

# STELCAR® JET KOTE® 120H

## TECHNICAL DATA

HVOF & PLASMA SPRAY DEPOSITION

### PREMIUM QUALITY HVOF COATING

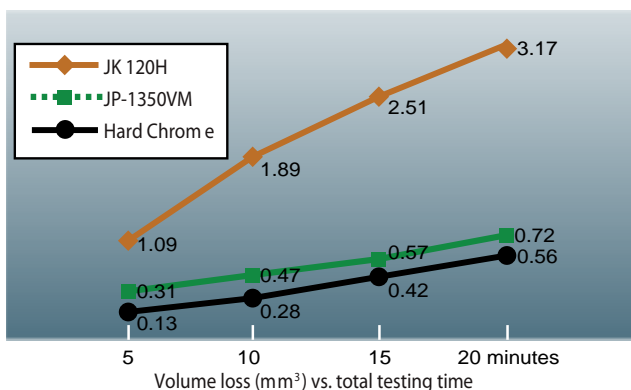
**JK®120H** is a premium quality powder developed specifically for the deposition of high quality HVOF coatings using hydrogen as fuel gas. JK®120P is recommended for carbon-based fuels such as propylene. When deposited using the Jet Kote® HVOF system, JK®120H can produce coatings with properties superior to Praxair D-Gun® LW-15. JK®120H coatings can be diamond ground and lapped to smooth surface finishes of  $<0.025\mu\text{m}$  ( $<1\ \mu\text{-inch}$ )  $R_A$ .

#### Typical Applications

**JK®120H** HVOF coatings replace hard chrome and Praxair D-Gun® LW-15 in many industries, including aerospace landing gear and actuators and fuel pump journals. The chromium in the matrix provides excellent corrosion resistance, and JK®120H coatings perform particularly well in wet and dry sour gas (hydrogen sulfide) environments. They are used in a variety of chemical, oil field and petrochemical applications, for example compressor rod hard facings, pumps (casings, impellers, plungers, sleeves), mechanical seal faces, feed screws, gate valves and fan blades. Other applications include paper manufacturing suction rolls, brine pumps, and centrifugal coal separators.

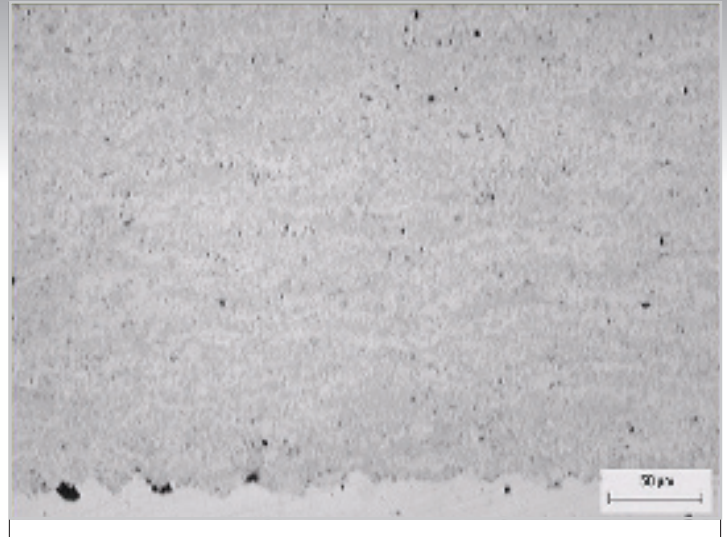
#### Superior Abrasion Wear Resistance of JK®120H HVOF Coatings

The volume loss ( $\text{mm}^3$ ) of JK®120H vs. JP-5000® 1350VM and hard chrome in the ASTM G65-91 abrasion test (130N force, 75 rpm) is shown below<sup>1</sup>. The Jet Kote® coating had a significantly lower volume loss than the 1350VM coating, and only one-sixth that of hard chrome. Both coatings were ground to a smooth finish.



#### Nominal Powder Properties

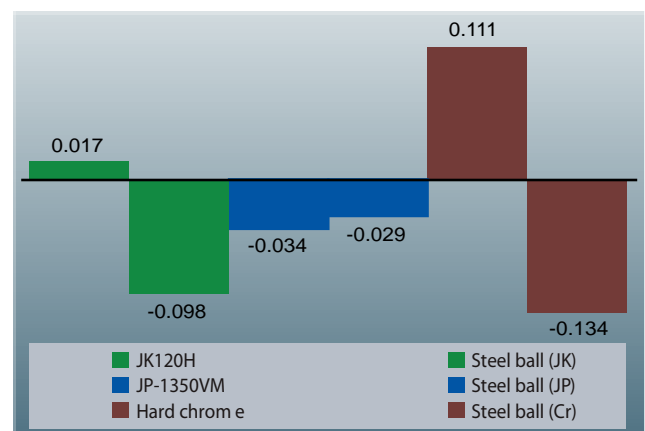
|                    |  |
|--------------------|--|
| Mass Composition:  | 86%WC 10%Co 4%Cr                                 |
| Nominal Size:      | -45+ $5\mu\text{m}$ (-325 mesh+ $5\mu\text{m}$ ) |
| Production Method: | Agglomerated, sintered and densified             |



