HIGH VELOCITY OXYGEN FUEL

JET KOTE ™

PROFESSIONAL SURFACING WITH **JET KOTE™**

Kennametal Stellite™ is proud to bring you the most competitive portfolio of professional surfacing solutions with our state-of-the-art coating equipment and high quality component surfacing technologies.

Jet Kote™ HVOF coating systems provide a versatile method of depositing high-quality coatings at low costs. Each Jet Kote™ system is designed with convenience and efficiency in mind allowing operators to capture optimum workflow throughput without sacrificing on product quality.

Industries Served

Kennametal Stellite's™ Jet Kote™ systems are prominently featured as the equipment of choice in a variety of industries and applications including:

- Aerospace
- Oil & Gas
- Automotive
- Power Generation
- Steel
- Lumber
- Processing Industries

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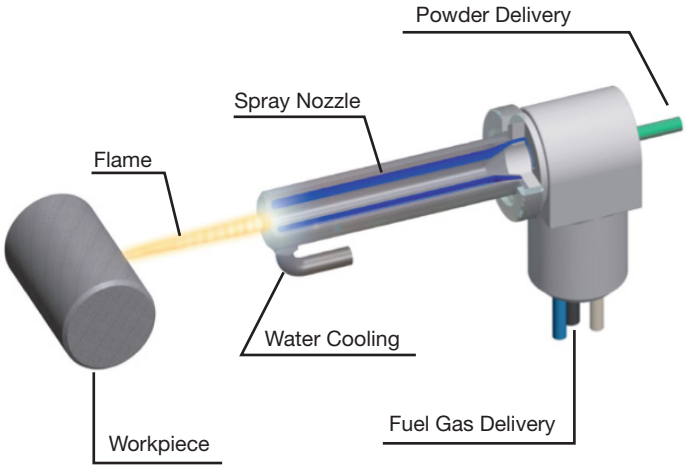
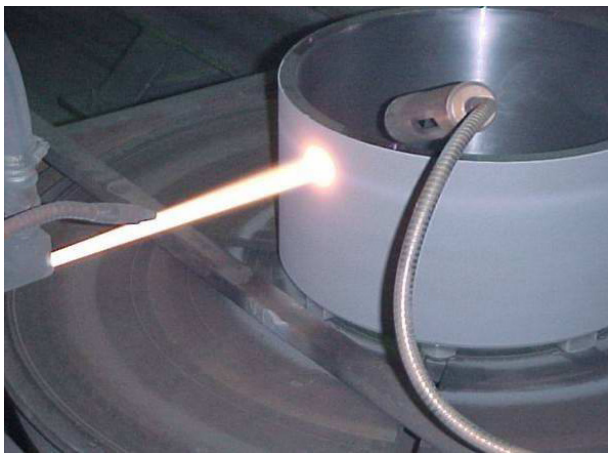
KENNAMETAL™
STELLITE

HIGH VELOCITY OXYGEN FUEL (HVOF)

In a typical HVOF process, the continuous combustion of a gaseous fuel & oxygen mixture occurs within a combustion chamber. Alloy and/or composite powder is introduced axially into the nozzle where it is heated and accelerated. The resulting exhaust/powder stream exits the nozzle at extreme high velocity in a tightly collimated flame whereupon particles impact the surface of the workpiece, forming a dense coating with excellent bonding properties.

