

## 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.

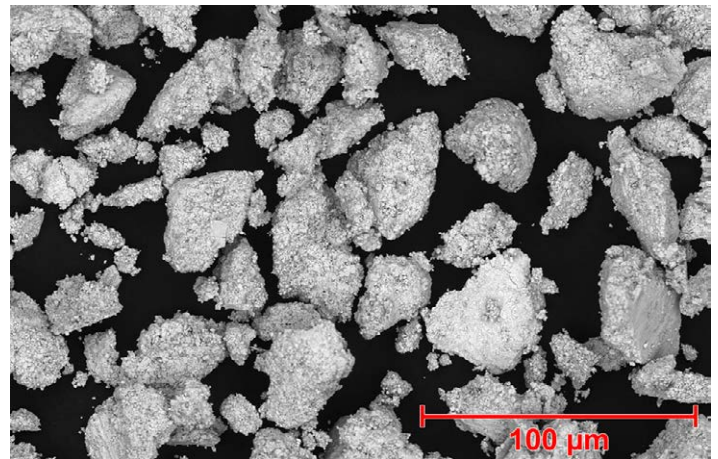
#### 1.1 Typical Uses and Applications

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 <sub>TOTAL</sub> <sup>a</sup>	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

<sup>a</sup> 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 (see datasheet DSMTS-0114).
- 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. (see datasheet DSMTS-0044).
- 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 (see datasheet DSMTS-0025),

Woka 360x series products (see datasheet DSMTS-0051), or Amdry 5843 and Diamalloy 5849 (see datasheet DSMTS-0113).

- Chromium carbide materials such as Woka 71xx, Woka 72xx or Woka 73xx series products (see datasheets DSMTS-0027, DSMTS-0031 and DSMTS-0058, respectively).
- 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 (see datasheets DSMTS-0056, DSMTS-0059, respectively).
- 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 (see datasheets DSMTS-0027, DSMTS-0031 and DSMTS-0058, respectively).
- 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, Metco 516x series products and Metco 5847 (see datasheet DSMTS-0025) or Woka 360x series products (see datasheet DSMTS-0051).

### 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](http://www.oerlikon.com/metco) (Resources – Safety Data Sheets).

Information is subject to change without prior notice.