Above: typical coating microstructure

#### Superior Sliding Wear Resistance of JK®120H HVOF Coatings

Volume loss (in  $\text{mm}^3$ ) of JK®120H, JP-5000®1350VM and hard chrome in identical ASTM G99-90 sliding wear tests<sup>1</sup> is shown below. The force was 10N with a sliding velocity of  $0.1\text{m}\cdot\text{s}^{-1}$ . The coatings were ground to a smooth finish. In all the tests the hardened steel ball (850-900HV,  $>65\text{HRC}$ ) wore, the highest steel loss being against the hard chrome. Material transfer from the ball to the coating occurred in the case of JK®120 and chrome, hence the apparent mass gains for these two materials. The friction coefficient of JK®120H was 0.56, equivalent to chrome's 0.55, whilst that of JP®1350VM was higher at 0.79. In the same tests, H13 tool steel lost more than 1000 times as much material as the WC-Co-Cr coatings. Bulk Stellite® 6 lost slightly more volume ( $0.047\text{mm}^3$ ) than the 1350VM coating, with a friction coefficient of 0.70.



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

### Corrosion Resistance of JK®120H Coatings

Due to the high Cr content of the matrix, JK®120H coatings have excellent corrosion resistance and can be used in a wide variety of environments, including seawater and many acids. They have been shown to be impervious to penetration by liquids and most gases. Although their primary function is wear protection they can also provide corrosion protection, especially when sealed. Nevertheless, if the substrate is not resistant to the environment, the coating edges should be protected.

**Salt Spray Test Results:** JK®120H, JP-5000®1350VM, and DJ-2600® Sulzer Metco® 5847 HVOF coatings were tested alongside hard chromed samples for 10 days at 35°C (95°F) in a salt spray test (ASTM B117-97)<sup>1</sup>. The HVOF coatings were tested both in the sealed and unsealed condition, and were ground to equivalent finish and thickness. There was no evidence of corrosion on any of the samples, except for the unsealed JP®1350VM coating, which showed signs of very slight pinpoint corrosion.

**Sour Gas Corrosion Test Results:** In an independent client test, JK®120H coatings were subjected to sour gas environments ([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]) for 30 days. JK®120H survived both tests with no sign of degradation or damage, and performed as well as, or better than, competitor coatings in the same test.

### Customer Specifications

Meets AMS 2447B-9 and BMS 10-67 Type XVII.

### Similar Powder Products

- Deloro Stellite GmbH JK®7109
- Sulzer Metco® 5847
- TAFE Praxair 1350VM
- Amperit® 558.074.

### Spraying of JK®120H HVOF Coatings

Although the use of the Jet Kote® HVOF system is recommended, JK®120H powder can also be deposited using other HVOF systems such as the DJ-2600 Diamond Jet®. Using the Jet Kote® system, deposition efficiencies as high as 60% have been achieved.

### Finishing of JK®120H HVOF Coatings

JK®120H coatings 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.

### Spray and grinding parameters for JK®120H are available on request.

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### Coating Properties

|                                     |  |
|-------------------------------------|--|
| Microhardness                       | 1130-1370 DPH[300g]  |
| Macrohardness                       | 93-95 R15N<br>(equivalent to 68-74HR <sub>C</sub> )  |
| Bond strength (ASTM C633)           | > 80 MPa (11.6 ksi)  |
| Porosity                            | Below 1%   |
| Density                             | 13 g/cm <sup>3</sup>   |
| Max. coating thickness              | 380 μm (0.015")  |
| Coverage                            | 0.269 kg.m <sup>-2</sup> .100μm <sup>-1</sup><br>(1.4 lb.ft <sup>-2</sup> .0.1in <sup>-1</sup> ) |
| Typical surface finish (as-sprayed) | 100-150 μ-inch RMS<br>2.5 - 3.8 μm R <sub>A</sub>  |
| Surface finish (ground/lapped)      | < 1 μ-inch RMS<br>< 0.025 μm R <sub>A</sub>  |
| Max. service temp.                  | ± 538 °C (1000°F)  |



Forklift truck hydraulic ram, previously hard chromed, now coated with JK®120H. As sprayed (top) and during surface finishing (bottom) to 7 μ-inches (0.018μm).

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