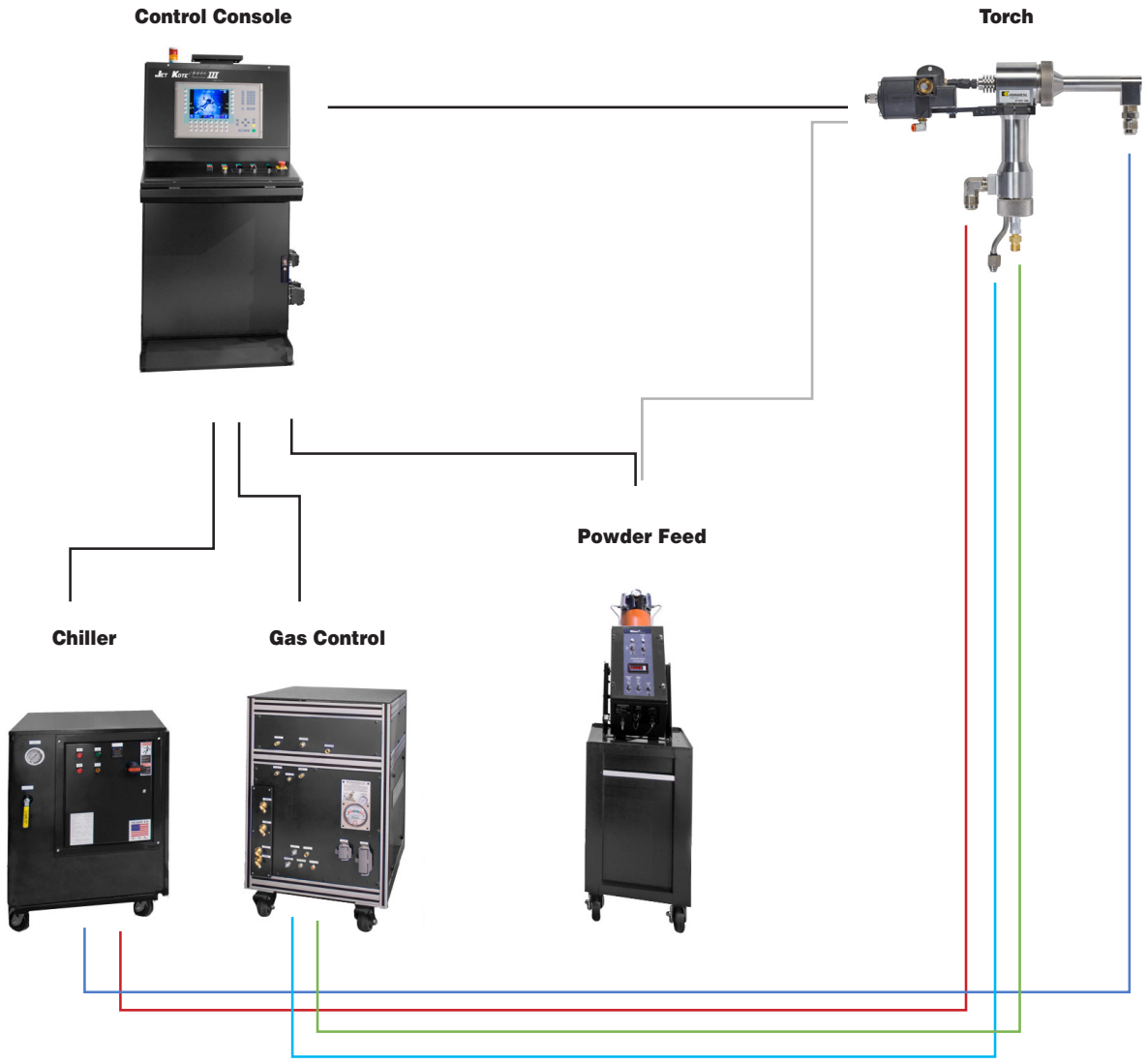


Kennametal Stellite's™ Jet Kote™ HVOF thermal spray coating systems deposit high bond strength, high-density coatings, typically with high hardness, which deliver outstanding performance in some of the most aggressive wear, and corrosive environments.

