WP15PE	5577939	TCF145R4SL25MB	Q14	5578715	TCF560R2SL50MG	Q9-10	5578867	577C04002W	WP15PE	L24
5576756	477705002W	WP15PE	5577940	TCF150R4SL25MB	Q14	5578716	TCF560R3SL50MG	Q12	5578868	577C04012T	WP15PE	L24
5576757	477705012T	WP15PE	5577941	TCF155R4SL25MB	Q14	5578717	TCF470R3SL50MG	Q12	5578894	CNMG120404UR	WS10PT	B43
5576758	477705022T	WP15PE	5577942	TCF160R4SL25MB	Q14	5578718	TCF480R3SL50MG	Q12	5578895	CNMG120404UR	WS25PT	B43
5576759	477706002T	WP15PE	5577943	TCF165R4SL25MB	Q14	5578719	TCF490R3SL50MG	Q12	5578896	CNMG160608UR	WS10PT	B43
5576760	477706002W	WP15PE	5577944	TCF170R4SL25MB	Q14	5578720	TCF500R3SL50MG	Q12	5578897	CNMG160608UR	WS25PT	B43
5576761	477706012T	WP15PE	5577945	TCF175R4SL25MB	Q14	5578721	TCF505R3SL50MG	Q12	5578898	CNMG160612UR	WS10PT	B43
5576762	477706022T	WP15PE	5577946	TCF180R4SL25MB	Q14	5578722	TCF510R3SL50MG	Q12	5578900	CNMG160616UR	WS10PT	B43
5576763	477707003T	WP15PE	5577947	TCF185R4SL25MB	Q14, Q16	5578723	TCF520R3SL50MG	Q12	5578901	CNMG160616UR	WS25PT	B43
5576764	477707003W	WP15PE	5577948	TCF140R5SL25MB	Q17	5578724	TCF530R3SL50MG	Q12	5578902	CNMG190612UR	WS10PT	B43
5576765	477707013T	WP15PE	5577949	TCF145R5SL25MB	Q17	5578726	TCF540R3SL50MG	Q12	5578990	577C05002T	WP15PE	L24
5576766	477707023T	WP15PE	5577950	TCF150R5SL25MB	Q17	5578727	TCF550R3SL50MG	Q12	5578991	577C05002W	WP15PE	L24
5576767	477708003T	WP15PE	5577951	TCF155R5SL25MB	Q17	5578728	TCF560R3SL50MG	Q12-13	5578992	577C06002T	WP15PE	L24
5576768	477708003W	WP15PE	5577952	TCF160R5SL25MB	Q17	5578729	TCF460R4SL50MG	Q15	5578993	577C06002W	WP15PE	L24
5576769	477708013T	WP15PE	5577953	TCF165R5SL25MB	Q17	5578730	TCF470R4SL50MG	Q15	5578994	577C06012T	WP15PE	L24
5576770	477708023T	WP15PE	5577954	TCF170R5SL25MB	Q17	5578731	TCF480R4SL50MG	Q15	5578995	577C07003T	WP15PE	L24
5576771	477709004T	WP15PE	5577955	TCF175R5SL25MB	Q17	5578732	TCF490R4SL50MG	Q15	5578996	577C07003W	WP15PE	L24
5576772	477709004W	WP15PE	5577956	TCF180R5SL25MB	Q17	5578733	TCF500R4SL50MG	Q15	5578997	577C08003T	WP15PE	L24
5576773	477709014T	WP15PE	5577957	TCF185R5SL25MB	Q17, Q19	5578734	TCF505R4SL50MG	Q15	5578998	577C08003W	WP15PE	L24
5576774	477709024T	WP15PE	5578539	TCF370R2SL40MF	Q9	5578735	TCF510R4SL50MG	Q15	5578999	577C08013T	WP15PE	L24
5576775	477710004T	WP15PE	5578600	TCF375R2SL40MF	Q9	5578736	TCF520R4SL50MG	Q15	5579021	577C09004T	WP15PE	L24
5576776	477710004W	WP15PE	5578601	TCF380R2SL40MF	Q9	5578737	TCF530R4SL50MG	Q15	5579022	577C09004W	WP15PE	L24
5576777	477710024T	WP15PE	5578602	TCF390R2SL40MF	Q9	5578738	TCF540R4SL50MG	Q15	5579023	577C10004T	WP15PE	L24
5576778	477710024T	WP15PE	5578603	TCF400R2SL40MF	Q9	5578739	TCF550R4SL50MG	Q15	5579024	577C10004W	WP15PE	L24
5576779	477711025T	WP15PE	5578604	TCF410R2SL40MF	Q9	5578750	TCF560R4SL50MG	Q15-16	5579025	577C10014T	WP15PE	L24
5576790	477712005T	WP15PE	5578605	TCF420R2SL40MF	Q9	5578751	TCF460R5SL50MG	Q18	5579026	577C12005T	WP15PE	L24
5576791	477712005W	WP15PE	5578606	TCF430R2SL40MF	Q9	5578752	TCF470R5SL50MG	Q18	5579027	577C12005W	WP15PE	L24
5576792	477712025T	WP15PE	5578607	TCF440R2SL40MF	Q9-10	5578753	TCF480R5SL50MG	Q18	5579028	577C12015T	WP15PE	L24
5576793	477712025T	WP15PE	5578608	TCF450R2SL50MF	Q9-10	5578754	TCF490R5SL50MG	Q18	5579029	577C14004T	WP15PE	L24
5576794	477714015T	WP15PE	5578609	TCF370R3SL40MF	Q12	5578755	TCF500R5SL50MG	Q18	5579040	577C14004W	WP15PE	L24
5576795	477714014W	WP15PE	5578610	TCF375R3SL40MF	Q12	5578756	TCF505R5SL50MG	Q18	5579041	577C14014T	WP15PE	L24
5576796	477716006T	WP15PE	5578611	TCF380R3SL40MF	Q12	5578757	TCF510R5SL50MG	Q18	5579042	577C16006T	WP15PE	L24
5576797	477716006W	WP15PE	5578612	TCF390R3SL40MF	Q12	5578758	TCF520R5SL50MG	Q18	5579043	577C16006W	WP15PE	L24
5576798	477716026T	WP15PE	5578613	TCF400R3SL40MF	Q12	5578759	TCF530R5SL50MG	Q18	5579044	577C16016T	WP15PE	L24
5576799	477716026T	WP15PE	5578614	TCF410R3SL40MF	Q12	5578760	TCF540R5SL50MG	Q18	5579045	577C18008T	WP15PE	L24
5576810	477718018T	WP15PE	5578615	TCF420R3SL40MF	Q12	5578761	TCF550R5SL50MG	Q18	5579046	577C18008W	WP15PE	L24
5576811	477718018W	WP15PE	5578616	TCF430R3SL40MF	Q12	5578762	TCF560R5SL50MG	Q18-19	5579047	577C20007T	WP15PE	L24
5576812	477720007T	WP15PE	5578617	TCF440R3SL40MF	Q12-13	5578820	TCF190R2SL25MC	Q8	5579048	577C20007W	WP15PE	L24
5576813	477720007W	WP15PE	5578618	TCF450R3SL50MF	Q12-13	5578821	TCF195R2SL25MC	Q8	5579049	577C20017T	WP15PE	L24
5576814	47772002T	WP15PE	5578619	TCF370R4SL40MF	Q15	5578822	TCF200R2SL25MC	Q8	5579060	577C25008T	WP15PE	L24
5576816	477725008T	WP15PE	5578620	TCF375R4SL40MF	Q15	5578823	TCF205R2SL25MC	Q8	5579061	577C25008W	WP15PE	L24
5576817	477725008W	WP15PE	5578621	TCF380R4SL40MF	Q15	5578824	TCF210R2SL25MC	Q8	5579234	CNMG190616UR	WS25PT	B43
5576818	47N005002T	WP15PE	5578622	TCF390R4SL40MF	Q15	5578825	TCF220R2SL25MC	Q8	5579271	CNMG150408UR	WS25PT	B62
5576819	47N006002T	WP15PE	5578623	TCF400R4SL40MF	Q15	5578826	TCF225R2SL25MC	Q8	5579276	CNMG150608UR	WS25PT	B62
5576820	47N008003T	WP15PE	5578624	TCF410R4SL40MF	Q15	5578827	TCF230R2SL25MC	Q8, Q10	5579292	CNMG150412UR	WS25PT	B62
5576821	47N010004T	WP15PE	5578625	TCF420R4SL40MF	Q15	5578828	TCF190R3SL25MC	Q11	5579350	CNMG120412UR	WS25PT	B75
5576822	47N012005T	WP15PE	5578626	TCF430R4SL40MF	Q15	5578829	TCF195R3SL25MC	Q11	5579352	CNMG150612UR	WS25PT	B75
5576823	47N016006T	WP15PE	5578627	TCF440R4SL40MF	Q15-16	5578830	TCF200R3SL25MC	Q11	5579357	CNMG190616UR	WS25PT	B75
5576824	47N020007T	WP15PE	5578628	TCF450R4SL50MF	Q15-16	5578831	TCF205R3SL25MC	Q11	5579395	CNMG160408UR	WS25PT	B89
5577828	TCF140R2SL25MB	Q8	5578629	TCF370R5SL40MF	Q18	5578832	TCF210R3SL25MC	Q11	5579397	CNMG220408UR	WS25PT	B89
5577829	TCF145R2SL25MB	Q8	5578640	TCF375R5SL40MF	Q18	5578833	TCF220R3SL25MC	Q11	5579405	CNMG270612UR	WS25PT	B89
5577920	TCF150R2SL25MB	Q8	5578641	TCF380R5SL40MF	Q18	5578834	TCF225R3SL25MC	Q11	5579416	CNMG160408UR	WS25PT	B99
5577921	TCF155R2SL25MB	Q8	5578642	TCF390R5SL40MF	Q18	5578835	TCF230R3SL25MC	Q11, Q13	5579420	CNMG080412UR	WS10PT	B104
5577922	TCF160R2SL25MB	Q8	5578643	TCF400R5SL40MF	Q18	5578836	TCF190R4SL25MC	Q14	5583159	4U4006002T	WP15PE	L58

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5583421	4U4010004T WP15PE	L58	5599113	57NC25028W WS15PE	L26	5623348	CCMT060208FW WM15CT	B32	5623515	WNMG080408FW WP15CT	B101
