

Metallography of WallCarb™ 80/20 HVOF powder

WallCarb™ 80/20 HVOF

Description:

WallCarb™ 80/20 Cr₃C₂/(Ni 20Cr) HVOF powder is designed for thermal spray applications, producing dense, wear-resistant coatings with excellent corrosion and oxidation resistance. Composed of 80% chromium carbide and 20% nickel-chromium matrix, this agglomerated, and sintered powder prevents decarburization during spraying and ensures strong carbide binding during service, delivering consistent and durable performance. The matrix is made up of 80% Ni and 20% Cr, which not only binds the carbides but also protects the coating against corrosion and oxidation.

Typical applications for WallCarb™ 80/20 HVOF powders include hydraulic cylinders, piston rods in earth-moving equipment, and furnace rolls in metal production. Also ideal for sieves, cones, and dampening fountain rollers where hard chrome plating alternatives are needed, especially in environments containing NaCl or NaOH. Not recommended for use in HCl environments.

Nominal Composition - % by Weight:

Ni	C	Fe	Cr
16.0	10.2	<0.5	Bal

Forms Available:

WallCarb™ 80/20 is supplied as spherical, spray dried and sintered for application with HVOF systems.

Micron Size	Application
-45+15 µm	HVOF
-38+10 µm	

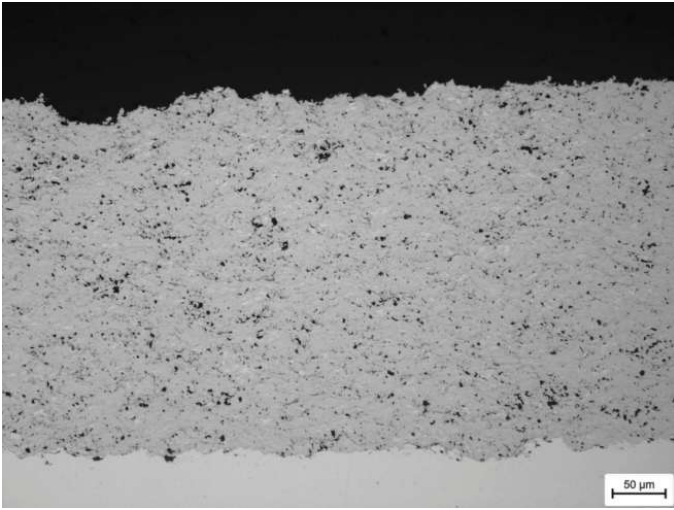
WallCarb™ 80/20 HVOF:

WallCarb™ 80/20 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 870°C (1600°F).

Properties:

Physical Properties (approximate):

Density	2.0 - 3.0 g/cc
Coating Hardness	>900 HV
Porosity	<1%
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



Photomicrograph of WallCarb™ 80/20 HVOF powder

Application by High Velocity Oxygen Fuel Thermal Spray Processes:

JP 5000 Parameters for Spraying WallCarb™ 80/20 HVOF Powder*

Gun barrel:	4"
Spray distance:	13"
Deposition Rate (inch/pass):	<0.0005
Spray rate:	10 lb./hr.

Spray Parameters	Supply Pressure	Flow	System Pressure **
Oxygen	210 psi	1900 scfh	~140 psi
Fuel (K1 kerosene)	170 psi	6 gph	~130 psi
Powder (nitrogen carrier)	50 psi	23 scfh	~170 psi
Water Temperature: incoming - outgoing -	min 70 max 150	10 gpm	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.

updated August 2025