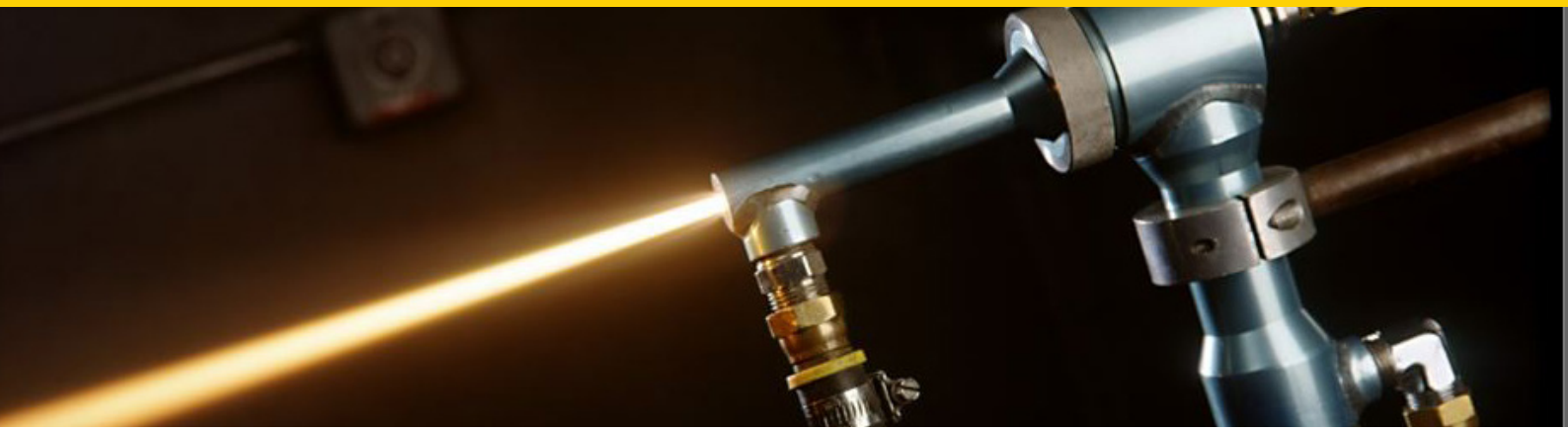


OPERATIONAL EXCELLENCE

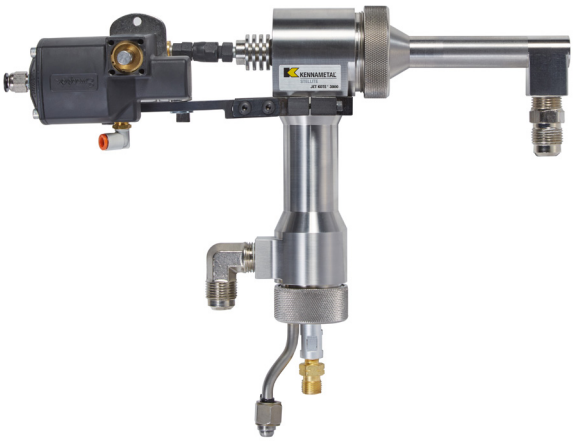
Kennametal Stellite's™ Jet Kote™ systems, first introduced in 1983, have a long legacy of producing the highest quality coatings on the market. The differentiated design coupled with robust engineering provide high particle velocities, oxide control and extremely dense coatings (<1% porosity). The Jet Kote™ system is capable of spraying materials at rates of up to 22 lb/hr, allowing for maximum control of throughput and efficiency.

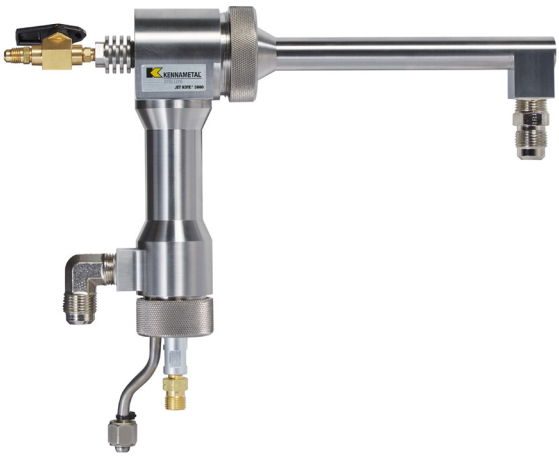


Typical Jet Kote™ systems consist of five major pieces: control console, Jet Kote™ 3000 torch, gas control hub, heat exchanger, and powder feeder. All of these systems are engineered to work together to provide unparalleled command and control. Additional options allow for the integration of a remote pendant which will duplicate the control console, remote powder torch valve, and remote torch ignition.



