

# STELCAR® JET KOTE® 117

## TECHNICAL DATA

HVOF & PLASMA SPRAY DEPOSITION

### PREMIUM QUALITY HVOF COATING

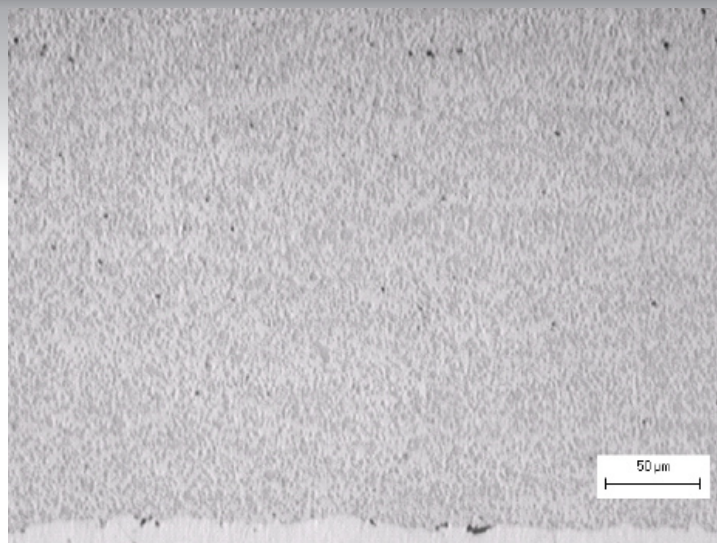
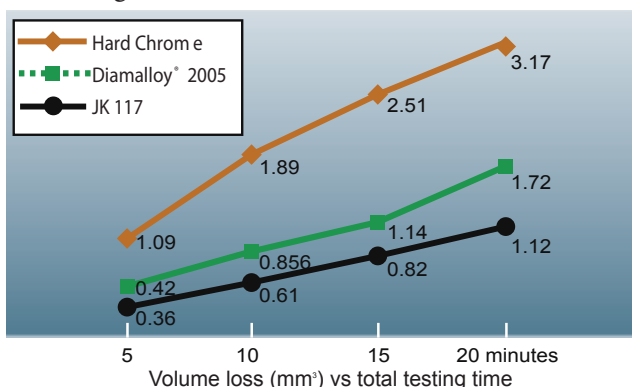
**JK®117** is a premium quality tungsten carbide/ cobalt powder for the deposition of high quality HVOF coatings. Applied correctly using the Jet Kote® HVOF system, JK®117 produces coatings with properties equivalent to Praxair D-Gun® LW-1N40 for use in industrial and aerospace applications. JK®117 coatings can be finished to  $<0.025\mu\text{m}$  ( $<1\mu\text{-inch}$ )  $R_A$ .

### Typical Applications

**JK®117** HVOF coatings are a suitable replacement for hard chrome plating and Praxair D-Gun® LW-1N40 in many industries, e.g. in chemical and petrochemical plants on mechanical seal faces, gate valves, oil well drill bearings and pump casings, impellers, plungers and sleeves. They are also used on compressor shafts and feed screws. In the aerospace industry, JK®117 protects aircraft compressor blade interlocks and airframe components such as flap and slat tracks, landing gear and actuators. It resists abrasion, low-angle erosion, sliding wear and fretting.

### Superior Abrasion Wear Resistance of JK®117 HVOF Coatings

The performance of JK®117 vs. DJ-2600® Diamalloy® 2005 HVOF coating and hard chrome in the ASTM G65-91 abrasion test (130N force, 75 rpm) is shown below<sup>1</sup>. The JK®117 coating had a significantly lower volume loss than the Diamalloy® 2005 coating, and performed almost three times as well as the hard chrome in this test. The HVOF coatings were both ground. In a separate abrasion test<sup>2</sup> with water-lubricated 120 grit SiC paper, JK®117 coatings outperformed four other WC-Co coatings, as well as a bulk sintered WC-Co hard metal. Furthermore, the indentation fracture toughness of JK®117 was superior to that of the other coatings.



Above: Coating structure obtained using parameter set "HRC" at 20 lb/hr or 152g/min powder feed rate

### Corrosion Resistance of JK®117 Coatings

The primary function of WC-Co coatings is wear protection, but they can also provide some corrosion protection, especially when sealed. Users are advised to test the coatings in the intended environment. If the substrate is not resistant to the environment, the coating edges should be protected. Coatings with a cobalt matrix are susceptible to galvanic corrosion and should not be used in applications where the potential for galvanic corrosion exists.

### Nominal Powder Properties

Composition:	83%WC 17%Co
Nominal Size:	-53+15 $\mu\text{m}$ (-270 mesh+15 $\mu\text{m}$ )
Production:	Agglomerated and sintered

### Customer Specifications

JK®117 powder or coating meets customer specifications MSRR9507/1, AMS 2447-7, BMS10-67 Type I, DMS 2049 Type 5, B50TF167 CL.A, F50TF71 CL. A and DMR 33.019.

