

JK™ 712 Stellite® 712 Powder

Technical Note

Date: 7/11/03

Supercedes: 4/9/99

No: C-053

Page: 1 of 4

DESCRIPTION

JK712 powder, STELLITE 712 powder is a cobalt-chromium alloy recommended for high temperature applications where resistance to abrasive grains, hard surfaces fretting, or particle erosion is encountered. JK712 coatings may be used at temperatures up to 1500 °F. The coatings are more resistant to oxidation than Stellite 6, JK576 Coatings.

COMPOSITION, Wt. %

Carbon	1.9
Chromium	30
Cobalt	Balance
Molybdenum	8
Nickel	3

MESH SIZE

270/Down

COATING CHARACTERISTICS

The parameters that follow are to be considered as starting JET KOTE parameters. The following coating properties are representative of results of coatings obtained from commercial available JK712 powder.

	<u>SET A</u>	<u>SET B</u>
Microhardness, DPH [300g	716	719-777
Macrohardness, 15N (Rc) Average	88.7 (56)	89.1-90.0 (58-60)
Bond Strength, KPSI (per ASTM 633) Average	9.0 ¹	6.7
Estimated coverage, LB/Ft / .010"	.5	.5
Est. Surface Finish, Microinch AA		
-As Sprayed	280-420	120-250
-Ground and Lapped	5-10	1-4
Maximum Coating Thickness, Inches	.030 (.060 ¹)	(.080 ¹)
As-sprayed on cylindrical shapes		
Maximum Coating Thickness, Inches ²	.015 (.045 ¹)	.025 (.060 ¹)
As-sprayed on flat or irregular shapes		
Maximum Service Temperature, °F	1500 ³	1500 ³
Coating Density, g/cm ³	7.2	7.4
Abrasive Wear Resistance, mm loss	17.7	17.2
30 LB load, 500 revolutions (ASTM G65)		

¹ Thickness and bond strength limits depend on use of coatings part configuration and composition. Higher coating thickness and bond strength is achievable with .0005"- .001" JK117 undercoat.

² Part size and configuration may vary values.

³ Maximum temperature without JK117 undercoat, with JK117 temperature is limited to 1000 °F.

STELLITE, JK and JET KOTE are trademarks of Deloro Stellite Inc.

FINISHING

Coatings of JK706 must be finished by WET grinding:

Grinding:

Option 1: SiC Grinding

Wheel type, 220 SiC Vitrified bond (friable)

H hardness

.035" - .075" cross-feed/pass

40-65 ft./min. surface speed

.0005" - .001" in-feed/pass

Option 2: Diamond Grinding

Wheel type, 100-240 Mesh Resinoid Bond Diamond (Friable Shape)

L, P, or R Hardness

50 Concentration

.035" - .050" Cross-feed/Pass

40-50 Ft./Min. Surface/Speed

.0005" In-feed/Pass

Substitutions for wheel specifications may be required if coarse grinding is desired.

POLISHING AND LAPPING:

SiC or diamond media is recommended. Aluminum Oxide media does not cut stock properly. Do not lap coatings dry. Use a lubricant as recommended for the particular media used in each step. Remove debris, wash and dry the coating surfaces prior to proceeding to the next grit size. Avoid contamination of the lapping surfaces by cleaning prior to application of fresh media.

Recommended grit size progression after grinding:

320, 400, and 600 - U.S. screen sizes

Superfinishing is best done with diamond media and recommended progression is as follows:

15 or 9 micron - paste or slurry

6 or 3 micron

SET A OPERATING PARAMETERS ⁽¹⁾

Fuel Gas	Propylene (C ₃ H ₆)
Powder Carrier Type	Argon (Ar)
Nozzle	5/16 x 6
Injector	#50

<u>Console Type</u>	<u>JKII</u>	<u>JKII NOVA-A</u>	<u>JKIIA or JKIII</u>
<u>Manifold Pressures, PSI</u>	(2) (7)	(8)	(3)
Oxygen	120	120	100
Main Fuel Gas	80	80	80
Carrier Gas	85	80	85
Hydrogen (Pilot)	25		100
<u>Console Pressures, PSI</u>			
Oxygen	75-85	75-85	62-75
Main Fuel	60-68	80-90	80-86
Carrier	48-50	48-50	48-50
<u>Console Flows (4)</u>			
Oxygen	980-1020	980-1020	990-1020
Main Fuel	56-60%	115-120	130-140
Carrier	30-35	57	57
<u>JKIIA Console Settings</u>			
Oxygen			54.0-57.2
Main Fuel			43.3-46.7
Carrier			40.7
<u>Cooling Water (5)</u>			
°F IN	80-90	80-90	80-90
°F OUT	115-120	115 -120	115 -120
Water Flow, GPM	8	8	8
<u>Powder feed Settings</u>			
RPM (Approximate)	2.0	2.0	2.0
Feed Rate (6), grams/Min.	40-45	40-45	40-45
<u>Spray Distance, Inches</u>	9	9	9