Jet Kote™ 3000 TORCH





The Jet Kote™ 3000 torch has long been accepted as the premier torch for applications of HVOF coatings. Thanks to its unique stabilizer, combustion head, combustion chamber and nozzle design the this torch s truly one of a kind.

The torch body is constructed from a one piece lightweight aluminum or 304 stainless steel mat. The seating area between the combustion head and chamber is designed to provide a tight and uniform fit which, in turn, minimizes maintenance requirements and extends crucial components life.

The design flexibility of the Jet Kote™ 3000 torch allows for operators to select from a variety of features based on fuel selection to maximize control, including:

- 3”, 6”, 9” or 12” nozzle length
- 5/16” or ¼” nozzle bore (based on fuel type)
- Fuel Injector (based on fuel type)
- Remote Ignition
- Remote Powder Valve Control

Jet Kote™ II – NOVA-A

The Jet Kote™ II – NOVA-A control console is where quality, performance and simplicity meet. This system features a built in gas control cabinet, analog display and simplified user interface.

The gas flows are controlled using precision needle valves with gas pressure regulators in the console to increase accuracy and repeatability of gas flow rates. The console has an analog display of supply pressures to torch as well as gas flow rate control (SCFH) using critical orifice flow meters for all gases.

This system also features a Gas Saver Mode which allows for economical operation and improved cycle times while the operator performs routine checks or cycles jobs.

Jet Kote™ II – NOVA-D & NOVA-FC

The Jet Kote™ II – NOVA-D & NOVA-FC control consoles allow for accurate and precise control of gas flow rates. These systems feature a built in gas control cabinet, digital display and simplified user interface.

For the Jet Kote™ II - NOVA-D the gas flows rates are controlled using thermal mass flow meters. For the Jet Kote™ II - NOVA-FC, gas flow rates are controlled using closed loop thermal mass flow system. In each case, the gas manifold and torch flow rates are displayed on a digital display to 0.1 psi.

These systems also features a Gas Saver Mode which allows for economical operation and improved cycle times while the operator performs routine checks or cycles jobs.

Jet Kote™ III

The Jet Kote™ III was designed with the highest operator convenience, control and efficiency in mind. It combines the high quality coatings Jet Kote™ is known for with consistent, repeatable performance.

The standard Jet Kote™ III consists of a control console, Jet Kote™ 3000 torch, heat exchanger, and powder feeder. All elements of the system are designed to work together to provide optimum performance.

Jet Kote™ III stands head and shoulders above the competition with deposition efficiencies of up to 70% and spray rates up to 20 lbs/hr. This high spray rate and deposit efficiency rate makes this one of the most effective spray systems available. Many competitive systems only average 25-35% deposit efficiency with the majority of material simply bouncing off the work piece, causing higher operating costs and reduced throughput.

It has graphic display showing operation conditions in three formats. Operators can modify parameters within a password protected library parameters, increasing security and constancy of coating properties

Jet Kote™ systems come with a number of customizable features including the ability to use multi fuel sources such as:

