

Nistelle® JK® 598 POWDER
80%Nickel/20%Chromium

TECHNICAL NOTE

DATE : 11/18/94
 SUPERSEDES: 5/12/94
 NO : C-017
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DESCRIPTION This powder is manufactured by gas atomization. It was developed for use via a JET KOTE® thermal spray system, but may be used with other HVOF or plasma spray devices. The coatings primary use is for restoration and/or protective coating where corrosion, abrasion, and erosion by hot gases are common. This alloy may be considered a candidate to substitute for chrome plate for applications where the plating is used for corrosion resistance to oxidizing environments.

APPROXIMATE COMPOSITION, WT % **MESH SIZE**

Chromium	20.0	270/D
Nickel	80.0	

APPLICATIONS Surface protection of automotive valve seats and stems, paper mill or fossil fuel power plant boiler tubes, and protective surfacing of paper manufacturing calendering and drying rolls.

COATING CHARACTERISTICS

SET A

SET B

Fuel Type	C ₃ H ₆	H ₂
Bond Strength, PSI (Per ASTM C-633)	Unknown	8,000
Microhardness, DPH [300g]	437-493	327-374
Avg. Microhardness, 15N (Rc Conversion)	79 (37)	77 (34)
Estimated porosity, %	<3	<2
Maximum Coating Thickness, Inches As-Sprayed, Flat or Irregular Surfaces	Unknown	Unknown
Maximum Coating Thickness, Inches As-Sprayed, on Cylindrical Shapes	Unknown	Unknown
Est. Maximum Service Temperature, °F	1200	1200
Est. Deposit Efficiency, %	55%	50%
Estimated Coverage, Lb/Ft ² /.010"	.6	.7
Est. Surface Finish, Microinch AA As-Sprayed	200-300	120-150
Est. Surface Finish, Microinch AA Ground And Lapped	<5	<5
Abrasive Wear Resistance, MM ³ Loss Per ASTM G65-80, Approximate	Unknown	Unknown

The above data, in no way, constitutes a specification.
 Stellite Coatings may make changes without notification.

JK[®]598
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SAFETY

The use of shaded glasses during the spraying of this powder is recommended to reduce operator fatigue due to the brightness and glare produced by the flame. A shade 5 lens is usually adequate.

FINISHING

MACHINING : TURNING OF JK598 COATINGS

It is possible to turn JK[®]598 coatings, however the preferred method of finishing is, by wet grinding, noted below. If machining of the coating is desired, keep tungsten carbide tools sharp, as damage to the coating may occur with use of dull tooling. 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/or decrease the size of cut being made.

WET GRINDING

Coolant should be flooded onto part and wheel for best results. Diamond finishing, although may be used, is not recommended due to potential loading of the wheel. Occasional dressing of the following wheel type is recommended for best results.

Wheel Type : 60 - 220 SiC Vitrified 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 like finish can be accomplished with SiC or diamond paste, slurry, hones, abrasive cloth or film. Diamond media usually produces the best results by using the following grain size progression:

15 or 9 micron and then 6 or 3 micron

Super-finishing is possible only if the coating does not have cracks or pull-out caused by improper coating of finishing techniques.

SET A OPERATING PARAMETERS⁽¹⁾

Fuel Gas	Propylene (C ₃ H ₆)
Powder Carrier Type	Nitrogen (N ₂)
Nozzle	5/16 x 6
Injector	#50
Carbide Insert	.082" or (.052"*)

<u>Console Type</u>	<u>JKII</u>	<u>JKIIA</u>
<u>Manifold Pressures, PSI</u>	⁽²⁾⁽⁷⁾	⁽³⁾
Oxygen	120	90-95
Main Fuel Gas	80	80
Carrier Gas	100	85
Hydrogen (Pilot)	25	90
<u>Console Pressures, PSI</u>		
Oxygen	79-85	71-79
Main Fuel	62-70	55-63
Carrier	42-52 (*52-62)	42-52 (*52-62)
<u>Console Flows⁽⁴⁾</u>		
Oxygen	1000-1020	980-1000
Main Fuel	52-60%	115-137
Carrier	35	77
<u>Console Settings</u>		
Oxygen		54.4-55.6
Main Fuel		38.3-45.7
Carrier		77.0
<u>Cooling Water⁽⁵⁾</u>		
°F IN	80-90	80-90
°F OUT	110-120	110-120
<u>Powder feed Settings</u>		
Dial Set (Approx.)	177-188	177-188
RPM (Approximate)	2.3-2.5	2.3-2.5
Feed Rate ⁽⁶⁾ , grams/Min.	40-50	40-50
<u>Spray Distance, Inches</u>	7-8	7-8

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_2 - Part #972915 C_3H_6 - Part #972763

SET B OPERATING PARAMETERS⁽¹⁾

Fuel Gas	Hydrogen (H ₂)
Powder Carrier Type	Argon (Ar)
Nozzle	1/4 x 9
Injector	#40
Carbide Insert	.080" or (.052"*)

<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	70-80	70-82
Carrier	47-57 (*57-67)	47-57 (*57-67)
<u>Console Flows⁽⁴⁾</u>		
Oxygen	425-500	430-500
Main Fuel	1200-1300	1150-1250
Carrier	30-35	56-66
<u>Console Settings</u>		
Oxygen		23.9-27.8
Main Fuel		62.9-69.4
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.)	162-188	162-188
RPM (Approximate)	2.0-2.5	2.0-2.5
Feed Rate ⁽⁶⁾ , grams/Min.	40-50	40-50
<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.
- Higher spray rates may be possible. The 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:
 H₂ - Part #972915 C₃H₆ - Part #972763