

# Stellite



JK<sup>TM</sup>718

TECHNICAL NOTE

DATE : 10/27/92  
SUPERSEDES : 4/6/92  
NO : C-040  
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DESCRIPTION

JK718 powder for JET KOTE<sup>R</sup> Surfacing Systems, produces coatings that are often used as build up coating material for restoration of dimensional tolerances. The material is similar to International Nickel's wrought alloy 718. The coatings have many applications, including aircraft frame and engine part restoration. The material can be used as a build-up coating for other coatings such as JK114. JK718 coatings are machinable similar to the wrought version.

APPROXIMATE COMPOSITION, Wt. %

MESH SIZE

Aluminum	.50	Nickel	Balance	270/D
Carbon	.08	Niobium +		
Cobalt	1.00	Tantalum	4.50	
Chrome	21.00	Other	1.00	
Iron	18.00	Silicon	.35	
Manganese	.40	Titanium	1.00	
Molybdenum	3.00			

APPLICATIONS

Potential applications for JK718 are:

Restoration of flanges and seal faces of aircraft engine shrouds, turbine shaft bearing seats and seal areas, and mis-machined components. Fabrication of bimetallic or composite components where fasteners are required to be attached to the JK718 coating instead of the base material, without reducing the strength of the base material. Fabrication of difficult to form components, such as aerospace fuel nozzles.

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JK™718

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COATING CHARACTERISTICS

Approximate properties of JK718 coatings produced by JET KOTE<sup>R</sup> II & JET KOTE II A units follow.

	<u>SET A</u>	<u>SET B</u>
Bond Strength, PSI	9-10,000 <sup>(1)</sup>	11,610+ <sup>(2)</sup>
Per ASTM 633		9,000+ <sup>(1,3)</sup>
Microhardness, DPH [300g]	275-468	361-454
Macrohardness, 15N	72.4-80.7	77.7-81.6
Estimated Porosity, As-Sprayed	<2%	<1%
Maximum Coating Thickness, Inches	.070	.125+
As-Sprayed, Flat or Irregular Shapes		
Maximum Coating Thickness, Inches	Unknown	Unknown
As-Sprayed, Cylindrical Shapes		
Est. Maximum Service Temperature, °F	1000	1000
Est. Deposit Efficiency, %	63	54
Estimated Coverage, Lb/Ft <sup>2</sup> /.010"	.6	.7
Est. Surface Finish, Microinch AA	170-250	120-150
Abrasive Wear Resistance, MM <sup>3</sup> Loss	Unknown	Unknown
Per ASTM G65-80		
Machinability	Good	Excellent
Oxide Level	High	Moderate
Est. Thermal Expansion Coefficient	Unknown	8.0
Microinches/inch/°F , 75-1000 °F		

(1) Bond Strength Of .014" Coating Applied To 1018 Steel.

(2) Bond Strength Of .015" Coating Applied To IN718.

(3) Bond Strength Of .035" Coating Applied To IN718.

Note : If possible preheat the part, making sure not to oxidize the substrate, and apply the coating up to 450°F. Do not let the part cool more than 150°F during the application of the coating. Let the part slow cool, in air, when coating build-up is complete.

FINISHINGMACHINING : TURNING, MILLING OR DRILLING OF JK718, SET B COATINGS

The use of tungsten carbide tools are recommended since JK718 coatings work-harden and can rapidly dull the tool. Dull tools increase the work-hardening effect and may damage the coating. Lubricating the coating and tool during machining is recommended. If the coating begins to machine hard, sharpen the tool, lower the surface speed of the part or tool and decrease the size of cut being made. Unlike most thermal spray coatings when machined, JK718 usually produces shavings similar to wrought alloys.

GRINDING

Wheel Type : 60-220 SiC Vitriified wheel of H to L hardness  
Cross Feed Per Pass : .035-.075  
Part Surface Speed : 40-65 Feet Per Minute  
In Feed Per Pass : .0005" - .001"

POLISHING AND LAPPING

SiC or diamond media is recommended. 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 surface prior to proceeding to the next grit size. Avoid contamination of the lapping surfaces by cleaning them prior to application of fresh media.

