

Material Product Data Sheet

Tungsten Carbide – 12 % Cobalt Sintered and Crushed Powders for Thermal Spray

Thermal Spray Powder Products: Metco™ 72F-NS, Diamalloy™ 2004

1 Introduction

Tungsten carbide 12 wt.% cobalt sintered and crushed powders are most commonly applied using HVOF or atmospheric plasma spray to produce very dense, well-bonded coatings. These coatings provide excellent resistance against most forms of abrasive wear at lower service temperatures.

The materials contain fine-grained carbides for resistance against abrasive grains, hard surfaces, particle erosion and fretting wear mechanisms. They should be used in dry, non-corrosive environments.

Compared to coatings of tungsten carbide – 17 wt.% cobalt, the reduced matrix content leads to coatings that are less ductile with higher hardness and better resistance to fretting and abrasion.

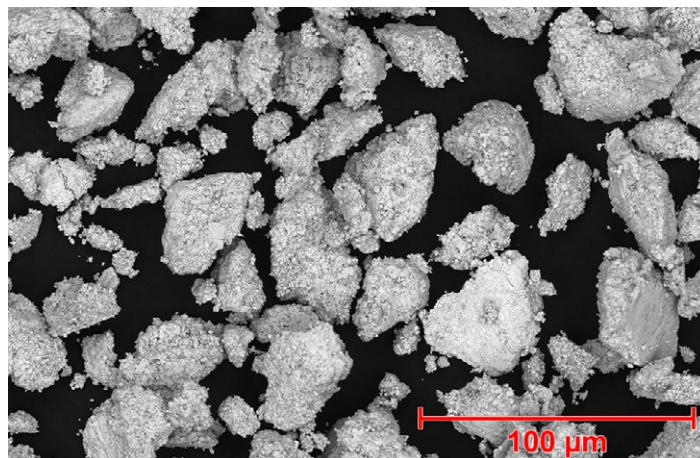
1.1 Typical Uses and Applications

Typical applications include:

- Conveyor screws
- Compressor stators
- Compressor air seals
- Fan blade midspan supports
- Duct segments
- Impeller shafts
- Aircraft flap tracks
- Cam followers
- Exhaust fans
- Expansion joints

Quick Facts

Classification	Carbide, tungsten-based
Chemistry	88WC 12Co
Manufacture	Sintered and crushed
Morphology	Angular / blocky
Purpose	Abrasive wear resistance
Melting Point	Approx. 1250 °C (2280 °F)
Service Temperature	≤ 500 °C (930 °F)
Process	HVOF or atmospheric plasma spray



SEM photomicrograph of Diamalloy 2004 showing the powder exterior morphology typical of these products.

2 Material Information

2.1 Chemical Composition

Product	Weight Percent (nominal)				
	W	Co	C _{TOTAL} ^a	Fe	Others
Metco 72F-NS	81 min	11.5 – 13.0	5.25 max	1.5 max	1.0 max
Diamalloy 2004	81 min	11.5 – 13.0	5.25 max	1.5 max	1.0 max

^a including free carbon

2.2 Particle Size Distribution and Apparent Density

Product	Nominal Range (µm)	Primary Carbide Grain Size
Metco 72F-NS	-45 +11	Medium
Diamalloy 2004	-45 +5	Medium

Particle size distribution: Analysis by sieve per ASTM B214 for all upper limits; values of 38 µm and lower based on laser scattering per ASTM C 1070 (Microtrac). Other particle size distributions are available on a proprietary basis for large quantities.

2.3 Key Selection Criteria

- Select a material appropriate for the recommended spray process and spray gun to be used. (refer to Section 2.5).
- Choose the material that meets the required customer specifications, if necessary (refer to Section 2.6).
- These materials are extensively used and applied using atmospheric plasma spray or HVOF. They provide excellent abrasion protection at low temperatures.

2.4 Related Products

- For higher matrix hardness and improved erosion characteristics, choose a fused and crushed tungsten carbide – 12 % cobalt material such as Diamalloy 2003 or Metco 71 series products.
- For better deposition efficiency, consider an agglomerated and sintered tungsten carbide – 12 % cobalt material. Oerlikon Metco offers these materials in a variety of particle size distributions that are optimized for different spray processes and spray guns..
- For better corrosion resistance choose:
 - A tungsten carbide product that contains chromium within the binder matrix such as Woka 365x series products, Metco 516x series products and Metco 5847, Woka 360x series products, or Amdry 5843 and Diamalloy 5849
 - Chromium carbide materials such as Woka 71xx, Woka 72xx or Woka 73xx series products
- For applications where service temperatures are greater than 500 °C (930 °F), but less than 700 °C (1290 °F), choose a material that contains both chromium carbide and tungsten carbide, such as Woka 75xx or Woka 37xx series products.
- When service temperatures exceed 700 °C (1290 °F), choose a chromium carbide material with a nickel-chromium matrix such as Woka 71xx, Woka 72xx or Woka 73xx series products
- If higher hardness or better abrasion resistance is required, choose a tungsten carbide material with a cobalt-chromium matrix such as Woka 365x series products,

2.5 Recommended Spray Process and Spray Guns

Product	HVOF	APS
	Diamond Jet	TriplexPro-200 / 9MB / F4, etc.
Metco 72F-NS		●
Diamalloy 2004	●	

2.6 Customer Specifications

Product	Customer Specifications
Metco 72F-NS	CFM International CP 6008 CFM International CP 6031 GE B50TF27 Class A GKN Aerospace PM 819-25 MTU MTS 1056 Rolls-Royce Corp. EMS 56756 Rolls-Royce plc MSRR 9507/58 SAE International AMS 7880
Diamalloy 2004	Chromalloy BZ003 Type 46 GE B50TF27 Class A and B Honeywell EMS 57736

3 Coating Information

3.1 Key Thermal Spray Coating Information

Specification	Typical Data
Recommended Spray Process	HVOF or Atmospheric Plasma Spray
Corrosion Resistance	Not recommended for corrosive media
Finishing	Diamond grind
Maximum Service Temperature	500 °C 930 °F

3.2 Coating Parameters

Please contact your Oerlikon Metco Account Representative for parameter availability. For specific coating application requirements, the services of Oerlikon Metco's Coating Solution Centers are available.

Recommended Spray Guns

HVOF

DiamondJet series

Atmospheric Plasma

Metco 9MB series

Metco F4 series

TriplexPro series

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 72F-NS	1000088	5 lb (approx. 2.25 kg)	Stock	Global
Diamalloy 2004	1000790	5 lb (approx. 2.25 kg)	Stock	Global

4.2 Handling Recommendations

- Store in the original container in a dry location.
- Tumble contents prior to use to prevent segregation.
- Open containers should be stored in a drying oven to prevent moisture pickup.

4.3 Safety Recommendations

See SDS 50-329 (Safety Data Sheet) for the product of interest localized for the country where the material will be used. SDS are available from the Oerlikon web site at www.oerlikon.com/metco (Resources – Safety Data Sheets).

Information is subject to change without prior notice.