NOTES:

- Pressures shown are running pressures with powder feeding.
- Manifold pressures for JKII system are critical, manifold regulators must be located at factory supplied hose ends.
- Manifold pressure too low will not allow enough flow. If it is too high the controller will pulse upon start up.
- JKII system does not correct flow due to change in gas temperature or pressures at the meters, JKIIA system compensates and flow is displayed as true Standard Cubic Feet per Hour (SCFH): T = 0°C, P = 14.7 PSIA
- A heat exchanger to control the water inlet temperature to the gun is recommended. Adjust water flow to achieve outlet temperature. Water temperatures may affect coating quality and torch performance.
- Powder feed rate must be checked with powder flowing through lit gun. Powder Feed Rate (PFR) = (Powder Weight (g) Initial-Powder Weight Final (g)/ Powder Feed Time (min.) Powder feed time must be greater than 1 min. PFR is linear to RPM of the feeder. To achieve required PFR, change RPM as follows:

$$\text{RPM (NEW)} = (\text{PFR (Required)} \times \text{RPM (Original)}) / \text{PFR (Calculated)}$$
- JKII flowmeter requires change for specific gas use: H₂ - Part #972915 C₃H₆ - Part #972763
- Maximum Console Inlet gases pressure is 150 PSI.

SET B OPERATING PARAMETERS ⁽¹⁾

Fuel Gas	Hydrogen (H ₂)
Powder Carrier Type	Argon (Ar)
Nozzle	1/4 x 9
Injector	#40

	<u>JKII</u>	<u>JKII NOVA-A</u>	<u>JKIIA or JKIII</u>
<u>Console Type</u>			
<u>Manifold Pressures, PSI</u>	(2) (7)	(8)	(3)
Oxygen	120	120	100
Main Fuel Gas	80	120	110
Carrier Gas	85	80	85
Hydrogen (Pilot)	25		100
<u>Console Pressures, PSI</u>			
Oxygen	46-50	52-56	54-57
Main Fuel	70-73	68-74	67-73
Carrier	48-51	47-51	47-51
<u>Console Flows (4)</u>			
Oxygen	400-450	425-450	425-450
Main Fuel	1200	1150-1160	1150-1160
Carrier	30-35	62	62
<u>JKIIA Console Settings</u>			
Oxygen			23.6-25.0
Main Fuel			63.9-64.1
Carrier			44.3
<u>Cooling Water (5)</u>			
°F IN	80-90	80-90	80-90
°F OUT	115-120	115 -120	115 -120
Water Flow, GPM	12-12.5	12-12.5	12-12.5
<u>Powder feed Settings</u>			
RPM (Approximate)	1.5-2.0	1.5-2.0	1.5-2.0
Feed Rate (6), grams/Min.	30-45	30-45	30-45
<u>Spray Distance, Inches</u>	7-9	7-9	7-9

NOTES:

- Pressures shown are running pressures with powder feeding.
- Manifold pressures for JKII system are critical, manifold regulators must be located at factory supplied hose ends.
- Manifold pressure too low will not allow enough flow. If it is too high the controller will pulse upon start up.
- JKII system does not correct flow due to change in gas temperature or pressures at the meters, JKIIA system compensates and flow is displayed as true Standard Cubic Foot per Hour (SCFH): T = 0°C, P = 14.7 PSIA
- A heat exchanger to control the water inlet temperature to the gun is recommended. Adjust water flow to achieve outlet temperature. Water temperatures may affect coating quality and torch performance.
- Powder feed rate must be checked with powder flowing through lit gun. Powder Feed Rate (PFR) = (Powder Weight (g) Initial-Powder Weight Final (g)/ Powder Feed Time (min.) Powder feed time must be greater than 1 min. PFR is linear to RPM of the feeder. To achieve required PFR, change RPM as follows:

$$\text{RPM (NEW)} = (\text{PFR (Required)} \times \text{RPM (Original)}) / \text{PFR (Calculated)}$$
- JKII flowmeter requires change for specific gas use: H₂ - Part #972915 C₃H₆ - Part #972763
- Maximum Console Inlet gases pressure is 150 PSI.