Stelcar™ JK™136

80% Chromium Carbide/ 20% Nichrome

Technical Note
DATE : 4/24/95
SUPERSEDES : NEW
NO : C-049

DESCRIPTION

Stelcar JK136 powder is manufactured by agglomeration, sintering and crushing of chromium carbide particles combined with a nickel chromium alloy. JK136 coatings produced by the Jet Kote® thermal spray process are similar in many respects to Stelcar JK135 coatings which are resistant to abrasion, particle erosion, impact sliding wear, fretting wear at low and elevated temperatures, and has good corrosion resistance, in a wide range of environments.

APPROXIMATE COMPOSITION, Wt.%

Carbon	10.0
Chromium	Balance
Iron	1.0
Nickel	14.0
Tungsten	.5

MESH SIZE

325/D

POTENTIAL APPLICATIONS

Paper calendaring rolls and drying cylinders, pump casings, pump impellers, pump plungers, pump sleeves, mechanical seal faces, feed screws, gate valves, marine components, various chemical and petrochemical parts such as ball valves, cat cracker valve stems, and guides, also heat exchanger components, furnace blowers, fans, thermowells, also gas turbine blades and bearing journals, steam valve seats and compressor rods.

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COATING CHARACTERISTICS - PROPYLENE FUEL

	SET A
Bond Strength, PSI (per ASTM 633)	Unknown
Microhardness, DPH [300g]	759-919
Macrohardness, 15N	89.9-92.4
Estimated Porosity, As-Sprayed	<1.5%
Est. Oxide Level, visual Appearance	10-20%
Maximum Coating Thickness, Inches As-Sprayed, Flat or Irregular Shapes	.030
Maximum Coating Thickness, Inches As-Sprayed on Cylindrical Shapes	Unknown
Est. Maximum Service Temperature, ^{o}F	1600
Est. Deposit Efficiency, %	24
Estimated Coverage, Lb/Ft^2/.010"	1.3
Est. Surface Finish, Microinch AA As-Sprayed	150-250
Est. Surface Finish, Microinch AA Diamond Ground and Diamond Lapped	<2
Abrasive Wear Resistance, MM^3 Loss Per ASTM G65-80, 2000 Revolutions	Unknown

COATING CHARACTERISTICS - HYDROGEN FUEL

	SET B	SET C
Bond Strength, PSI (per ASTM 633)	Unknown	Unknown
Microhardness, DPH [300g]	983	824-852
Macrohardness, 15N	92.1	91.0-91.9
Estimated Porosity, As-Sprayed	<1.5%	<1%
Est. Oxide Level, Visual Appearance	8-15%	5-10%
Maximum Coating Thickness, Inches As-Sprayed, Flat or Irregular Shapes	.025	.030
Maximum Coating Thickness, Inches As-Sprayed on Cylindrical Shapes	Unknown	.045
Est. Maximum Service Temperature, ^{o}F	1600	1600
Est. Deposit Efficiency, %	34%	24%
Estimated Coverage, Lb/Ft^2/.010"	.9	1.3
Est. Surface Finish, Microinch AA As-Sprayed	150-300	150-250
Est. Surface Finish, Microinch AA Diamond Ground and Diamond Lapped	Unknown	Unknown
Abrasive Wear Resistance, MM^3 Loss Per ASTM G65-80, 2000 Revolutions	Unknown	Unknown

The above data in no way constitutes a specification. Parameters and other technical information in this document are for guidance only. Stellite Coatings may change data in this document as additional information becomes available.

FINISHING

For many applications JK136 coating can be used in the as-sprayed condition. To improve initial erosion resistance, a wire brush or abrasive flapping wheel can be used to improve the surface texture. Many JK136 coatings require machined surfaces, which must be performed by grinding or lapping.

Light Duty Grinding:

Wheel Type: 100-240 Mesh Resinoid Bonded Diamond Wheel of L, P or R Hardness with Concentration of 50
Cross-Feed Pass: .035" - .050"
Part Surface Speed: 40-50 Feet Per Minute
In-Feed Per Pass: .0005"

Note: Diamond wheels must be dressed periodically to achieve proper cutting and to avoid damage to the coating.

Heavy Duty Grinding:

Use all of the above but substitute a wheel with 100 mesh, nickel-clad diamonds in a resinoid bonded matrix, and hardness of R. Large surfaces may require a softer wheel.

NOTE:

1. Important! Diamonds must be periodically relieved by dressing the wheel to insure proper grinding.
2. Irreversible damage to the coating can occur when the grinding wheel specifications and/or the grinding technique is incorrect.
3. Coolant must be flooded onto the part and grinding wheel during grinding.

