

Metallography of WallCarb™ 86/10/4 HVOF JP8000 coating showing dense fine grained carbide microstructure. Original at 1000x, etched with Murakami's reagent.

WallCarb™ 86/10/4 HVOF

A Tungsten Carbide 10% Cobalt 4% Chromium Sintered Powder for application by High Velocity Thermal Spray Processes

Description:

WallCarb™ 86/10/4 (WC-10Co-4Cr) HVOF powder is designed for thermal spray applications, offering dense, hard coatings with low porosity and excellent wear and corrosion resistance. This spheroidal, spray dried, and sintered powder enables high deposit efficiencies and consistent parameter settings, resulting in smooth coatings that reduce finishing and grinding times.

Typical applications for WallCarb™ 86/10/4 HVOF powders include seal areas on shafts, ball and gate valves, hydraulic rams, pump seals, and industrial settings where hard chrome plating replacement options are needed.

Nominal Composition - % by Weight:

WC	Co	Cr
86.0	10.0	4.0

Forms Available:

WallCarb™ 86/10/4 is supplied as spheroidal, spray dried and sintered for application with HVOF systems.

Micron Size	Application
-45+15 µm	HVOF
-38+10 µm	
-30+5 µm	HVAF

WallCarb™ 86/10/4 HVOF:

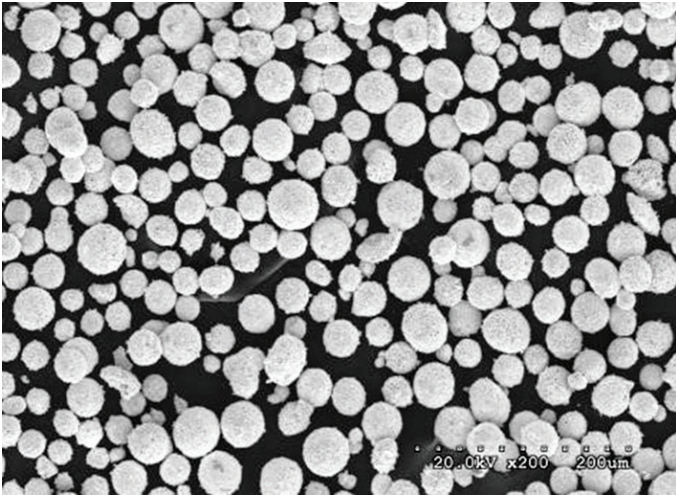
WallCarb™ 86/10/4 HVOF powder has been designed specifically for the HVOF process and can produce extremely dense and compressively stressed coatings. Coatings exhibit good wear resistance in basic environments as well as at temperatures up to 450°C (840°F).

Attention to particle shape and sizing, allows for higher deposit efficiencies and continual use of parameter sets from one lot to the next. This is especially important to applicators who are looking for powders that will allow them to change powder lots, without changing their parameter set. Applicators will also find the WallCarb™ 86/10/4 material will produce very smooth coatings allowing for quicker finishing/grinding times.

Properties:

Physical Properties (approximate):

Coating Density	14.0 g/cc
Coating Hardness	>1,400 HV
Porosity	<1%
Dry Abrasive Wear – ASTM G65 (A)	35 mg / 2.5 mm ³
Adhesion – ASTM C633:	>10,000psi
Surface finish (Ra) – as sprayed:	150-200µin
Surface finish (Ra) – as ground:	8-10µin
Surface finish (Ra) – super finished:	3-6µin



Micrograph of WallCarb™ 86/10/4 HVOF powder at 200X.

Application by High Velocity Oxygen Fuel Thermal Spray Processes:

JP 5000 Parameters for Spraying WallCarb™ 86/10/4 HVOF Powder*

Gun barrel:	6"
Spray distance:	15"
Deposition Rate (inch/pass):	<0.0005
Spray rate:	10 lb./hr.

Spray Parameters	Supply Pressure	Flow	System Pressure**
Oxygen	210 psi	2050 scfh	~140 psi
Fuel (K1 kerosene)	170 psi	6.5 gal/hr	~130 psi
Powder (nitrogen carrier)	50 psi	23 scfh	~170 psi
Water Temperature: incoming - outgoing -	min 70°F max 150°F	10 gal/ min	35 psi

* Some modifications to the parameters may be needed to compensate for longer hoses.

** System pressures are based on supply pressure and flow settings and are present for the purpose of monitoring the condition system consumables; located at the bottom of the control console.

Grinding and Lapping:

Grinding is used to remove any necessary material. Smooth surfaces usually wear better, because they generate less heat and friction. A diamond wheel is required. Use 24 to 36 grit for roughing and 60 grit or

finer for finishing. Grind wet when possible; do not let the wheel get loaded; dress frequently. Take light, fast cuts. (Manufacturer can provide full details for grinding.)

Dry lapping can be used to give the alloy an excellent finish. Silicon carbide, boron carbide and diamond dust are all capable of cutting the HVOF carbide coating, but they must be embedded in a cast iron or steel wheel to properly lap fused deposits of the HVOF carbide. Apply with a steady pressure and avoid overheating. If the lapping compounds are used loose, they will cut the cobalt matrix before the chromium carbides, giving the surface an etched appearance.

Safety:

When handling powders do so in such a way to avoid creating a dust cloud; avoid inhalation or contact with skin or eyes. Conduct coating operations in a properly ventilated area. For more information, consult 11.8 (Ventilation), *AWS Thermal Spraying: Practice, Theory, and Application* available from American Welding Society, OSHA Safety and Health Standards available from U.S. Government Printing Office, and the manufacturer's Safety Data Sheet (SDS).

Warning: Thermal spray torches and heating torches used for application of this product utilize compressed gasses or liquid fuels including oxygen, air, flammable fuel gas, or flammable liquid fuel. Follow your employers safety procedures when using and handling these gases and equipment. Infrared and ultraviolet radiation (light) emitted from flame and hot metal can injure eyes and burn skin. HVOF and HVAF systems can produce noise levels that can damage hearing. Use appropriate personal protective equipment.

Storage Requirements:

Keep thermal spray powders in a closed container and protect against moisture pick-up. The containers should be tumbled before using the powder. If moisture is absorbed from the atmosphere, it can be removed and flowability can be restored by drying the powder.

The information provided herein is given as a guideline to follow. It is the responsibility of the end user to establish the process information most suitable for their specific application(s). Wall Colmonoy assumes no responsibility for failure due to misuse or improper application of this product, or for any incidental damages arising out of the use of this material.

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