

**Stelcar® JK™119**

91% Tungsten Carbide/  
9% Cobalt

**Technical Note**

DATE : 5/28/93  
SUPERSEDES : 9/6/88  
NO : C-021  
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**DESCRIPTION**

Stelcar JK® 119 powder is manufactured by the cast/crushed and sintered method. Coatings of this material are resistant to abrasion, particle erosion and fretting wear. JK119 composition is similar to Praxair D-Gun coating LW-1.

**APPROXIMATE COMPOSITION, Wt.%**

|          |         |
|----------|---------|
| Carbon   | 4.2     |
| Cobalt   | 9.0     |
| Iron     | 0.5     |
| Tungsten | Balance |

**MESH SIZE**

325/D

**APPLICATIONS:**

Hardfacing of compressor shafts, pump casings, pump impellers, pump plungers, pump sleeves, mechanical seal faces, feed screws, gate valves, marine components, sintered carbide molds, chemical and petrochemical parts.

**COATING CHARACTERISTICS**

|   | <b><u>SET A</u></b> | <b><u>SET B</u></b> | <b><u>SET C</u></b> |
|---|---------------------|---------------------|---------------------|
| Bond Strength, PSI (per ASTM 633)   | 10,500+             | 10,500+             | 10,500+             |
| Microhardness, DPH [300g]   | 958-1142            | 994-1128            | 1167                |
| Macrohardness, 15N  | 89.0-90.8           | 91.2-94.3           | 91.5                |
| Estimated Porosity, As-Sprayed  | <2%                 | <1%                 | <1%                 |
| Maximum Coating Thickness, Inches<br>As-Sprayed, Flat or Irregular Shapes | .020                | .015                | .030                |
| Maximum Coating Thickness, Inches<br>As-Sprayed on Cylindrical Shapes     | .020                | .015                | .030                |
| Est. Maximum Service Temperature, °F                                      | 1000                | 1000                | 1000                |
| Est. Deposit Efficiency, %  | 50.0                | 45.3                | 53.0                |
| Estimated Coverage, Lb/Ft <sup>2</sup> /.010"                             | 1.5                 | 1.6                 | 1.45                |
| Est. Surface Finish, Microinch AA   | 200-300             | 150-250             | 150-250             |
| Abrasive Wear Resistance, MM <sup>3</sup> Loss<br>Per ASTM G65-80         | Unknown             | Unknown             | Unknown             |

The above data, in no way, constitutes a specification. Parameters and other technical information in this document is for guidance only. Stellite Coatings reserves the right to make changes.

**FINISHING**

Coatings of JK119 must be finished by grinding or lapping.

**Light Duty Grinding :**

Wheel Type : 100-240 Mesh Resinoid Bonded Diamond Wheel of  
L, P or R Hardness and 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. The coolant must not contain Amines, which can attack and pit the cobalt matrix!

**Recommended Lapping**

1. Lapping is best done following a 6-14 microinch AA diamond ground finish of the coating.
2. Diamond paste or slurry is recommended as lapping media. 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.
3. Recommended grain size progression after grinding :

| <u>Lapping Compound</u> | <u>Est. Finish, Microinch AA</u> |
|-------------------------|----------------------------------|
| 30 Micron               | 3-5                              |
| 15 Micron               | 2-4                              |
| 9 Micron                | 1-2                              |

4. Superfinishing is possible only if the coating does not have cracks or pull out caused by improper coating or finishing techniques.

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

|                                       |  |                        |
|---------------------------------------|--|------------------------|
| Fuel Gas                              | Propylene (C <sub>3</sub> H <sub>6</sub> ) |                        |
| Powder Carrier Type                   | Argon (Ar) or [Nitrogen (N <sub>2</sub> )] |                        |
| Nozzle                                | 5/16 x 6                                   |                        |
| Injector                              | #50  |                        |
| Carbide Insert                        | .052" or .080"                             |                        |
| <b><u>Console Type</u></b>            | <b><u>JKII</u></b>                         | <b><u>JKIIA</u></b>    |
| <b><u>Manifold Pressures, PSI</u></b> | (2) (7)                                    | (3)                    |
| Oxygen                                | 120  | 100                    |
| Main Fuel Gas                         | 80   | 80                     |
| Carrier Gas                           | 100  | 85                     |
| Hydrogen (Pilot)                      | 25   | 100                    |
| <b><u>Console Pressures, PSI</u></b>  |  |                        |
| Oxygen                                | 80-86                                      | 62-73                  |
| Main Fuel                             | 63-72                                      | 54-67                  |
| Carrier                               | 54-64 (.052")                              | 54-64 (.052")          |
| <b><u>Console Flows(4)</u></b>        | 45-55 (.080")                              | 45-50 (.080")          |
| Oxygen                                | 980-1020                                   | 980-1020               |
| Main Fuel                             | 58-60%                                     | 130-137                |
| Carrier                               | 30-40                                      | Ar 56-66               |
| <b><u>Console Settings</u></b>        |  | [N <sub>2</sub> 67-77] |
| Oxygen                                |  | 54.4-56.7              |
| Main Fuel                             |  | 43.3-45.7              |
| Carrier                               |  | Ar 40.0-47.1           |
| <b><u>Cooling Water(5)</u></b>        |  | [N <sub>2</sub> 67-77] |
| °F IN                                 | 80-90                                      | 80-90                  |
| °F OUT                                | 115-120                                    | 115-120                |
| <b><u>Powder feed Settings</u></b>    |  |                        |
| Dial Set (Approximate)                | 183-225                                    | 183-225                |
| RPM (Approximate)                     | 2.4-3.2                                    | 2.4-3.2                |
| Feed Rate (6), grams/Min.             | 48-65                                      | 48-65                  |
| <b><u>Spray Distance, Inches</u></b>  | 7-8  | 7-8                    |