5583422	4U4012005T WP15PE	L58	5599114	57NC25038T WS15PE	L26	5623349	CCMT093044FW WP15CT	B32	5623516	WNMG080408MW WP15CT	B102
5583423	4U4016006T WP15PE	L58	5599115	57NC25038W WS15PE	L26	5623420	CCMT090304MU WP25CT	B33	5623517	WNMG080408MW WP25CT	B102
5583424	4U4020007T WP15PE	L58	5599116	57NC25058T WS15PE	L26	5623421	CCMT090304MU WM25CT	B33	5623581	DCMT11T304MU WM25CT	B49
5583425	4U4025008T WP15PE	L58	5599117	57NC25058W WS15PE	L26	5623423	CCMT090308MU WM25CT	B33	5623582	DCMT11T304MU WS10PT	B49
5583426	4U7006002T WP15PE	L59	5599118	57NC25078T WS15PE	L26	5623424	CCMT090308MU WP25CT	B33	5623583	DCMT11T304MU WP25CT	B49
5583427	4U7008003T WP15PE	L59	5599119	57NC25078W WS15PE	L26	5623425	CCMT090308MU WP15CT	B33	5623584	DCMT11T304MU WS25PT	B49
5583428	4U7010004T WP15PE	L59	5599120	57NC25088T WS15PE	L26	5623426	CCMT09T304MU WS25PT	B33	5623585	DCMT11T304MU WP15CT	B49
5583429	4U7012005T WP15PE	L59	5599121	57NC25088W WS15PE	L26	5623427	CCMT09T304MU WM25CT	B33	5623586	DCMT11T304MU WK05CT	B49
5583430	4U7016006T WP15PE	L59	5599122	57NE10004T WS15PE	L33	5623428	CCMT09T304MU WS10PT	B33	5623587	DCMT11T304MU WK20CT	B49
5583431	4U7016046T WP15PE	L59	5599123	57NE10024T WS15PE	L33	5623429	CCMT09T304MU WK05CT	B33	5623588	DCMT11T308MU WM25CT	B49
5583432	4U7020007T WP15PE	L59	5599124	57NE10024W WS15PE	L33	5623430	CCMT09T304MU WP25CT	B33	5623589	DCMT11T308MU WK20CT	B49
5583433	4U7020047T WP15PE	L59	5599125	57NE10034T WS15PE	L33	5623431	CCMT09T304MU WP15CT	B33	5623600	DCMT11T308MU WP15CT	B49
5583434	4U7025008T WP15PE	L59	5599126	57NE10034W WS15PE	L33	5623432	CCMT09T304MU WK20CT	B33	5623601	DCMT11T308MU WS10PT	B49
5583435	4U7025048T WP15PE	L59	5599127	57NE10054T WS15PE	L33	5623433	CCMT09T308MU WK20CT	B33	5623602	DCMT11T308MU WK05CT	B49
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5583437	4U7008003W WP15PE	L59	5599129	57NE12005W WS15PE	L33	5623435	CCMT09T308MU WM25CT	B33	5623604	DCMT150408MU WM25CT	B49
5583438	4U7010004W WP15PE	L59	5599130	57NE12025V WS15PE	L33	5623436	CCMT09T308MU WP25CT	B33	5623605	DCMT150408MU WK05CT	B49
5583439	4U7012005W WP15PE	L59	5599131	57NE12025W WS15PE	L33	5623437	CCMT09T308MU WS25PT	B33	5623606	DCMT150408MU WP15CT	B49
5583440	4U7016006W WP15PE	L59	5599132	57NE12035V WS15PE	L33	5623438	CCMT09T308MU WS10PT	B33	5623607	DCMT150408MU WK20CT	B49
5583441	4U7020007W WP15PE	L59	5599133	57NE12035W WS15PE	L33	5623439	CCMT09T308MU WP35CT	B33	5623608	DCMT150408MU WM25CT	B49
5583442	4U7025008W WP15PE	L59	5599134	57NE12055V WS15PE	L33	5623440	CCMT120408MU WP15CT	B33	5623609	DCMT150408MU WS10PT	B49
5598905	57NC16026W WS15PE	L25	5599135	57NE12055W WS15PE	L33	5623441	CCMT120408MU WK20CT	B33	5623610	DCMT150408MU WS25PT	B49
5598906	57NC06002T WS15PE	L25	5599136	57NE16006V WS15PE	L33	5623442	CCMT120408MU WM25CT	B33	5623611	DCMT150412MU WK05CT	B49
5598907	57NC06022T WS15PE	L25	5599137	57NE16026V WS15PE	L33	5623443	CCMT120408MU WP25CT	B33	5623612	DCMT150412MU WK20CT	B49
5598908	57NC06022W WS15PE	L25	5599138	57NE16026W WS15PE	L33	5623444	CCMT120408MU WS25PT	B33	5623613	DCMT16T304MU WM25CT	B83
5598909	57NC06032T WS15PE	L25	5599139	57NE16036V WS15PE	L33	5623445	SCMT090308MU WK20CT	B69	5623614	TCMT16T304MU WP15CT	B83
5599070	57NC06032W WS15PE	L25	5599140	57NE16036W WS15PE	L33	5623446	SCMT090308MU WP15CT	B69	5623615	TCMT16T304MU WP25CT	B83
5599071	57NC06042W WS15PE	L25	5599141	57NE16056V WS15PE	L33	5623447	SCMT09T304MU WM25CT	B69	5623616	TCMT16T304MU WK20CT	B83
5599072	57NC08003T WS15PE	L25	5599142	57NE16056W WS15PE	L33	5623448	SCMT09T308MU WM25CT	B69	5623617	TCMT16T304MU WS25PT	B83
5599073	57NC08023T WS15PE	L25	5599143	57NE20007V WS15PE	L33	5623449	SCMT09T308MU WK20CT	B69	5623618	TCMT16T308MU WK20CT	B83
5599074	57NC08023W WS15PE	L25	5599144	57NE20027V WS15PE	L33	5623460	SCMT09T308MU WS10PT	B69	5623619	TCMT16T308MU WM25CT	B83
5599075	57NC08033T WS15PE	L25	5599145	57NE20027W WS15PE	L33	5623461	SCMT09T308MU WP15CT	B69	5623620	TCMT16T308MU WP25CT	B83
5599076	57NC08033W WS15PE	L25	5599146	57NE20037V WS15PE	L33	5623462	SCMT09T308MU WP35CT	B69	5623621	TCMT16T308MU WP15CT	B83
5599077	57NC08053W WS15PE	L25	5599147	57NE20037W WS15PE	L33	5623464	SCMT09T308MU WP25CT	B69	5623622	TCMT16T308MU WS10PT	B83
5599078	57NC10004T WS15PE	L25	5599148	57NE20057V WS15PE	L33	5623470	CCMT09T304FW WM15CT	B32	5642230	XDCT110404PDSRML WP40PM	G9
5599079	57NC10024T WS15PE	L25	5599149	57NE20057W WS15PE	L33	5623471	CCMT09T304MW WP15CT	B33	5642231	XDPT110404PDSRMM WP40PM	
5599080	57NC10024W WS15PE	L25	5599160	57NE20087V WS15PE	L33	5623472	CCMT09T304MW WP25CT	B33			G10
5599081	57NC10034T WS15PE	L25	5599161	57NE20087W WS15PE	L33	5623473	CCMT09T308FW WP15CT	B32	5642232	XDPT110412PDSRMM WP40PM	
5599082	57NC10034W WS15PE	L25	5599162	57NE25008V WS15PE	L33	5623474	CCMT09T308MW WP15CT	B33			G10
5599083	57NC10054T WS15PE	L25	5599163	57NE25028V WS15PE	L33	5623475	CCMT09T308MW WP25CT	B33	5642233	XDPT110416PDSRMM WP40PM	
5599084	57NC10054W WS15PE	L25	5599164	57NE25028W WS15PE	L33	5623476	CCMT120404MW WP15CT	B33			G10
5599085	57NC12005T WS15PE	L25	5599165	57NE25038V WS15PE	L33	5623477	CCMT120404MW WP25CT	B33	5642234	XDPT110431PDSRMM WP40PM	
5599086	57NC12025T WS15PE	L25	5599166	57NE25038W WS15PE	L33	5623478	CCMT120408MW WP15CT	B33			G10
5599087	57NC12025W WS15PE	L25	5599167	57NE25058V WS15PE	L33	5623479	CCMT120408MW WP25CT	B33	5642235	XDPT110412PDSRMM WP40PM	
5599088	57NC12035T WS15PE	L25	5599168	57NE25058W WS15PE	L33	5623480	CNMG120408FW WP15CT	B38			G10
5599089	57NC12035W WS15PE	L25	5599169	57NE25088V WS15PE	L33	5623481	CNMG120412FW WP15CT	B38	5642236	XDPT110416PDSRMM WP40PM	
5599090	57NC12055T WS15PE	L25	5599170	57NE25088W WS15PE	L33	5623482	DCMT11T304FW WP15CT	B48			G10
5599091	57NC12055W WS15PE	L25	5599171	577E10004T WS15PE	L32	5623483	DCMT11T304FW WM15CT	B48	5642237	XDPT110404PDSRMM WP25PM	
5599092	57NC16006T WS15PE	L25	5599172	577E10024T WS15PE	L32	5623484	DCMT11T304MW WP15CT	B50			G10
5599093	57NC16026T WS15PE	L25	5599173	577E10024W WS15PE	L32	5623485	DCMT11T304MW WP25CT	B50	5645177	XPH160408 WP40PM	G48, H9
5599094	57NC16036T WS15PE	L25	5599174	577E12005V WS15PE	L32	5623486	DCMT11T308FW WP15CT	B48	5645178	XPH160412 WP40PM	G48, H9
5599095	57NC16036W WS15PE	L25	5599175	577E12015V WS15PE	L32	5623487	DCMT11T308FW WM15CT	B48	5645179	XPH160416 WP40PM	G48, H9