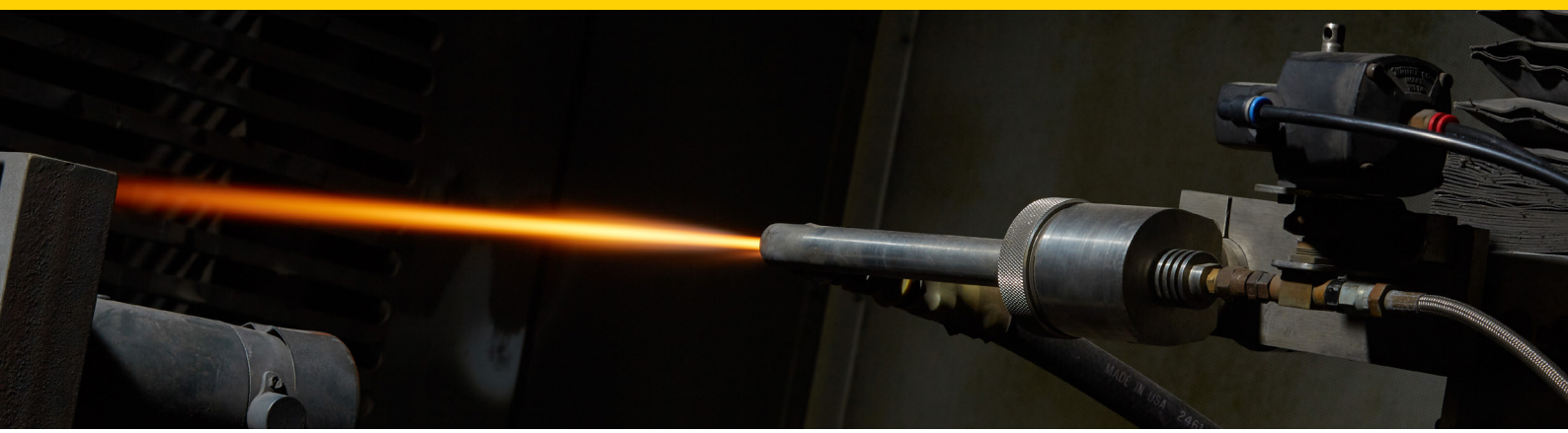
- Hydrogen
- Propylene
- Propane
- Ethylene

Jet Kote™ Heat Exchangers

Keeping your HVOF torch cool is critical to maintaining consistent combustion efficiency and uniform coating production. The Jet Kote™ 3000 torch systems come with a water to water heat exchanger or a refrigerated heat exchanger to provide constant temperature cooling to the torch.

Jet Kote™ Powder Feeders

Two powder feeders options are available for use with your Jet Kote™ system. The open loop powder feeder dispenses Jet Kote™ powders from a fixed wheel RPM set by the operator. It comes mounted on a tool cart with casters allowing you to position your feeder in a convenient location. The closed loop powder feeder includes a scale in place of the tool cart, allowing for constant monitoring and automatic output adjustment of powder feed rate based on weight loss.



	Jet Kote™ II NOVA-A	Jet Kote™ II NOVA-D Jet Kote™ II NOVA-FC	Jet Kote™ III
Display	Analog dial gages	1" digital LED meters	Graphical Color Display
Flowmeter Type	Critical Orifice	D-Thermal Mass D/FC-Thermal Mass Closed Loop	Thermal Mass Closed Loop
Gas Flow Control	Needle Valve	Needle Vlave	Mass-flow Controller
Open Loop Control	Yes	Yes	No
Closed Loop Control	No	D-No D/FC-Yes	Yes
Gas Saver Mode	Yes	Yes	Yes
Gas Ramping	No	No	Yes
Carrier Gas Flow Meter	Argon (standard) or Nitrogen	Switch to select Argon or Nitrogen	Switch to select Argon or Nitrogen
Multi-fuel Modules	Up to 2 Fuels	Option up to Two Fuels Per Flowmeter	Option up to Five Fuels
Remote Pendant	Optional	Optional	Yes
Remote Control	No	No	Optional
Remote Ignition	Optional	Optional	Yes
Remote Powder Valve Actuator	Optional	Optional	Yes
Auto Cycle	No	No	Yes
Password Protected Parameter Limits	No	No	Yes
Parameter Storage	No	No	Yes
Parameters Backup	No	No	Yes
Data Acquisition Logging	No	No	Optional
Open Loop Feeder	Standard	Standard	Standard
Closed Loop Feeder	Optional	Optional	Optional
Refrigerated HEX	Optional	Optional	Optional
Water-to-Water HEX	Standard	Standard	Standard
Robotic Integration Available	No	No	Yes

