

# STELCAR® JET KOTE® 135

## TECHNICAL DATA

HVOF & PLASMA SPRAY DEPOSITION

### PREMIUM QUALITY HVOF COATING

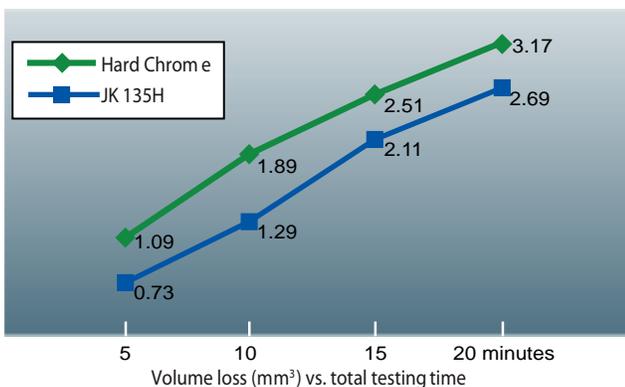
**JK®135** is a premium quality powder developed specifically for the deposition of high quality HVOF coatings. When deposited using the Jet Kote® HVOF system, JK®135 produces coatings with similar, or in many cases superior, performance to Praxair D-Gun® LC-1C and LC-1H, although JK®135 contains less Cr<sub>3</sub>C<sub>2</sub> particles than is typical of these coating compositions. JK®135 coatings can be diamond ground and lapped to smooth surface finishes of <0.05 µm (<2 µ-inch) R<sub>A</sub>.

#### Typical Applications

**JK®135** HVOF coatings replace hard chrome and Praxair D-Gun® LC-1C and LC-1H coatings in many industries. JK®135 is used for the hardfacing of nuclear plant power check and flow control valve seats and seals, and in the aerospace industry on engine stage seal areas, fuel nozzles, compressor and turbine blades for high temperature oxidation, fretting wear and erosion resistance. Other applications include gas turbine bearing journals, steam valve seats, compressor rods, feed screws, doctor blades, paper drying and calendaring rolls, mechanical seal faces and pump casings, impellers, plungers, and sleeves. The NiCr matrix provides excellent corrosion resistance in a wide range of environments. JK®135 coatings perform well in chemical and petrochemical applications, for example ball valves, catalytic converter valve stems and guides, heat exchanger components, furnace blowers, fans, thermo-wells and gate valves.

#### Wear Resistance of JK®135 Coatings

**JK®135** coatings are resistant to abrasion, solid particle erosion, cavitation and fretting wear up to about 980°C (1800°F). The volume loss of JK®135 vs. hard chrome in the ASTM G65-91 abrasion test (130N force, 75 rpm) is shown below<sup>1</sup>. JK®135 exhibits a significantly lower mass loss than hard chrome.



Above: JK®135 coating microstructure as obtained using Parameter Set D

#### Corrosion Resistance of JK®135 Coatings

**JK®135** has excellent corrosion resistance in a wide range of environments, including high temperature oxidation resistance in gaseous environments, due to the NiCr matrix. The primary function of JK®135 is wear protection. If the substrate is not corrosion resistant to the environment, JK®135 can provide superior corrosion protection especially when sealed.

**Sour Gas Corrosion Test Results:** In an independent client test, JK®135 coatings were subjected to two sour gas environments for 30 days, as follows:

- 500ppm Cl<sup>-</sup> brine, 30 psia H<sub>2</sub>S, 30 psia CO<sub>2</sub>, 740 psia N<sub>2</sub> at 175°F
- 500ppm Cl<sup>-</sup> brine, 330 psia H<sub>2</sub>S, 330 psia CO<sub>2</sub> at 350°F

JK®135 provided excellent protection in the first environment (corrosion rate <0.21mpy), and reasonable protection in the second environment (corrosion rate <0.30mpy). In both tests JK®135 performed either as well as or better than all three competitive coatings subjected to the same test.

#### Nominal Powder Properties

Mass Composition:	75%Cr <sub>3</sub> C <sub>2</sub> - 25% [Ni -20%Cr
Nominal Size:	-53+ 10µm (-270 mesh+10µm)
Production Method:	Agglomerated, sintered and densified

1. As tested independently by TWI Ltd., Cambridge, U.K., <http://www.twi.co.uk>. All coatings produced with manufacturer's recommended spray parameters.