5599096	57NC16056T WS15PE	L25	5599176	577E12015W WS15PE	L32	5623488	DCMT11T308MW WP15CT	B50	5645210	XPH160420 WP40PM	G48, H9
5599097	57NC16056W WS15PE	L25	5599177	577E16006V WS15PE	L32	5623489	DCMT11T308MW WP25CT	B50	5645211	XPH160425 WP40PM	G48, H9
5599098	57NC16076T WS15PE	L26	5599178	577E16016V WS15PE	L32	5623490	DNMG110404FW WP15CT	B55	5645212	XPH160432 WP40PM	G48, H9
5599099	57NC16076W WS15PE	L26	5599179	577E16016W WS15PE	L32	5623491	DNMG110408FW WP15CT	B55	5645213	XPH160440 WP40PM	G48, H9
5599100	57NC20007T WS15PE	L26	5599180	577E20007V WS15PE	L32	5623492	DNMG150404FW WP15CT	B55	5645217	CNMG120404UM WS10PT	B42
5599101	57NC20027T WS15PE	L26	5599181	577E20017V WS15PE	L32	5623493	DNMG150408FW WP15CT	B55	5645219	CNMG120408UM WP25CT	B42
5599102	57NC20027W WS15PE	L26	5599182	577E20017W WS15PE	L32	5623494	DNMG150408MW WP15CT	B58	5645250	CNMG120408UM WP15CT	B42
5599103	57NC20037T WS15PE	L26	5599183	577E25018V WS15PE	L32	5623495	DNMG150408MW WP25CT	B58	5645251	DNMG150408UM WS10PT	B61
5599104	57NC20037W WS15PE	L26	5599184	577E25018W WS15PE	L32	5623496	DNMG150604FW WP15CT	B55	5645253	DNMG150608UM WS10PT	B61
5599105	57NC20057T WS15PE	L26	5622622	XNGJ0905ANSNGD3W WK15CM		5623497	DNMG150608FW WP15CT	B55	5645254	DNMG150404UM WS10PT	B61
5599106	57NC20057W WS15PE	L26			F35	5623498	DNMG150608MW WP15CT	B58	5645255	DNMG150604UM WS10PT	B61
5599107	57NC20077T WS15PE	L26	5623158	CCMT060208MU WK20CT	B33	5623499	DNMG150608MW WP25CT	B58	5645256	DNMG110408UM WS10PT	B61
5599108	57NC20077W WS15PE	L26	5623159	CCMT060208MU WM25CT	B33	5623510	WNMG060404FW WP15CT	B101	5645257	DNMG150612UM WS25PT	B61
5599109	57NC20087T WS15PE	L26	5623344	CCMT060202FW WP15CT	B32	5623511	WNMG060408FW WP15CT	B101	5645258	DNMG150612UM WS10PT	B61
5599110	57NC20087W WS15PE	L26	5623345	CCMT060204FW WP15CT	B32	5623512	WNMG060408MW WP15CT	B102	5645259	DNMG150412UM WS10PT	B61
5599111	57NC25008T WS15PE	L26	5623346	CCMT060204FW WM15CT	B32	5623513	WNMG060408MW WP25CT	B102	5645260	DNMG150408UM WP15CT	B61

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5645262	DNMG150608UM WP25CT	B61	5684275	DNMG150408FF WS10PT	B54	5696282	A32SDWLNLO8KCO4 WG	C59	5696722	DTFNL3225P16KCO4 WG	C16
5645264	DNMG150608UM WS25PT	B61	5684276	DNMG150604FF WS10PT	B54	5696283	A40TDWLNRO8KCO4 WG	C59	5696723	DTFNL3225P22KCO4 WG	C16
5645265	TNMG220408UM WS10PT	B88	5684277	SNMG090308FF WS10PT	B72	5696284	A40TDWLNLO8KCO4 WG	C59	5696724	DTFNR2020K16KCO4 WG	C16
5645266	TNMG220408UM WP15CT	B88	5684278	SNMG120408FF WS10PT	B72	5696553	SNMM12040865 WM25CT	B76	5696725	DTFNR2525M16KCO4 WG	C16
5645267	WNMG060408UM WS10PT	B104	5684279	SNMG090304FF WS10PT	B72	5696554	SNMM12040865 WP25CT	B76	5696726	DTFNR3232P27KCO6 WG	C16
5645268	WNMG060404UM WS10PT	B104	5684330	SNMG120404FF WS10PT	B72	5696555	SNMM12040865 WP35CT	B76	5696727	DTGTL2020K16KCO4 WG	C16
5645269	WNMG080412UM WS10PT	B104	5684331	TNMG110304FF WS10PT	B84	5696556	SNMM12041265 WM25CT	B76	5696728	DTGTL2525M16KCO4 WG	C16
5645270	WNMG080408UM WP25CT	B104	5684332	TNMG110308FF WS10PT	B84	5696557	SNMM12041265 WP25CT	B76	5696729	DTGTL2020K16KCO4 WG	C16
5645271	WNMG080412UM WP15CT	B104	5684333	WNMG160408FF WS10PT	B97	5696558	SNMM15061665 WM25CT	B76	5696730	DTGTL2525M16KCO4 WG	C16
5645588	CNMG120408UF WS10PT	B42	5684334	WNMG160404FF WS10PT	B97	5696559	SNMM15061665 WP25CT	B76	5696731	DTGTL2525M22KCO4 WG	C16
5645589	CNMG120404UF WP15CT	B42	5684335	WNMG080408FF WS10PT	B100	5696610	SNMM19061265 WM25CT	B76	5696732	DVJNL2020K16KCO4 WG	C17
5645600	CNMG120404UF WS10PT	B42	5684336	WNMG080404FF WS10PT	B100	5696611	SNMM19061265 WP15CT	B76	5696733	DVJNL2525M16KCO4 WG	C17
5645601	DNMG150404UF WS10PT	B60	5684337	CCMT060204FP WS10PT	B31	5696612	SNMM19061265 WP25CT	B76	5696734	DVJNL2525M22KCO4 WG	C17
5645602	DNMG150408UF WS10PT	B60	5684338	CCMT09T308FP WS25PT	B31	5696613	SNMM19061265 WP35CT	B76	5696735	DVJNL3225P16KCO4 WG	C17
5645603	DNMG110404UF WS10PT	B60	5684340	CCMT060204FP WS25PT	B31	5696614	SNMM19061665 WM25CT	B76	5696736	DVJNL3225P22KCO4 WG	C17
5645604	DNMG110408UF WS10PT	B60	5684341	CCMT09T304FP WS10PT	B31	5696615	SNMM19061665 WP15CT	B76	5696737	DVJNR2020K16KCO4 WG	C17
5645605	DNMG150408UF WP25CT	B60	5684342	CCMT060208FP WS10PT	B31	5696616	SNMM19062465 WM25CT	B76	5696738	DVJNR2525M16KCO4 WG	C17
5645606	DNMG150408UF WP15CT	B60	5684343	CCMT09T304FP WS25PT	B31	5696617	SNMM19062465 WP25CT	B76	5696739	DVJNR2525M22KCO4 WG	C17
5645607	DNMG150608UF WS10PT	B60	5684344	CCMT060208FP WS25PT	B31	5696618	TNMM16040865 WP25CT	B90	5696740	DVJNR3225P16KCO4 WG	C17
5645608	DNMG150604UF WS10PT	B60	5684346	CNMG120416ML WP25CT	B38	5696619	TNMM16040865 WP35CT	B90	5696741	DVJNR3225P22KCO4 WG	C17
5645609	DNMG150608UF WP25CT	B60	5684347	TNMG110304ML WP25CT	B85	5696620	TNMM16041265 WP35CT	B90	5696742	DVONL2020K08KCO4 WG	C18
5645610	SNMG120404UF WS10PT	B74	5684348	TNMG220404ML WP15CT	B85	5696621	TNMM22040865 WP15CT	B90	5696743	DVONL2525M16KCO4 WG	C18
5645611	SNMG120408UF WS10PT	B74	5684349	CCMT120408MP WS10PT	B32	5696622	TNMM22040865 WP25CT	B90	5696744	DVONL3225P16KCO4 WG	C18
5645612	TNMG220404UF WS10PT	B88	5684350	CCMT09T308MP WS10PT	B32	5696623	TNMM22040865 WP35CT	B90	5696745	DVONR2020K16KCO4 WG	C18
5645613	TNMG160412UF WS10PT	B88	5684351	CCMT060204MP WS10PT	B32	5696624	TNMM22041265 WM25CT	B90	5696746	DVONR2525M16KCO4 WG	C18
5645614	TNMG220408UF WS10PT	B88	5684352	CCMT09T304MP WS10PT	B32	5696625	TNMM22041265 WP25CT	B90	5696747	DVONR3225P16KCO4 WG	C18
5645615	TNMG160408UF WP15CT	B88	5684353	CNMG120416MR WP25CT	B39	5696626	TNMM22041265 WP35CT	B90	5696748	DVNN2020K16KCO4 WG	C18
5645616	WNMG160404UF WS10PT	B98	5684354	SNMG120412MR WP15CT	B73	5696627	TNMM22041665 WM25CT	B90	5696749	DVNN2525M16KCO4 WG	C18
5645617	WNMG160408UF WS10PT	B98	5684355	SNMG120412MR WP25CT	B73	5696628	TNMM22041665 WP15CT	B90	5696750	DVNN3225P16KCO4 WG	C18
5645618	WNMG160408UF WP15CT	B98	5684356	CNMG120408RH WP35CT	B41	5696629	TNMM22041665 WP25CT	B90	5696751	DWLN2020K06KCO4 WG	C19
5645619	WNMG080404UF WS10PT	B103	5696071	A25RDCLNR12KCO4 WG	C56	5696642	CNMM190616SR WP25CT	B44	5696752	DWLN2020K08KCO4 WG	C19
5645621	WNMG060404UF WS10PT	B103	5696072	A25RDCLNR12KCO4 WG	C56	5696643	CNMM190616SR WP15CT	B44	5696753	DWLN2525M06KCO4 WG	C19
5645622	WNMG060408UF WS10PT	B103	5696073	A32SDCLNR12KCO4 WG	C56	5696644	CNMM190624SR WP35CT	B44	5696754	DWLN2525M08KCO4 WG	C19