Jet Kote™ (HVOF) Powders

Kennametal Stellite's™ Jet Kote™ systems, first introduced in 1983, have a long legacy of producing the highest quality With over 100 years of proven performance, Kennametal Stellite™ is known as the worldwide material solution for wear, heat and corrosion applications. And through decades of engineering and optimization, Jet Kote™ offers one of the most comprehensive portfolio of HVOF powders on the market. Kennametal Stellite's™ powders are produced under stringent quality standards at one of our ISO 9000/9001 certified facilities using the state-of-the-art in manufacturing technologies.

	ALLOY	MECHANICAL WEAR	CORROSION	HIGH OPERATING TEMPERATURE
Resistance	Stellite™	■ ■ ■	■ ■ ■	■ ■ ■ ■
■ Low	Deloro™	■ ■ ■	■ ■	■ ■
■ ■ Satisfactory	Tribaloy™	■ ■ ■	■ ■ ■	■ ■ ■ ■
■ ■ ■ Very Good	Nistelle™	■	■ ■ ■ ■	■ ■ ■
■ ■ ■ ■ Excellent	Stelcar™	■ ■ ■ ■	■ ■	■ ■

Stellite™ HVOF Powder

The cobalt-based Stellite™ alloys are the most well- known and successful alloys in the world, with the best “all-round” properties. They combine excellent mechanical wear resistance, especially at high temperatures, with very good corrosion resistance. The Stellite™ alloys are mostly cobalt based with additions of Cr, C, W, and/or Mo. They are resistant to cavitation, corrosion, erosion, abrasion, and galling. The lower carbon alloys are generally recommended for cavitation, sliding wear, or moderate galling.

		NOMINAL COMPOSITION (mass %)											
MATERIAL	**GRADE**	Co	Ni	Cr	W	Mo	C	Fe	Si	B	others	**HARDNESS**	**NOMINAL SIZE (um)**
Stellite™ 1	JK™ 575/JK™ 7201	Bal.	<2	30	13	<1	2.5	<2	<2	--	<2	775-815 DPH	53/10
Stellite™ 6	JK™ 576/JK™ 7206	Bal.	<2	28.5	4.6	<1	1.2	<2	<1	--	<2	495-580 DPH	53/10
Stellite™ 21	JK™ 571/JK™ 7221	Bal.	2.6	27.5	__	5.4	0.25	<2	<2	--	2.6	400-520 DPH	53/10
Stellite™ 12	JK™ 572/JK™ 7212	Bal.	<2	30	8.5	<1	1.45	<2	<2	--	<2	680-675 DPH	53/10
Stellite™ 31	JK™ 573/JK™ 7231	Bal.	10.5	26	7.5	<1	0.5	<2	<1	--	10.5	420-506 DPH	45/10
Stellite™ SF6	JK™ 577	Bal.	14	19	7.5	1	0.8	3	2.5	1.7	14	635-790 DPH	53/10
Stellite™ 25	JK™ 579/JK™ 7225	Bal.	10	20	15	<1	0.1	2	<1	--	10	450-490 DPH	53/10
ULTIMET™	ULTIMET™	Bal.	9.4	26	2	5	0.07	3	<1	--	9.4	~500 DPH	53/20

** ULTIMET is a registered trademark of Haynes International

Tribaloy™ HVOF Powder

Tribaloy™ alloys, with either nickel or cobalt base, were developed for applications in which extreme wear is present in a high temperatures and high corrosion environment. Their high molybdenum content accounts for the excellent self lubricating properties of Tribaloy™ alloys and makes them very suitable for use in adhesive (metal-to-metal) wear situations. Tribaloy™ alloys can be used up to 1000° C (1832° F).