## Coating Properties when using Propylene Fuel

	Parameter Set A	Parameter Set B
Microhardness	610 - 720 DPH [300g]	700 - 910 DPH [300g]
Macrohardness	88.0 - 89.5 R15N	87.5 - 91.5 R15N
Bond strength (ASTM C633)	Approx. 69 MPa (10 ksi)	> 75.9 MPa (>11 ksi)
Est. Porosity	< 1.5%	< 1.0%
Oxide level (visual estimate)	8 - 15%	10 - 20%
Density (approx.)	5.8 g/cm <sup>3</sup>	6.2 g/cm <sup>3</sup>
Max. Coating Thickness **	0.6mm (0.025")	1.3mm (0.05")
D.E. approx.	49%	49%
Powder feed	30 - 40 g/min.	30 - 40 g/min.
Coverage (estimated)	0.14 kg.m <sup>-2</sup> .100µm <sup>-1</sup> (0.7 lb.ft <sup>2</sup> .0.1in <sup>-1</sup> )	
Surface Finish as-sprayed	5.1 - 7.5 µm (200 - 300 µ-in) AA	4.4 - 6.6 µm (175 - 258 µ-in) AA
Surface Finish Ground/Lapped	0.026 - 0.052 µm (1 - 2 µ-in.) AA	
Service Temp.	Up to approx. 980 °C (1800°F)	

### Customer Specifications

**JK®135** powder can be certified to B50TF263 Class B. The coating is approved to F50TF77, Class A and B, when sprayed with Parameter Set C or D and the certified powder. The powder meets AMS 2447-3, is approved to Z518 and is similar to AMS 7875, PWA1305, MSRR 9507/17, DMR 33.006, EMS 52432 CL. II and MIL-P-83348-Comp C Type III.

### Spraying of JK®135 HVOF Coatings

Although the use of the Jet Kote® HVOF system is recommended, JK®135 powder can be deposited using other HVOF systems.

### Similar Powder Products

- Deloro Stellite GmbH JK®7184
- Amperit® 584, Amperit®585
- AMDRY® 5260
- TAFE Praxair 1376T



## Coating Properties when using Hydrogen Fuel

	Parameter Set C	Parameter Set D
Microhardness	730 - 875 DPH [300g]	775 - 940 DPH [300g]
Macrohardness	87.5 - 90.3 R15N	88.5 - 91.5 R15N
Bond strength (ASTM C633)	> 69 MPa (10 ksi)	> 75.9 MPa (>11 ksi)
Est. Porosity	< 1.0%	< 1.0%
Oxide level (visual estimate)	5-10%	<5%
Density (approx.)	5.8 g/cm <sup>3</sup>	6.2 g/cm <sup>3</sup>
Max. Coating Thickness **	1.3mm (0.050")	1.9mm (0.076")
D.E. approx.	57%	53%
Powder feed	30 - 45 g/min.	30 - 45 g/min.
Coverage (estimated)	0.10 - 0.12 kg.m <sup>-2</sup> .100µm <sup>-1</sup> (0.5 - 0.6 lb.ft <sup>2</sup> .0.1in <sup>-1</sup> )	
Surface Finish as-sprayed	2.5 - 5.1 µm (100 - 200 µ-in) AA	
Surface Finish Ground/Lapped	0.026 - 0.052 µm (1 - 2 µ-in.) AA	
Service Temp.	Up to approx. 980 °C (1800°F)	

\*\* Approximate, when sprayed onto flat shapes. Thicker coatings will often be possible on cylindrical parts.

### Finishing of JK®135 HVOF Coatings

**JK®135** coatings are typically finished to 6-14 µ-inches (0.15-0.36 µm) by wet grinding with diamond media. They can also be super finished by lapping to < 2 µ-inch (0.05 µm).

### Heat Treatment of JK®135 HVOF Coatings

Heat treating the coating obtained by Parameter Sets C and D at 538°C (1000°F) for 72 hours can increase the hardness to approximately 1100 DPH[300g]. This may increase low angle erosion resistance, especially at elevated temperatures.

**Spray and grinding parameters for JK®135 are available on request.**

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