5645623	WNMG080408UF WS10PT	B103	5696074	A32SDCLNR12KCO4 WG	C56	5696645	CNMM250924SR WP15CT	B44	5696755	DWLN3225P08KCO4 WG	C19
5645624	WNMG080412UF WS10PT	B103	5696075	A40TDCLNR12KCO4 WG	C56	5696646	CNMM250924SR WP25CT	B44	5696756	DWLN3232P08KCO4 WG	C19
5661464	TDS501A03571 WJ25PD	080	5696076	A40TDCLNR12KCO4 WG	C56	5696647	CNMM250924SR WP35CT	B44	5696757	DWLN2020K06KCO4 WG	C19
5661502	TDS501A04623 WJ25PD	080	5696077	A40TDCLNR16KCO6 WG	C56	5696648	SNMM190616SR WM25CT	B76	5696758	DWLN2020K08KCO4 WG	C19
5661503	TDS501A04763 WJ25PD	081	5696078	A40TDCLNR16KCO6 WG	C56	5696649	SNMM190624SR WM25CT	B76	5696759	DWLN2525M06KCO4 WG	C19
5661504	TDS501A05410 WJ25PD	081	5696079	A25RDDPNR11KCO4 WG	C56	5696680	SNMM190624SR WP15CT	B76	5696760	DWLN2525M08KCO4 WG	C19
5661505	TDS501A05558 WJ25PD	081	5696080	A32SDDPNR15KCO6 WG	C56	5696681	SNMM190624SR WP25CT	B76	5696761	DWLN3225P08KCO4 WG	C19
5661506	TDS501A06528 WJ25PD	081	5696081	A32SDDPNR15KCO6 WG	C56	5696682	DSKNL2525M12KCO4 WG	C13	5696762	DWLN3225P22KCO4 WG	C19
5661507	TDS501A06746 WJ25PD	081	5696082	A40TDDPNR15KCO6 WG	C56	5696683	DSKNL3225P12KCO4 WG	C13	5697853	DSKNL2020K12KCO4 WG	C8
5661509	TDS501A07145 WJ25PD	081	5696083	A40TDDPNR15KCO6 WG	C56	5696684	DSKNL3232P15KCO6 WG	C13	5697854	DSKNL2525M12KCO4 WG	C8
5661540	TDS501A07938 WJ25PD	082	5696085	A32SDDQNR15KCO6 WG	C57	5696685	DSKNR2020K12KCO4 WG	C13	5697855	DSKNL3225P12KCO4 WG	C8
5661541	TDS501A08334 WJ25PD	082	5696086	A32SDDQNL15KCO6 WG	C57	5696686	DSKNR2525M12KCO4 WG	C13	5697856	DSKNR2020K12KCO4 WG	C8
5661542	TDS501A08433 WJ25PD	082	5696087	A40TDDQNR15KCO6 WG	C57	5696687	DSKNR3225P12KCO4 WG	C13	5697857	DSKNR2525M12KCO4 WG	C8
5661543	TDS501A08733 WJ25PD	082	5696088	A40TDDQNL15KCO6 WG	C57	5696688	DSKNR3232P15KCO6 WG	C13	5697858	DSKNR3225P12KCO4 WG	C8
5661544	TDS501A09347 WJ25PD	082	5696089	A25RDDUNR11KCO4 WG	C57	5696689	DSKNR3232P19KCO6 WG	C13	5697859	DSKNR3232P16KCO6 WG	C8
5661546	TDS501A09750 WJ25PD	082	5696210	A25RDDUNL11KCO4 WG	C57	5696700	DSRNL2525M12KCO4 WG	C14	5697880	DSKNR3232P19KCO6 WG	C9
5661547	TDS501A10716 WJ25PD	083	5696211	A32SDUNR11KCO4 WG	C57	5696701	DSRNL3232P15KCO6 WG	C14	5697881	DCLNL1616H09KCO3 WG	C9
5661548	TDS501A12304 WJ25PD	083	5696212	A32SDUNL11KCO4 WG	C57	5696702	DSRNL4040S25KCO9 WG	C14	5697882	DCLNL2020K09KCO3 WG	C9
5680085	CNMG120408UR WK20CT	B43	5696213	A32SDUNR15KCO6 WG	C57	5696703	DSRNL2020K12KCO4 WG	C14	5697883	DCLNL2020K12KCO4 WG	C9
5680086	CNMG120408UR WK05CT	B43	5696214	A32SDUNL15KCO6 WG	C57	5696704	DSRNL2525M12KCO4 WG	C14	5697884	DCLNL2525M12KCO4 WG	C9
5680087	CNMG120412UR WK05CT	B43	5696215	A40TDDUNR15KCO6 WG	C57	5696705	DSRNL3232P15KCO6 WG	C14	5697885	DCLNL2525M16KCO6 WG	C9
5680088	CNMG190612UR WK05CT	B43	5696216	A40TDDUNL15KCO6 WG	C57	5696706	DSRNL3232P19KCO6 WG	C14	5697886	DCLNL3232P16KCO6 WG	C9
5680089	CNMG120416UR WS10PT	B43	5696217	A50UDDUNR15KCO6 WG	C57	5696707	DSRNL4040S25KCO9 WG	C14	5697887	DCLNL3232P19KCO6 WG	C9
5680170	CNMG120416UR WS25PT	B43	5696218	A50UDDUNL15KCO6 WG	C57	5696708	DSSNL2020K12KCO4 WG	C15	5697888	DCLNL4040S19KCO6 WG	C9
5680171	DNMG150416UR WS10PT	B62	5696219	A25RDTFNR16KCO4 WG	C58	5696709	DSSNL2525M12KCO4 WG	C15	5697889	DCLNL4040S25KCO9 WG	C9
5680172	DNMG150612UR WK05CT	B62	5696260	A25RDTFNL16KCO4 WG	C58	5696710	DSSNL3225P12KCO4 WG	C15	5697890	DCLNR1616H09KCO3 WG	C9
5680173	SNMG120416UR WS25PT	B75	5696261	A32SDTFNR16KCO4 WG	C58	5696711	DSSNL3232P15KCO6 WG	C15	5697891	DSKNR2020K09KCO3 WG	C9
5680174	SNMG120416UR WS10PT	B75	5696262	A32SDTFNL16KCO4 WG	C58	5696712	DSSNL3232P19KCO6 WG	C15	5697892	DCLNR2020K12KCO4 WG	C9
5680175	TNMG160412UR WS25PT	B89	5696263	A32SDVUNR16KCO4 WG	C58	5696713	DSSNR2020K12KCO4 WG	C15	5697893	DCLNR2525M12KCO4 WG	C9
5680176	WNMG160412UR WS10PT	B99	5696264	A32SDVUNL16KCO4 WG	C58	5696714	DSSNR2525M12KCO4 WG	C15	5697894	DCLNR2525M16KCO6 WG	C9
5680177	WNMG060408UR WS25PT	B104	5696265	A40TDVUNR15KCO6 WG	C58	5696715	DSSNR2525M15KCO6 WG	C15	5697895	DSSNR3232P16KCO6 WG	C9
5680178	WNMG060408UR WS10PT	B104	5696266	A40TDVUNL16KCO4 WG	C58	5696716	DSSNR3225P12KCO4 WG	C15	5697896	DCLNR3232P19KCO6 WG	C9
5680179	WNMG080408UR WK05CT	B104	5696267	A25RDWLNRO6KCO4 WG	C59	5696717	DSSNR3232P15KCO6 WG	C15	5697897	DCLNR4040S19KCO6 WG	C9
5684271	CNMG120404FF WS10PT	B37	5696268	A25RDWLNLO6KCO4 WG	C59	5696718	DSSNR3232P19KCO6 WG	C15	5697898	DCLNR4040S25KCO9 WG	C9
5684272	CNMG120408FF WS10PT	B37	5696269	A25RDWLNRO8KCO4 WG	C59	5696719	DTFNL2020K16KCO4 WG	C16	5697899	DCRNL2020K12KCO4 WG	C10
5684273	DNMG110404FF WS10PT	B54	5696280	A25RDWLNLO8KCO4 WG	C59	5696720	DTFNL2525M16KCO4 WG	C16	5697900	DCRNL2525M12KCO4 WG	C10

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5697902 DCRNL3232P16KC06 WG.....	C10	5710285 VSM490D025Z02B25XN15	G33	 G34		5880452 28380300T007 TIALN	M20
5697903	..... DCRNR2020K12KC04 WG.....	C10	5710286	..... VSM490D032Z03B32XN15	G33	5873221	..... VSM490D050Z04S22XN15	G35	5880453	..... 28380400T008 TIALN	M20
5697904	..... DCRNR2525M12KC04 WG.....	C10	5710287	..... VSM490D025Z02A25XN15L170		5873222	..... VSM490D063Z05S22XN15	G35	5880454	..... 28380500T010 TIALN	M20
5697905	..... DCRNR3225P12KC04 WG.....	C10		..... G34		5873223	..... VSM490D080Z05S27XN15	G35	5880455	..... 28380600T010 TIALN	M20
5697906	..... DCRNR3232P16KC06 WG.....	C10	5710288	..... VSM490D032Z03A32XN15L200		5873224	..... VSM490D080Z09S27XN15	G35	5880456	..... 28380800T016 TIALN	M20
5697907	..... DCRNR3232P19KC06 WG.....	C10		..... G34		5873225	..... VSM490D100Z11S32XN15	G35	5880457	..... 28381000T019 TIALN	M20
5697908	..... DCSNL2020K12KC04 WG.....	C10	5710289	..... VSM490D040Z04S16XN15	G35	5873226	..... VSM490D125Z09S40XN15	G35	5880458	..... 28381200T022 TIALN	M20
5697909	..... DCSNL2525M12KC04 WG.....	C10	5710520	..... VSM490D040Z05S16XN15	G35	5873227	..... VSM490D125Z12S40XN15	G35	5880459	..... 28381400T022 TIALN	M20
5697911	..... DCSNR2020K12KC04 WG.....	C10	5710521	..... VSM490D050Z05S22XN15	G35	5873228	..... VSM490D160Z12S40XN15	G35	5880460	..... 28381600T026 TIALN	M20
5697913	..... DCSNR2525M12KC04 WG.....	C10	5710522	..... VSM490D050Z06S22XN15	G35	5873415	..... XNPU15T608SRMM WP25PM.....	G37	5880461	..... 28382000T032 TIALN	M20
5697915	..... DDJNL2020K11KC04 WG.....	C11	5710523	..... VSM490D063Z06S22XN15	G35	5873416	..... XNPU15T608SRMM WP40PM.....	G37	5880462	..... 28380300T007 UNCOATED	M20