Recommended grit size progression after grinding or machining:

320, 400, and then 600 - U.S. Screen Sizes

Super-finishing to a mirror finish can be accomplished with SiC or diamond paste or slurry. Diamond media may produce the best results by using the following grain size progression:

15 or 9 micron and then 6 or 3 micron

SET A OPERATING PARAMETERS<sup>(1)</sup>

Fuel Gas  
 Powder Carrier Type  
 Nozzle  
 Injector

Propylene (C<sub>3</sub>H<sub>6</sub>)  
 Nitrogen (N<sub>2</sub>)  
 5/16 x 6  
 #50

<u>Console Type</u>	<u>JKII</u>	<u>JKIIA</u>
<u>Manifold Pressures, PSI</u>	(2) (7)	(3)
Oxygen	120	100
Main Fuel Gas	80	80
Carrier Gas	100	85
Hydrogen (Pilot)	25	100
<u>Console Pressures, PSI</u>		
Oxygen	75-85	72-79
Main Fuel	55-66	55-63
Carrier	65-80	52-64
<u>Console Flows(4)</u>		
Oxygen	980-1020	980-1020
Main Fuel	52-60%	115-137
Carrier	35-40	77-89
<u>Console Settings</u>		
Oxygen		54.4-56.7
Main Fuel		38.3-45.7
Carrier		77.0-89.0
<u>Cooling Water(5)</u>		
°F IN	80-90	80-90
°F OUT	115-120	115-120
<u>Powder Feed Settings</u>		
Dial Set (Approx.)	130-204	130-204
RPM (Approximate)	1.4-2.8	1.4-2.8
Feed Rate (6), grams/Min.	35-50	35-50
<u>Spray Distance, Inches</u>	8-10	8-10

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):  

$$T = 0^{\circ}\text{C}, P = 14.7 \text{ PSIA}$$
- 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 gun 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:  

$$\text{RPM (NEW)} = \frac{\text{PFR (Required)} \text{ RPM (Original)}}{\text{PFR (Calculated)}}$$
- JKII flowmeter requires change for specific gas use:  
 H<sub>2</sub> - Part #972915    C<sub>3</sub>H<sub>6</sub> - Part #972763

Fuel Gas  
Powder Carrier Type  
Nozzle  
Injector

SET B OPERATING PARAMETERS<sup>(1)</sup>

Hydrogen (H<sub>2</sub>)  
Argon (Ar)  
1/4 x 9  
#40

<u>Console Type</u>	<u>JKII</u>	<u>JKIIA</u>
<u>Manifold Pressures, PSI</u>	(2) (7)	(3)
Oxygen	120	90
Main Fuel Gas	120	90
Carrier Gas	100	85
Hydrogen (Pilot)	25	
<u>Console Pressures, PSI</u>		
Oxygen	51-58	50-64
Main Fuel	73-80	70-82
Carrier	55-67	53-68
<u>Console Flows (4)</u>		
Oxygen	425-500	430-500
Main Fuel	1225-1275	1130-1200
Carrier	30-35	56-66
<u>Console Settings</u>		
Oxygen		23.9-27.8
Main Fuel		62.8-66.7
Carrier		40.0-47.1
<u>Cooling Water (5)</u>		
°F IN	80-90	80-90
°F OUT	115-120	115-120
<u>Powder Feed Settings</u>		
Dial Set (Approx.)	130-177	130-177
RPM (Approximate)	1.4-2.3	1.4-2.3
Feed Rate (6), grams/Min.	28-45	28-45
<u>Spray Distance, Inches</u>	10	10

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- JKII flowmeter requires change for specific gas use:

H<sub>2</sub> - Part #972915      C<sub>2</sub>H<sub>2</sub> - Part #972763  
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