### Similar Powder Products

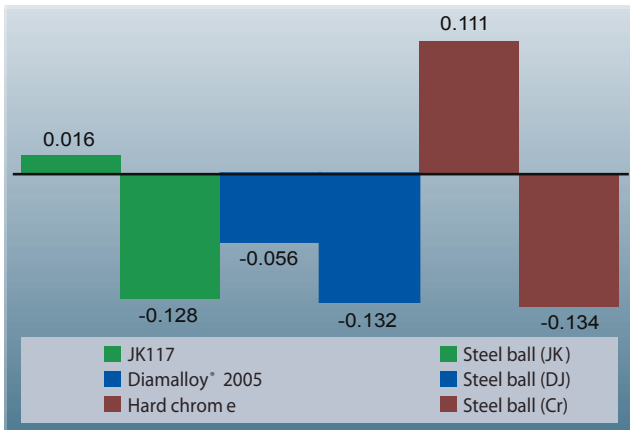
- Deloro Stellite GmbH JK®7117
- AMDRY® 983, 9830 and 9831, Diamalloy® 2005
- Metco® 73F
- TAFA Praxair 1343VM and 1343V
- Amperit® 526

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

2. D.A. Lee, S. Sampath and D.L. Houck, results presented at *Int. Therm. Spray Conf.*, Houston, Texas, 1995 and S. Usmani, S. Sampath, D.L. Houck, and D.A. Lee: *Tribology Transactions* Vol. 40(3), 1997, pp. 470-478 (Coating C2= JK®117)

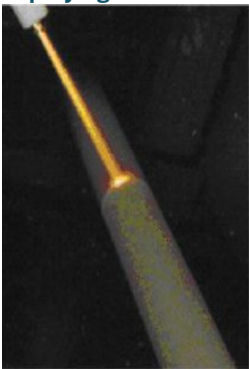
### Sliding Wear Resistance of JK®117 Coatings

The volume loss of HVOF-sprayed JK®117 and Diamalloy® 2005 vs. hard chrome in a sliding wear test<sup>1</sup> is shown below (ASTM G99-90, F=10N; v=0.1m.s<sup>-1</sup>). The coatings were ground to a smooth finish. In all the tests the hardened steel ball (850-900HV, >65HRC) lost between 0.128 and 0.134 mm<sup>3</sup> material. Steel transfer to the coating occurred in the case of JK®117 and chrome, hence the apparent mass gains for these materials. The friction coefficients were: JK®117: 0.59, hard chrome: 0.55, Diamalloy® 2005: 0.51. In the same test H13 tool steel (40HRC) lost over 650 times more material than the HVOF coatings. Bulk Stellite® 6 lost 0.047mm<sup>3</sup>, comparable to the coatings, with friction coefficient 0.70.



In a similar test<sup>2</sup> conducted at a lower sliding velocity (0.015 m.s<sup>-1</sup>), the JK®117 coating's friction coefficient was 0.18. At a 50N load against an alumina ball, the friction coefficient was 0.33 for JK®117 and 0.31-0.42 for other WC-Co coatings.

### Spraying of JK®117 Coatings



In tests conducted in collaboration with SUNY at Stony Brook, JK®117 coatings exhibited the lowest degree of decomposition of the WC phase during HVOF spraying, which was shown to be beneficial for the fracture toughness and abrasion resistance<sup>2</sup>. Although the use of the Jet Kote® HVOF system is recommended, JK®117 powder can also be deposited using other HVOF systems such as the JP-5000®.

### Spray parameters are available on request.

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### Coating Properties \*

	Set A	Set HRC **
Microhardness	1055 - 1243 DPH [300g]	1097 - 1285 DPH [300g]
Macrohardness	89.5 - 92.5 R15N	93.2 - 94.8 R15N
Bond strength	> 69 MPa (> 10 ksi) (ASTM C633)	
Porosity	Below 1%	
Density	12.8 g/cm <sup>3</sup>	13.9 g/cm <sup>3</sup>
Max. coating thickness	0.635 - 0.765 mm (0.025 - 0.030")	In excess of 4.8 mm (0.187")
D.E. approx.	55 - 60%	65 - 70%
Powder feed	33 - 66 g/min.	76 - 152 g/min.
Coverage (estimated)	0.25 - 0.27 kgm <sup>-2</sup> .100µm <sup>1</sup> (1.3 - 1.4 lb.ft <sup>0.1in</sup> )	
Surface Finish as-sprayed AA	140 - 200 µ-inch (3.6 - 5.1 µm)	100 - 200 µ-inch (2.5 - 5.1 µm)
Surface Finish Ground/Lapped	1 - 2 µ-inch AA (0.026 - 0.052 µm)	1 - 2 µ-inch AA (0.026 - 0.052 µm)
Service Temp.	Up to approx. 538 °C (1000°F)	

- \* Spray parameters designed to optimize selected properties, depending on the application, are available for the JK®-II, JK®II NOVA-A, JK®II NOVA-D, JK®IIA and JK®III spray systems.
- \*\* For a detailed description of the development of Parameter Set HRC, which was specifically designed for high deposition rates on large parts, see *Journal of Thermal Spray Technology* Vol 4[3], 1995, pp. 229-234

### Finishing of JK®117 HVOF Coatings

Coatings of JK®117 are typically finished to 8-16 µ-inches by wet grinding with diamond media. They can also be super finished to below 1 µ-inch (0.025µm) if required. Coolant must be flooded onto part and wheel during grinding.

**The coolant may not contain Amines.**

**Grinding parameters are available on request.**

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