5697916	..... DDJNL2020K15KC06 WG.....	C11	5710524	..... VSM490D063Z07S22XN15	G35	5873417	..... XNPU15T608SRMM WU35PM.....	G37	5880463	..... 28380400T008 UNCOATED	M20
5697918	..... DDJNL2525M11KC04 WG.....	C11	5710525	..... VSM490D080Z07S27XN15	G35	5873418	..... XNPU15T608SRMM WP35CM.....	G37	5880464	..... 28380500T010 UNCOATED	M20
5697920	..... DDJNL2525M15KC06 WG.....	C11	5710526	..... VSM490D100Z08S32XN15	G35	5873419	..... XNPU15T608SRMM WK15PM.....	G37	5880465	..... 28380600T010 UNCOATED	M20
5697922	..... DDJNL3225P15KC06 WG.....	C11	5710527	..... XNGU15T608SRMM WP25PM	G37	5873420	..... XNPU15T608SRMM WK15CM.....	G37	5880466	..... 28380800T016 UNCOATED	M20
5697924	..... DDJNR2020K11KC04 WG.....	C11	5710528	..... XNGU15T608SRMM WP40PM	G37	5873481	..... XNGU15T608ERML WP25PM.....	G36	5880467	..... 28381000T019 UNCOATED	M20
5697926	..... DDJNR2020K15KC06 WG.....	C11	5710529	..... XNGU15T608SRMM WU35PM	G37	5873482	..... XNGU15T608ERML WP40PM.....	G36	5880468	..... 28381200T022 UNCOATED	M20
5697928	..... DDJNR2525M11KC04 WG.....	C11	5825545	..... 28480400T011 TIALN	M38	5873483	..... XNGU15T608ERML WU35PM.....	G36	5880469	..... 28381400T022 UNCOATED	M20
5697930	..... DDJNR2525M15KC06 WG.....	C11	5825546	..... 28480500T013 TIALN	M38	5880387	..... 40010100T004 TIALN	M21	5880470	..... 28381600T026 UNCOATED	M20
5697932	..... DDJNR3225P15KC06 WG.....	C11	5825547	..... 28480600T013 TIALN	M38	5880388	..... 40010150T005 TIALN	M21	5880471	..... 28382000T032 UNCOATED	M20
5697934	..... DDNNL2020K15KC06 WG.....	C11	5825548	..... 28480800T019 TIALN	M38	5880389	..... 40010200T006 TIALN	M21	5883097	..... XNPU15T608ERML WP25PM.....	G37
5697936	..... DDNNL2525M15KC06 WG.....	C11	5825549	..... 28481000T020 TIALN	M38	5880390	..... 40010250T007 TIALN	M21	5883098	..... XNPU15T608ERML WP40PM.....	G37
5697938	..... DDNNL3225P15KC06 WG.....	C11	5825550	..... 28481200T026 TIALN	M38	5880391	..... 40010300T009 TIALN	M21	5883099	..... XNPU15T608ERML WU35PM.....	G37
5697940	..... DDNNR2020K15KC06 WG.....	C11	5825551	..... 28481400T026 TIALN	M38	5880392	..... 40010350T012 TIALN	M21	5883447	..... XNPU15T616SRMM WP25PM.....	G37
5697942	..... DDNNR2525M15KC06 WG.....	C11	5825552	..... 28481600T032 TIALN	M38	5880393	..... 40010400T012 TIALN	M21	5883448	..... XNPU15T616SRMM WP40PM.....	G37
5697944	..... DRGNL3225P12KC04 WG.....	C12	5825553	..... 28481800T032 TIALN	M38	5880395	..... 40110400T019 TIALN	M21	5883449	..... XNPU15T616SRMM WU35PM.....	G37
5697946	..... DRGNL4040S25KC09 WG.....	C12	5825554	..... 28482000T038 TIALN	M38	5880396	..... 40210400T031 TIALN	M21	5883450	..... XNPU15T616SRMM WP35CM.....	G37
5697948	..... DRGNR2525M12KC04 WG.....	C12	5825555	..... 40000200T006 TIALN	M39	5880397	..... 40210500T014 TIALN	M21	5883521	..... XNPU15T616SRMM WK15PM.....	G37
5697950	..... DRGNR3225P12KC04 WG.....	C12	5825556	..... 40000300T020 TIALN	M39	5880398	..... 40010600T020 TIALN	M21	5883522	..... XNPU15T616SRMM WK15CM.....	G37
5697952	..... DRGNR4040S25KC09 WG.....	C12	5825557	..... 40000400T014 TIALN	M39	5880399	..... 40010600T028 TIALN	M21	5890728	..... XNPU15T612SRMM WP25PM.....	G37
5697954	..... DSDNN2020K12KC04 WG.....	C12	5825558	..... 40100400T025 TIALN	M39	5880400	..... 40210600T038 TIALN	M21	5890729	..... XNPU15T612SRMM WP40PM.....	G37
5697955	..... DSDNN2525M12KC04 WG.....	C12	5825559	..... 40000500T016 TIALN	M39	5880401	..... 40010800T020 TIALN	M21	5890730	..... XNPU15T612SRMM WU35PM.....	G37
5697957	..... DSDNN2525M15KC06 WG.....	C12	5825560	..... 40100500T030 TIALN	M39	5880402	..... 40110800T028 TIALN	M21	5890761	..... XNPU15T612SRMM WP35CM.....	G37
5697959	..... DSDNN3225P12KC04 WG.....	C12	5825573	..... 40000600T016 TIALN	M39	5880403	..... 40210800T040 TIALN	M21	5890762	..... XNPU15T612SRMM WK15PM.....	G37
5697961	..... DSDNN3232P19KC06 WG.....	C12	5825574	..... 40100600T019 TIALN	M39	5880404	..... 40011000T022 TIALN	M21	5890763	..... XNPU15T612SRMM WK15CM.....	G37
5697963	..... DSDNN4040S25KC09 WG.....	C12	5825575	..... 40100600T030 TIALN	M39	5880405	..... 40111000T032 TIALN	M21	5890821	..... XNGU15T604ERML WP25PM.....	G36
5698342	..... WOJL20712SRMR WP40PM.....	J14	5825576	..... 40000800T019 TIALN	M39	5880406	..... 40211000T045 TIALN	M21	5890822	..... XNGU15T604ERML WP40PM.....	G36
5698343	..... WOJL20712SRMR WP25PM.....	J14	5825577	..... 40100800T040 TIALN	M39	5880407	..... 40011200T025 TIALN	M22	5890823	..... XNGU15T604ERML WU35PM.....	G36
5698347	..... CNMML12040865 WM25CT.....	B44	5825578	..... 40001000T022 TIALN	M39	5880408	..... 40111200T045 TIALN	M22	5895291	..... HNGJ0704ANENLD WP25PM.....	F16, F21
5698348	..... CNMML12040865 WM15CT.....	B44	5825579	..... 40101000T040 TIALN	M39	5880409	..... 40211200T075 TIALN	M22	5895292	..... HNGJ0704ANENLD WP35CM.....	F8, F16, F21
5698349	..... CNMML12040865 WP25CT.....	B44	5825580	..... 40001200T025 TIALN	M39	5880410	..... 40011400T032 TIALN	M22	5895293	..... HNPJ0704ANSNGD WP25PM.....	F9, F17, F22
5698360	..... CNMML12040865 WP35CT.....	B44	5825581	..... 40101200T045 TIALN	M39	5880411	..... 40011600T032 TIALN	M22	5895294	..... HNPJ0704ANSNGD WP35CM.....	F9, F17, F22
5698361	..... CNMML12041265 WM25CT.....	B44	5825583	..... 40001400T032 TIALN	M39	5880412	..... 40012000T038 TIALN	M22			
5698362	..... CNMML12041265 WP15CT.....	B44	5825584	..... 40101400T050 TIALN	M39	5880413	..... 40112000T075 TIALN	M22			
5698363	..... CNMML12041265 WP25CT.....	B44	5825585	..... 40001600T032 TIALN	M39	5880425	..... 40010100T004 UNCOATED	M21			
5698364	..... CNMML12041665 WM25CT.....	B44	5825586	..... 40101600T065 TIALN	M39	5880426	..... 40010150T005 UNCOATED	M21			
5698365	..... CNMML12041665 WP25CT.....	B44	5825587	..... 40001800T038 TIALN	M39	5880427	..... 40010200T006 UNCOATED	M21			
5698366	..... CNMML16060865 WP25CT.....	B44	5825588	..... 40102000T056 TIALN	M39	5880428	..... 40010250T007 UNCOATED	M21			
5698367	..... CNMML16060865 WP35CT.....	B44	5825594	..... 28480400T011 UNCOATED	M38	5880429	..... 40010300T009 UNCOATED	M21			
5698368	..... CNMML16061265 WM25CT.....	B44	5825595	..... 28480500T013 UNCOATED	M38	5880430	..... 40010400T012 UNCOATED	M21			
5698369	..... CNMML16061265 WP15CT.....	B44	5825596	..... 28480600T013 UNCOATED	M38	5880431	..... 40110400T019 UNCOATED	M21			