**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) : T = 0°C, 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:  

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

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

|   |  |                     |
|---|--|---------------------|
| Fuel Gas                                  | Propylene (C <sub>3</sub> H <sub>6</sub> ) |                     |
| Powder Carrier Type                       | Argon (Ar)                                 |                     |
| Nozzle                                    | 5/16 x 12                                  |                     |
| Injector                                  | #50  |                     |
| Carbide Insert                            | .052" or .080"                             |                     |
| <b><u>Console Type</u></b>                | <b><u>JKII</u></b>                         | <b><u>JKIIA</u></b> |
| <b><u>Manifold Pressures, PSI</u></b>     | (2) (7)                                    | (3)                 |
| Oxygen                                    | 140  | 120-130             |
| Main Fuel Gas                             | 110  | 100-110             |
| Carrier Gas                               | 100  | 85-95               |
| Hydrogen (Pilot)                          | 25   | 100                 |
| <b><u>Console Pressures, PSI</u></b>      |  |                     |
| Oxygen                                    | 106-116                                    | 98-110              |
| Main Fuel                                 | 90-92                                      | 94-105              |
| Carrier                                   | 77-87 (.052")                              | 77-87 (.052")       |
| <b><u>Console Flows<sup>(4)</sup></u></b> | 65-75 (.080")                              | 65-75 (.080")       |
| Oxygen                                    | 1200                                       | 1220-1240           |
| Main Fuel                                 | 66-70%                                     | 181-220             |
| Carrier                                   | 35-40                                      | 67-77               |
| <b><u>Console Settings</u></b>            |  |                     |
| Oxygen                                    |  | 67.8-68.9           |
| Main Fuel                                 |  | 60.3-73.3           |
| Carrier                                   |  | 47.9-55.0           |
| <b><u>Cooling Water<sup>(5)</sup></u></b> |  |                     |
| °F IN                                     | 80-90                                      | 80-90               |
| °F OUT                                    | 115-120                                    | 115-120             |
| <b><u>Powder feed Settings</u></b>        |  |                     |
| Dial Set (Approximate)                    | 183  | 183                 |
| RPM (Approximate)                         | 2.4  | 2.4                 |
| Feed Rate (6), grams/Min.                 | 50-60                                      | 50-60               |
| <b><u>Spray Distance, Inches</u></b>      | 7-8  | 7-8                 |

**NOTES:**

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3. Manifold pressure too low will not allow enough flow. If it is too high the controller will pulse upon start up.
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$$\text{RPM (NEW)} = \frac{\text{PFR (Required)} \text{ RPM (Original)}}{\text{PFR (Calculated)}}$$
7. JKII flowmeter requires change for specific gas use:  
 H<sub>2</sub> - Part #972915 C<sub>3</sub>H<sub>6</sub> - Part #972763

**SET C OPERATING PARAMETERS<sup>(1)</sup>**

|                                       |                            |                     |
|---------------------------------------|----------------------------|---------------------|
| Fuel Gas                              | Hydrogen (H <sub>2</sub> ) |                     |
| Powder Carrier Type                   | Argon (Ar)                 |                     |
| Nozzle                                | 1/4 x 6                    |                     |
| Injector                              | #40                        |                     |
| Carbide Insert                        | .052" or .080"             |                     |
| <b><u>Console Type</u></b>            | <b><u>JKII</u></b>         | <b><u>JKIIA</u></b> |
| <b><u>Manifold Pressures, PSI</u></b> | (2) (7)                    | (3)                 |
| Oxygen                                | 120                        | 90                  |
| Main Fuel Gas                         | 120                        | 100                 |
| Carrier Gas                           | 100                        | 85                  |
| Hydrogen (Pilot)                      | 25                         |                     |
| <b><u>Console Pressures, PSI</u></b>  |                            |                     |
| Oxygen                                | 57-62                      | 62-67               |
| Main Fuel                             | 73-78                      | 75-85               |
| Carrier                               | 61-68 (.052")              | 61-68 (.052")       |
| <b><u>Console Flows(4)</u></b>        | 50-56 (.080")              | 50-56 (.080")       |
| Oxygen                                | 575                        | 570                 |
| Main Fuel                             | 1250                       | 1150                |
| Carrier                               | 30-35                      | 57-67               |
| <b><u>Console Settings</u></b>        |                            |                     |
| Oxygen                                |                            | 31.7                |
| Main Fuel                             |                            | 63.9-73.3           |
| Carrier                               |                            | 40.7-47.9           |
| <b><u>Cooling Water(5)</u></b>        |                            |                     |
| °F IN                                 | 80-90                      | 80-90               |
| °F OUT                                | 115-120                    | 115-120             |
| <b><u>Powder feed Settings</u></b>    |                            |                     |
| Dial Set (Approximate)                | 125-152                    | 125-152             |
| RPM (Approximate)                     | 1.3-1.8                    | 1.3-1.8             |
| Feed Rate (6), grams/Min.             | 30-40                      | 30-40               |
| <b><u>Spray Distance, Inches</u></b>  | 7-8                        | 7-8                 |

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H<sub>2</sub> - Part #972915 C<sub>3</sub>H<sub>6</sub> - Part #972763