		NOMINAL COMPOSITION (mass %)											
MATERIAL	**GRADE**	Co	Ni	Cr	W	Mo	C	Fe	Si	B	others	**HARDNESS**	**NOMINAL SIZE (um)**
T-400	JK™ 554/JK™ 7560	Bal.	--	8.5	--	29	<0.08	--	2.6	--	--	450-600 DPH	53/10
T-700	JK™ 557/JK™ 7570	--	Bal.	15.5	--	32.5	<0.08	--	3.4	--	--	~700 DPH	45/10
T-800H	JK™ 558H	Bal.	--	18	--	28	<0.08	--	3.4	--	--	670-780 DPH	45/5
T-800P	JK™ 558P/ JK™ 7580	Bal.	--	18	--	28	<0.08	--	3.4	--	--	455-620 DPH	53/10
T-900H	JK™ 559H	Bal.	16	18	--	23	<0.08	--	2.7	--	--	~700 DPH	45/5
T-900P	JK™ 559P	Bal.	16	18	--	23	<0.08	--	2.7	--	--	~500 DPH	53/10

** Tribaloy T-400 and Tribaloy T-800 powders are available to meet General Electric's B50 TF154 and B50TF190 specifications respectively

Deloro™ HVOF Powder

The Deloro™ alloys are typically nickel based and cover a very wide range of hardness from soft, tough, build-up alloys that are easily machined or hand finished to exceptionally hard, wear-resistant alloys. The lower hardness Deloro™ alloys are typically used for glass forming molds. The higher hardness Deloro™ alloys are used in severe wear applications, such as rebuilding the flights of feeder screws, and they can be blended with carbides for an even harder deposit. They maintain their properties up to temperatures of about 315° C (600° F) and also offer good oxidation resistance..

		NOMINAL COMPOSITION (mass %)											
MATERIAL	**GRADE**	Co	Ni	Cr	W	Mo	C	Fe	Si	B	others	**HARDNESS**	**NOMINAL SIZE (um)**
Deloro™ 40	JK™ 584/JK™ 7640	--	Bal.	7.5	--	--	0.3	2.5	3.5	1.7	--	~40 HRC	53/10
Deloro™ 50	JK™ 585/JK™ 7650	--	Bal.	11	--	--	0.45	2.9	4	2.3	--	~50 HRC	53/10
Deloro™ 60	JK™ 586/JK™ 7660	--	Bal.	17	--	--	0.7	4	4.4	3.1	--	~60 HRC	53/10

Nistelle™ HVOF Powder

Nistelle™ alloys are designed for corrosion resistance rather than wear resistance, particularly in aggressive chemical environments where their high chromium and molybdenum contents provide excellent pitting resistance. As a class, they are also generally resistant to high-temperature oxidation and hot gas corrosion. Care should be taken to select the correct alloy for any given corrosive environment.

		NOMINAL COMPOSITION (mass %)											
MATERIAL	**GRADE**	Co	Ni	Cr	W	Mo	C	Fe	Si	B	others	**HARDNESS**	**NOMINAL SIZE (um)**
Nistelle™ 2347	JK™ 347	--	Bal.	--	--	5	--	--	--	--	Al 6	332-336 DPH	63/15
Nistelle™ 2350	JK™ 350/K™ 7301	--	Bal.	--	--	--	--	--	--	--	Al 5	285-335 DPH	63/15
Nistelle™ C	JK™ 591 H	--	Bal.	16.5	4.5	17	--	5.5	--	--	--	400-440 DPH	45/5
Nistelle™ C	JK™ 591P/JK™ 7391	--	Bal.	16.5	4.5	17	--	5.5	--	--	--	375-390 DPH	63/15
Nistelle™ "Super C"	JK-H Nistelle™ Super C	--	Bal.	23	--	18	--	--	--	--	--	410 DPH	45/10
Nistelle™ "Super C"	JK-P Nistelle™ Super C	--	Bal.	23	--	18	--	--	--	--	--	410 DPH	53/15
Nistelle™ 625	JK™ 625/JK™ 7342		Bal.	21.5		9		<5			(Nb+Ta) 3.7 , Al	385-460 DPH	53/20
Nistelle™ 718	JK™ 718/JK™ 7341		Bal.	19		3	0.08	18			(Nb+Ta) 3.7 , Al 0.5, Ti 1	275-470 DPH	45/15