5698370	..... CNMML16061265 WP25CT.....	B44	5825597	..... 28480800T019 UNCOATED	M38	5880432	..... 40210400T031 UNCOATED	M21			
5698371	..... CNMML16061265 WP35CT.....	B44	5825598	..... 28481000T022 UNCOATED	M38	5880433	..... 40010500T014 UNCOATED	M21			
5698372	..... CNMML16061665 WP15CT.....	B44	5825599	..... 28481200T026 UNCOATED	M38	5880435	..... 40010600T020 UNCOATED	M21			
5698373	..... CNMML16061665 WP25CT.....	B44	5825600	..... 28481400T026 UNCOATED	M38	5880436	..... 40110600T028 UNCOATED	M21			
5698374	..... CNMML19061265 WM25CT.....	B44	5825601	..... 28481600T032 UNCOATED	M38	5880437	..... 40210600T038 UNCOATED	M21			
5698376	..... CNMML19061265 WP35CT.....	B44	5825602	..... 28481800T032 UNCOATED	M38	5880438	..... 40010800T020 UNCOATED	M21			
5698377	..... CNMML19061665 WM25CT.....	B44	5825603	..... 28482000T038 UNCOATED	M38	5880439	..... 40110800T028 UNCOATED	M21			
5698378	..... CNMML19061665 WP15CT.....	B44	5873211	..... VSM490D025Z02M12XN15	G32	5880440	..... 40210800T040 UNCOATED	M21			
5698379	..... CNMML19062465 WM25CT.....	B44	5873212	..... VSM490D032Z03M16XN15	G32	5880441	..... 40011000T022 UNCOATED	M21			
5698410	..... CNMML19062465 WP15CT.....	B44	5873213	..... VSM490D032Z04M16XN15	G32	5880442	..... 40111000T032 UNCOATED	M21			
5698411	..... CNMML19062465 WP25CT.....	B44	5873214	..... VSM490D035Z04M16XN15	G32	5880443	..... 40211000T045 UNCOATED	M21			
5698412	..... DNMM15060865 WM25CT.....	B62	5873215	..... VSM490D040Z03B32XN15	G33	5880444	..... 40011200T025 UNCOATED	M22			
5698413	..... DNMM15060865 WP15CT.....	B62	5873216	..... VSM490D025Z02A25XN15L100		5880445	..... 40111200T045 UNCOATED	M22			
5698414	..... DNMM15060865 WP25CT.....	B62		..... G34		5880446	..... 40211200T075 UNCOATED	M22			
5698415	..... DNMM15060865 WP35CT.....	B62	5873217	..... VSM490D032Z03A32XN15L110		5880447	..... 40011400T032 UNCOATED	M22			
5698416	..... DNMM15061265 WM25CT.....	B62		..... G34		5880448	..... 40011600T032 UNCOATED	M22			
5698417	..... DNMM15061265 WP15CT.....	B62	5873218	..... VSM490D032Z04A32XN15L110		5880449	..... 40012000T038 UNCOATED	M22			
5698418 DNMM15061665 WP15CT.....	B62	 G34		5880450 40112000T075 UNCOATED	M22			

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5895350	HNGJ0905ANSNGD WP40PM	F28, F34, F40	5903707	MDHW120408 WK15CM	I15	5908932	TNMG160408MS WU1OHT	B86	5978096	777NE12005T WS15PE	L44
5895371	HNGJ0905ANSNHD WP25PM	F28, F34, F40	5903723	MDHW120408 WP25PM	I15	5908933	TNMG220404MS WS10PT	B86	5978097	777NE12025T WS15PE	L44
5895372	HNGJ0905ANSNHD WP35CM	F28, F34, F40	5908742	CNMG120404MS WS10PT	B40	5908934	TNMG220404MS WS25PT	B86	5978098	777E12005T WS15PE	L45
5895373	HNGJ0905ANSNHD WP40PM	F28, F34, F40	5908743	CNMG120404MS WS25PT	B40	5908935	TNMG220404MS WU1OHT	B86	5978099	777E12025T WS15PE	L45
5895374	HNPJ0905ANSNGD WP25PM	F27, F34, F40	5908744	CNMG120404MS WU1OHT	B40	5908936	TNMG220408MS WS10PT	B86	5978100	777E12005T WS15PE	L45
5895375	HNPJ0905ANSNGD WP35CM	F27, F34, F40	5908745	CNMG120408MS WS10PT	B40	5908937	TNMG220408MS WS25PT	B86	5978101	777E12025T WS15PE	L45
5895376	HNPJ0905ANSNHD WP25PM	F28, F34, F40	5908746	CNMG120408MS WS25PT	B40	5908938	TNMG220408MS WU1OHT	B86	5978102	777E12005V WS15PE	L45
5895377	HNPJ0905ANSNHD WP35CM	F28, F34, F40	5908747	CNMG120408MS WU1OHT	B40	5908939	TNMG220412MS WS10PT	B86	5978103	777E12025V WS15PE	L45
5895378	HNPJ0905ANSNHD WP35CM	F28, F34, F40	5908748	CNMG120412MS WS10PT	B40	5908940	TNMG220412MS WS25PT	B86	5978104	777NE16006T WS15PE	L44
5895379	HNPJ090543ANSNHD WP25PM	F28, F34, F40	5908749	CNMG120412MS WS25PT	B40	5908941	TNMG220412MS WU1OHT	B86	5978105	777NE16026T WS15PE	L44
5895380	HNPJ090543ANSNHD WP40PM	F28, F34, F40	5908750	CNMG120412MS WU1OHT	B40	5908942	TNMG220412MS WS25PT	B86	5978106	777E16006T WS15PE	L45
5895381	XNGJ0905ANSNGD3W WP25PM	F35	5908751	CNMG120416MS WS10PT	B40	5908943	TNMG270608MS WU1OHT	B86	5978107	777E16026T WS15PE	L45
5895382	XNGJ0905ANSNGD3W WP40PM	F35	5908752	CNMG120416MS WS25PT	B40	5908944	VNMG160404MS WS10PT	B98	5978108	777E16006T WS15PE	L45
5895383	SNMT1205AZR31 WP25PM	F55	5908753	CNMG120416MS WU1OHT	B40	5908945	VNMG160404MS WS25PT	B98	5978109	777E16026T WS15PE	L45
5895384	SNMT1205AZR31 WP35CM	F55	5908754	CNMG160608MS WS10PT	B40	5908946	VNMG160404MS WU1OHT	B98	5978110	777E16006V WS15PE	L45
5895385	SNKT1505AZR31 WP25PM	F59	5908755	CNMG160608MS WS25PT	B40	5908947	VNMG160408MS WS10PT	B98	5978111	777E16026V WS15PE	L45
5895386	SNKT1505AZR31 WP35CM	F59	5908756	CNMG160608MS WU1OHT	B40	5908948	VNMG160408MS WS25PT	B98	5978112	777NE20007T WS15PE	L44
5895387	HPGT06T3DZENG WP25PM	F47	5908757	CNMG160612MS WS10PT	B40	5908949	VNMG160408MS WU1OHT	B98	5978113	777NE20027T WS15PE	L44
5895388	HPGT06T3DZENG WP40PM	F47	5908758	CNMG160612MS WS25PT	B40	5908950	VNMG220404MS WS10PT	B98	5978114	777E20007T WS15PE	L45
5895389	HPGT06T3DZERL WP25PM	F46	5908759	CNMG160612MS WU1OHT	B40	5908951	VNMG220404MS WS25PT	B98	5978115	777E20027T WS15PE	L45
5895390	HPGT06T3DZERL WP40PM	F46	5908760	CNMG190608MS WS10PT	B40	5908952	VNMG220404MS WU1OHT	B98	5978116	777E20007T WS15PE	L45
5895391	HPGT06T3DZERGD3W WP25PM	F47	5908761	CNMG190608MS WS25PT	B40	5908953	VNMG220408MS WS10PT	B98	5978117	777E20027T WS15PE	L45
5895392	HPGT06T3DZERGD3W WP40PM	F47	5908762	CNMG190608MS WU1OHT	B40	5908954	VNMG220408MS WS25PT	B98	5978118	777E20007V WS15PE	L45
5895393	HPPT06T3DZENG WP25PM	F47	5908763	CNMG190612MS WS10PT	B40	5908955	VNMG220408MS WU1OHT	B98	5978119	777E20027V WS15PE	L45
5895394	HPPT06T3DZENG WP40PM	F47	5908764	CNMG190612MS WS25PT	B40	5908956	VNMG220408MS WS10PT	B102	5980398	XDPT110420PDSRMM WP40PM	G10
5895395	HPPT06T3DZENG WP35CM	F47	5908765	CNMG190612MS WU1OHT	B40	5908957	VNMG220408MS WS25PT	B102	5980399	XDPT110420PDSRMM WP25PM	G10
5901354	XDPT110424PDSRMM WP40PM	G10	5908766	CNMG190616MS WS10PT	B40	5908972	VNMG080408MS WS10PT	B102	5983390	SXHX060204R20 WP20PH	P17
5901355	XDPT110424PDSRMM WP25PM	G10	5908767	CNMG190616MS WS25PT	B40	5908973	VNMG080408MS WS25PT	B102	5983701	SXHX060208R20 WP20PH	P17
5903644	123506599 WP40PM	I5	5908768	CNMG190616MS WU1OHT	B40	5908974	VNMG080408MS WS10PT	B102	5983702	SXHX070304R20 WP20PH	P17
5903645	123506600 WP40PM	I6	5908769	DNMG110408MS WS10PT	B58	5908975	VNMG080404MS WS25PT	B102	5983703	SXHX070308R20 WP20PH	P17