Lapping:

1. Lapping is best done following a 6-14 microinch AA diamond ground finish of the coating. Lapping as-sprayed coatings is best done by starting with 30 or 45micron diamond media.
2. Diamond paste or slurry is recommended as lapping media. Diamond film can produce excellent surface finishes with the proper technique and equipment.
3. 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 grain size. Avoid contamination of the lapping surfaces by cleaning prior to application of fresh media.
4. Recommended grain size progression after grinding:

Lapping Compound	Est. Finish, Microinch AA
15 or 30 Micron	3-5
9 or 15 Micron	2-4
3 or 6 Micron	1-2

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

SET A OPERATING PARAMETERS (1)

Fuel Gas	Propylene (C_3H_6)	
Powder Carrier Type	Nitrogen (N_2)	
Nozzle	5/16 x 6	
Injector	#50	
Carbide Insert	.052" or .080"- For High Rate	
Console Type	**JKII**	**JKIIA**
Manifold Pressures, PSI	(2) (7)	(3)
Oxygen	120	90-100
Main Fuel Gas	80	75-80
Carrier Gas	100	85
Hydrogen (Pilot)	25	90-100
Console Pressures, PSI		
Oxygen	65-75	68-74
Main Fuel	50-60	54-64
Carrier	54-65 (.052")	54-64 (.052")
Console Flows(4)	43-49 (.080")	43-49 (.080")
Oxygen	1020	1000-1020
Main Fuel	45-55%	110-127
Carrier	35	77
Console Settings		
Oxygen		55.6-56.7
Main Fuel		36.7-42.3
Carrier		77
Cooling Water(5)		
^oF IN	85-95	85-95
^oF OUT	115-120	115-120
Flow, GPM	8-9.0	8-9.0
Powder feed Settings		
Dial Set (Approximate)	162-378	162-378
RPM (Approximate)	2.0-6.1	2.0-6.1
Feed Rate (6), grams/Min.	23-82	23-82
Spray Distance, Inches	8-9	8-9

NOTES:

1. Pressures shown are running pressures with powder feeding.
2. Manifold pressures for JKII system are critical, manifold regulators must be located at factory supplied hose ends.
3. Manifold pressure too low will not allow enough flow. If it is too high the controller will pulse upon start up.
4. 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) at: T = 0^oC, P = 14.7 PSIA
5. 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.
6. 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:

$$\text{RPM (NEW)} = \frac{\text{PFR (Required) RPM (Original)}}{\text{PFR (Calculated)}}$$

7. 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 6	
Injector	#40	
Carbide Insert	.052" or .080"- For High Rate	
Console Type	**JKII**	**JKIIA**
Manifold Pressures, PSI	(2) (7)	(3)
Oxygen	120	90
Main Fuel Gas	120	90
Carrier Gas	100	85
Hydrogen (Pilot)	25	
Console Pressures, PSI		
Oxygen	56-63	55-62
Main Fuel	65-70	62-68
Carrier	59-65(.052")	59-65(.052")
Console Flows(4)	47-55(.080")	47-55(.080")
Oxygen	575	580
Main Fuel	900	870
Carrier	30-35	57
Console Settings		
Oxygen		32.2
Main Fuel		48.3
Carrier		40.7
Cooling Water(5)		
^oF IN	85-95	85-95
^oF OUT	115-120	115-120
Flow, GPM	9-10	9-10
Powder feed Settings		
Dial Set (Approximate)	307-328	307-328
RPM (Approximate)	4.8-5.2	4.8-5.2
Feed Rate (6), grams/Min.	60-65	60-65
Spray Distance, Inches	7.5	7.5

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SET C OPERATING PARAMETERS(1)

Fuel Gas	Hydrogen (H_2)	
Powder Carrier Type	Argon (Arm)	
Nozzle	1/4 x 6	
Injector	#40	
Carbide Insert	.052" or .080"- For High Rate	
Console Type	**JKII**	**JKIIA**
Manifold Pressures, PSI	(2) (7)	(3)
Oxygen	120	90-100
Main Fuel Gas	120	90-100
Carrier Gas	100	85
Hydrogen (Pilot)	25	
Console Pressures, PSI		
Oxygen	Unknown	49-53
Main Fuel	Unknown	73-77
Carrier	50-57 (.052")	50-57 (.052")
Console Flows(4)	43-50 (.080")	43-50 (.080")
Oxygen	450	450
Main Fuel	1300	1290
Carrier	30	57
Console Settings		
Oxygen		25.0-30.0
Main Fuel		67.7-71.7
Carrier		40.7-41.4
Cooling Water(5)		
^oF IN	85-95	85-95
^oF OUT	115-120	115-120
Flow, GPM	11-12	11-12
Powder feed Settings		
Dial Set (Approximate)	218-378	218-378
RPM (Approximate)	3.1-6.2	3.1-6.2
Feed Rate (6), grams/Min.	40-80	40-80
Spray Distance, Inches	8-9	8-9

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