Stelcar™ HVOF Powder

Stelcar™ alloys are mixtures of carbide particles blended in a nickel- and/or cobalt-based matrix. These composites are designed to have excellent wear resistance in the harshest abrasive and erosive environments.

		NOMINAL COMPOSITION (mass %)											
MATERIAL	**GRADE**	Co	Ni	Cr	W	Mo	C	Fe	Si	B	others	**HARDNESS**	**NOMINAL SIZE (um)**
WC-12Co with fine carbides	JK™ 112H*	12	--	--	Bal.	--	5.5	--	--	--	--	1140-1296 DPH	53/10 Spray Dried & Sintered
WC-12Co with fine carbides	JK™ 112P/JK™ 7112**	12	--	--	Bal.	--	5.5	--	--	--	--	960-1150 DPH	45/10 Spray Dried, Sintered & Densified
WC-12Co with coarse carbides	JK™ 114/JK™ 7114	12	--	--	Bal.	--	4	--	--	--	--	1000-1150 DPH	45/10 Spray Dried, Sintered & Crushed
WC-17Co with intermediate carbides	JK™ 117/JK™ 7117	17	--	--	Bal.	--	5.2	--	--	--	--	960-1240 DPH	53/15 Spray Dried & Sintered
WC-9Co with coarse carbides	JK™ 119	9	--	--	Bal.	--	4.2	--	--	--	--	860-1170 DPH	45/5 Agglomerated, Sintered & Crushed
WC-10Co-4CR	JK™ 120H/JK™ 7109*	10	--	4	Bal.	--	5.4	--	--	--	--	1160-1370 DPH	45/5 Spray Dried & Sintered
WC-10Co-4CR	JK™ 120P/JK™ 7109**	10	--	4	Bal.	--	5.4	--	--	--	--	825-1030 DPH	53/10 Spray Dried & Sintered
WC-25Cr3C2-7Ni	JK™ 125/JK™ 7175	--	7.5	20	Bal.	--	5	--	--	--	--	900-1100 DPH	53/10 Spray Dried & Sintered
WC-10Ni with large carbides	JK™ 6189	--	10	--	Bal.	--	3.7	--	--	--	--		53/10 Agglomerated, Sintered & Crushed
WC-12Co with Nistelle Super C	JK™ 6806	9	14	5.5	Bal.	4.5	4	--	--	--	--		53/15 Spray Dried, Sintered, Densified &
75Cr3C2-25NiCr	JK™ 135	--	20	Bal.	--	--	9.7	--	--	--	--		53/10 Spray Dried, Sintered & Densified

Additional Alloys

In addition to Jet Kote's™ comprehensive product portfolio, technical support and excellent customer service, engineers are available to assist in designing a comprehensive solution to your exact standards. With a variety of manufacturing methods and years of experience, Kennametal Stellite™ can tailor particle composition and size distribution to generate a one-of-a-kind solution for you.

PRODUCTIVE INNOVATIVE ADVANCED

OUR MISSION

Kennametal delivers productivity to customers seeking peak performance in demanding environments by providing innovative customized and standard wear-resistant solutions, enabled through our advanced materials sciences, application knowledge, and commitment to a sustainable environment.

KENNAMETAL™
STELLITE

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