5903646	123506601 WP40PM	I5	5908770	DNMG110408MS WS25PT	B58	5908976	VNMG080408MS WU1OHT	B102	5983704	SXHX090304R20 WP20PH	P17
5903647	123506602 WP40PM	I6	5908771	DNMG110408MS WU1OHT	B58	5908977	VNMG080408MS WS10PT	B102	5983705	SXHX090308R20 WP20PH	P17
5903648	123506599 WK15CM	I5	5908772	DNMG150404MS WS10PT	B58	5908978	VNMG080404MS WU1OHT	B102	5983706	VXGX10030234 WP20PH	P17
5903649	123506600 WK15CM	I6	5908773	DNMG150404MS WS25PT	B58	5908979	VNMG080404MS WS25PT	B102	5987689	XDPT170404PESRMM WP40PM	G27
5903650	123506601 WK15CM	I5	5908774	DNMG150404MS WU1OHT	B58	5908980	VNMG080408MS WS10PT	B102	5987690	XDPT170404PESRMM WU35PM	G27
5903671	123506602 WK15CM	I6	5908775	DNMG150408MS WS10PT	B58	5908981	VNMG080408MS WS25PT	B102	5987946	XDPT170408PESRMM WP40PM	G27
5903672	123506599 WP35CM	I5	5908776	DNMG150412MS WS10PT	B58	5908982	VNMG080408MS WS10PT	B102	5987947	XDPT170408PESRMM WP35CM	G27
5903673	123506600 WP35CM	I6	5908777	DNMG150412MS WS25PT	B58	5908983	VNMG080408MS WU1OHT	B102	5987948	XDPT170408PESRMM WK15CM	G27
5903674	123506601 WP35CM	I5	5908778	DNMG150408MS WS25PT	B58	5908984	VNMG080408MS WS10PT	B102	5987949	XDPT170408PESRMM WP25PM	G27
5903675	123506602 WP35CM	I6	5908779	DNMG150408MS WU1OHT	B58	5908985	VNMG080408MS WS25PT	B102	5987950	XDPT170408PESRMM WU35PM	G27
5903704	MDHX09T308 WP40PM	I12	5908780	DNMG150412MS WS10PT	B58	5908986	VNMG080408MS WS10PT	B102	5988055	VSM17D025Z02A25X17L110	G22
5903705	MDHW120408 WP40PM	I15	5908781	DNMG150412MS WS25PT	B58	5908987	VNMG080408MS WU1OHT	B102	5988056	VSM17D025Z02A25X17L170	G22
5908928	TNMG160404MS WS25PT	B86	5908782	DNMG150404MS WS10PT	B58	5908988	VNMG080408MS WS25PT	B102	5988057	VSM17D032Z03A32X17L120	G22
5908929	TNMG160404MS WU1OHT	B86	5908783	DNMG150404MS WS25PT	B58	5908989	VNMG080408MS WU1OHT	B102	5988058	VSM17D032Z03A32X17L210	G23
5908930	TNMG160408MS WS10PT	B86	5908784	DNMG150408MS WS10PT	B58	5908990	VNMG080408MS WS10PT	B102	5988059	VSM17D032Z03A32X17L250	G23
5908931	TNMG160408MS WS25PT	B86	5908785	DNMG150408MS WS10PT	B58	5908991	VNMG080408MS WS25PT	B102	5988060	VSM17D040Z04A32X17L130	G22
5908932	TNMG160408MS WU1OHT	B86	5908786	DNMG150408MS WS25PT	B58	5908992	VNMG080408MS WS10PT	B102	5988061	VSM17D040Z04A32X17L250	G23
5908933	TNMG220404MS WS10PT	B86	5908787	DNMG150408MS WS10PT	B58	5908993	VNMG080408MS WS25PT	B102	5988062	VSM17D025Z02M12X17	G20
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5908935	TNMG220404MS WU1OHT	B86	5908789	DNMG150408MS WS10PT	B58	5908995	VNMG080408MS WS10PT	B102	5988064	VSM17D032Z03M16X17	G20
5908936	TNMG220408MS WS10PT	B86	5908790	DNMG150412MS WS10PT	B58	5908996	VNMG080408MS WS25PT	B102	5988065	VSM17D032Z03M22X17	G20
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5908938	TNMG220408MS WU1OHT	B86	5908792	DNMG150604MS WS10PT	B58	5908998	VNMG080408MS WS10PT	B102	5988067	VSM17D100Z08S32X17	G24
5908939	TNMG220412MS WS10PT	B86	5908793	DNMG150604MS WS25PT	B58	5908999	VNMG080408MS WS25PT	B102	5988068	VSM17D100Z08S32X17L110	G22
5908940	TNMG220412MS WS25PT	B86	5908794	DNMG150604MS WU1OHT	B58	5909000	VNMG080408MS WS10PT	B102	5988069	VSM17D100Z08S32X17L120	G22
5908941	TNMG220412MS WU1OHT	B86	5908795	DNMG150608MS WS10PT	B58	5909001	VNMG080408MS WS25PT	B102	5988070	VSM17D100Z08S32X17L210	G23
5908942	TNMG270608MS WS25PT	B86	5908796	DNMG150608MS WS10PT	B58	5909002	VNMG080408MS WS10PT	B102	5988071	VSM17D100Z08S32X17L250	G23
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5908945	VNMG160404MS WS25PT	B98	5908799	DNMG150612MS WS25PT	B58	5909005	VNMG080408MS WU1OHT	B102	5988074	VSM17D032Z02A32X17L250	G23
5908946	VNMG160404MS WU1OHT	B98	5908800	DNMG150612MS WU1OHT	B58	5909006	VNMG080408MS WS10PT	B102	5988075	VSM17D032Z02A32X17L250	G23
5908947	VNMG160408MS WS10PT	B98	5908801	DNMG150612MS WS10PT	B58	5909007	VNMG080408MS WS25PT	B102	5988076	VSM17D032Z02A32X17L250	G23
5908948	VNMG160408MS WS25PT	B98	5908802	DNMG150616MS WS10PT	B58	5909008	VNMG080408MS WS10PT	B102	5988077	VSM17D032Z02A32X17L250	G23
5908949	VNMG160408MS WU1OHT	B98	5908803	DNMG150616MS WS25PT	B58	5909009	VNMG080408MS WU1OHT	B102	5988078	VSM17D032Z02A32X17L250	G23
5908950	VNMG220404MS WS10PT	B98	5908804	DNMG150616MS WS10PT	B58	5909010	VNMG080408MS WS10PT	B102	5988079	VSM17D032Z02A32X17L250	G23
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5908952	VNMG220404MS WU1OHT	B98	5908806	DNMG150616MS WS10PT	B58	5909012	VNMG080408MS WS10PT	B102	5988081	VSM17D032Z02A32X17L250	G23
5908953	VNMG220408MS WS10PT	B98	5908807	DNMG150616MS WS25PT	B58	5909013	VNMG080408MS WS25PT	B102	5988082	VSM17D032Z02A32X17L250	G23
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5908955	VNMG220408MS WU1OHT	B98	5908809	DNMG150616MS WS10PT	B58	5909015	VNMG080408MS WS25PT	B102	5988084	VSM17D032Z02A32X17L250	G23
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5908958	VNMG220408MS WU1OHT	B98	5908812	DNMG150616MS WS10PT	B58	5909018	VNMG080408MS WS25PT	B102	5988087	VSM17D032Z02A32X17L250	G23
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NG4250LK TN6010	D59	NGD3M400LK TN6010	D62	NR2031R TN6025	D67	NR3M100R TN6025	D67
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NG4250R TN6010	D51	NGD3M400RK TN6010	D60	NR2047R TN6025	D67	NR3M125L TN6025	D69
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				NR2M100L TN6010	D68	NR3M175L TN6025	D69
				NR2M100L TN6025	D68	NR3M175L TN7110	D69
						NR3M175R TN6010	D67

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NR3M200L TN6010	D69	NSR2525M4 W	D74	PDJNR3232P15 WG	C23	PTGNL2525M16 WG	C29
NR3M200L TN6025	D69	NSR3225P3 W	D74	PDJNR4025R15 WG	C23	PTGNL2525M22 WG	C29
NR3M200R TN6010	D68	NSR3225P4 W	D74	PDNNL2525M15 WG	C24	PTGNL3232P22 WG	C29
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NR3M225R TN6010	D68	NST2	C40-41	PDNNR4025M15 WG	C24	PTGNR2525M16 WG	C29
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NSR2525M2 W	D74	PDJNR2525M11 WG	C23	PTGNL1616H16 WG	C29	RDHT1003MOT TN7525	J48

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VBMT1604021P TN10U	B144	VDS201A01600 WU25PD	08	VDS201A05600 WU25PD	010	VDS201A10800 WU25PD	012
VBMT1604021P TN15U	B144	VDS201A01700 WU25PD	08	VDS201A05616 WU25PD	010	VDS201A10900 WU25PD	012
VBMT1604021P TN20K	B144	VDS201A01800 WU25PD	08	VDS201A05700 WU25PD	010	VDS201A11000 WU25PD	012
VBMT1604021P TN30M	B144	VDS201A01900 WU25PD	08	VDS201A05800 WU25PD	010	VDS201A11100 WU25PD	012
VBMT160402FP WM25CT	B94	VDS201A01984 WU25PD	08	VDS201A05900 WU25PD	010	VDS201A11113 WU25PD	012
VBMT160402FP WP25CT	B94	VDS201A02000 WU25PD	08	VDS201A05954 WU25PD	010	VDS201A11200 WU25PD	012
VBMT160404 WP15CT	B94	VDS201A02100 WU25PD	08	VDS201A06000 WU25PD	010	VDS201A11300 WU25PD	012
VBMT160404 WP25CT	B94	VDS201A02200 WU25PD	08	VDS201A06100 WU25PD	010	VDS201A11400 WU25PD	012
VBMT160404 WP35CT	B94	VDS201A02300 WU25PD	08	VDS201A06200 WU25PD	010	VDS201A11500 WU25PD	012
VBMT1604041P TN10P	B144	VDS201A02383 WU25PD	08	VDS201A06300 WU25PD	010	VDS201A11509 WU25PD	012
VBMT1604041P TN10U	B144	VDS201A02400 WU25PD	09	VDS201A06350 WU25PD	010	VDS201A11600 WU25PD	012
VBMT1604041P TN15M	B144	VDS201A02439 WU25PD	09	VDS201A06400 WU25PD	010	VDS201A11700 WU25PD	012
VBMT1604041P TN15U	B144	VDS201A02489 WU25PD	09	VDS201A06500 WU25PD	010	VDS201A11800 WU25PD	012
VBMT1604041P TN20K	B144	VDS201A02500 WU25PD	09	VDS201A06528 WU25PD	010	VDS201A11900 WU25PD	012
VBMT1604041P TN20P	B144	VDS201A02578 WU25PD	09	VDS201A06600 WU25PD	010	VDS201A11908 WU25PD	012
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VBMT160404FP WM15CT	B94	VDS201A02700 WU25PD	09	VDS201A06746 WU25PD	010	VDS201A12200 WU25PD	012
VBMT160404FP WM25CT	B94	VDS201A02705 WU25PD	09	VDS201A06800 WU25PD	010	VDS201A12300 WU25PD	012
VBMT160404FP WP15CT	B94	VDS201A02779 WU25PD	09	VDS201A06900 WU25PD	010	VDS201A12304 WU25PD	012
VBMT160404FP WP25CT	B94	VDS201A02800 WU25PD	09	VDS201A07000 WU25PD	011	VDS201A12400 WU25PD	012
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WNMG060404UM WS10PT	B104	WNMG0804082P TN10P	B148	WNMG0804127N TN20P	B149	WOEJ120712SRMH WP20CM	J13
WNMG0604086P TN10P	B149	WNMG0804082P TN10U	B148	WNMG0804127N TN30P	B149	WOEJ120712SRMH WP25PM	J13
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WNMG0604086P TN20P	B149	WNMG0804082P TN15U	B148	WNMG080412FW WM15CT	B101	WOEJ120712SRMH WP40PM	J13
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XDCT110408PDERML WP35CM	G9	XDPT110420PDSRMM WP40PM	G10	XNGU15T608SRMH WP35CM	G37	XPHT160412ERGE TN450	G48, H8
XDCT110408PDERML WP40PM	G9	XDPT110424PDSRMM WP25PM	G10	XNGU15T608SRMH WP40PM	G37	XPHT160412ERGE TN6510	G48, H8
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XDCT110424PDFRALP WN25PM	G11	XDPT110440PESRMM WK15CM	G27	XNKT1205AZER11 TN7525	F55	XPHT160412MR TN7525	G49, H9
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XDCT110412PEFRALP WN10HM	G26	XDPT1104412PESRMM WP40PM	G27	XNPU15T612SRMM WK15PM	G37	XPHT160420 WP40PM	G48, H9
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XDCT110432PEFRALP WN25PM	G26	XDPT1104432PESRMM WK15CM	G27	XNPU15T616SRMM WP40PM	G37	XPHT160432 WP40PM	G48, H9
XDCT110440PEERML WP25PM	G25	XDPT1104432PESRMM WP25PM	G27	XNPU15T616SRMM WU35PM	G37	XPHT160440 TN7525	G48, H9
XDCT110440PEFRALP WN25PM	G26	XDPT1104432PESRMM WP35CM	G27	XPHT160404ALP THM-U	G47, H8	XPHT160440 TN7535	G48, H9
XDCW110404PDFRPPCD WDN10U	G11	XDPT1104432PESRMM WP40PM	G27	XPHT160408 TN2510	G48, H9	XPHT160440 WK15CM	G48, H9
XDCW110408PDFRPPCD WDN10U	G11	XDPT1104440PESRMM WP25PM	G27	XPHT160408 TN6510	G48, H9	XPHT160440 WP40PM	G48, H9
XDPT110404PDSRMM WK15CM	G10	XDPT1104440PESRMM WP40PM	G27	XPHT160408 TN6520	G48, H9	XPNT160412 TN2510	G49, H9
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XDPT110408PDSRMM WK15CM	G10	XNGJ0704ANENLD3W TN6540	F17	XPHT160408 TN7535	G48, H9	XPNT160412 TN7525	G49, H9
XDPT110408PDSRMM WP35CM	G10	XNGJ0704ANENLD3W TN6550	F17	XPHT160408 WK15CM	G48, H9	XPNT160412 TN7535	G49, H9
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XDPT110408PDSRMM WP25PM	G10	XNGJ0704ANFNLDJ3W TN6501	F17	XPHT160408ERGE TN6510	G48, H8		
XDPT110408PDSRMM WP35CM	G10	XNGJ0905ANFNLDJ3W THM-U	F35	XPHT160408ERGE TN6520	G48, H8		
XDPT110408PDSRMM WP40PM	G10	XNGJ0905ANFNLDJ3W TN6501	F35	XPHT160408ERGE TN6525	G48, H8		
XDPT110408PDSRMM WS30PM	G10	XNGJ0905ANSNGD3W TN6510	F35	XPHT160408ERGE TN6540	G48, H8		
XDPT110408PDSRMM WU35PM	G10	XNGJ0905ANSNGD3W TN6520	F35	XPHT160408ERGE TN7525	G48, H8		
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Turning Icons

Shank: KM-TS™ (ISO 26622)	ISO: 26622	Through Coolant: 100 bar	Through Coolant: 1500 psi	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 HSS-PM Material	HSS-M42 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°

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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 sh6	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

P Steel	K Cast Iron	S High-Temp Alloys
M Stainless Steel	N Non-Ferrous	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%	–	–	–	GAISiCu4, GDAISi10Mg
N3	High-Silicon Aluminium Alloys and Magnesium Alloys	Si >12,2%	–	–	–	G-ALSi12, G-AISi17Cu4, G-AISi21CuNiMg
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 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 the WIDIA 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.

ArCut, AluSurf, Blue Box, CERMET-DCFD, CW2015, CW3020, CW5025, ERICKSON, GP6505, GP6520, Green Box, GUN, HCK10, HSR, HydroForce, KM, KM-LOC, KM-LOC II, KM-TS, K10, K10F, K10F-DCFD, M25, M100, M170, M200, M270, M370, M900, NINA, NOVO, ProGroove, Quadralock, ROTAFLEX, Shoulder Mill 11, Shoulder Mill 17, Separator, SuperFeed, TN6010, TN6025, TopClamp, Top Cut 4, TOP DRILL, TOP DRILL G, TOP DRILL M1, TOP DRILL S, TOP DRILL S+, ToolBOSS, TopGroove, TopThread, VariDrill, VariMill, VariMill I, VariMill II, VariMill III, VariTap, VariTurn, Victory, Vision Plus, Vision Plus X-Feed, VSM11, VSM17, VSM490-15, WavCut, WavCut I, WBH10P, WBH25P, WBH30P, WBK40U, WDN00U, WDN25U, Widaflex, WIDIA, WIDIA-CIRCLE, WIDIA-GTD, WIDIA-Hanita, WIDIA-Metcut, WIDIA-Rubig, WK15CM, WK15PD, WMT, WMT-SX, WN10HD, WP15PE, WP20PD, WP25CT, WP35CT, WP40PM, WST, WS10PT, WS15PE, WS25PT, WS30PM, WU05PR, WU10HT, WU10PT, WU20PD, WU25PD, and X-Feed are trademarks of Kennametal, Inc. and are used as such herein. The absence of a product, service name, or logo from this list does not constitute a waiver of Kennametal's trademark or other intellectual property rights concerning that name or logo.

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