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Material Product Data Sheet

Tungsten Carbide – 20 % Cobalt Sintered and Crushed Powders for Thermal Spray

Thermal Spray Powder Products:
Metco™ 76F-NS, Amdry™ 5670

1 Introduction

Tungsten carbide 20 wt. % cobalt sintered and crushed powders are most commonly applied using the combustion powder flame spray process, and are not technique-sensitive.

Due to the high cobalt matrix content, these materials can be sprayed to higher thicknesses and will produce dense, well-bonded coatings with very good resistance against most forms of abrasive and erosive wear.

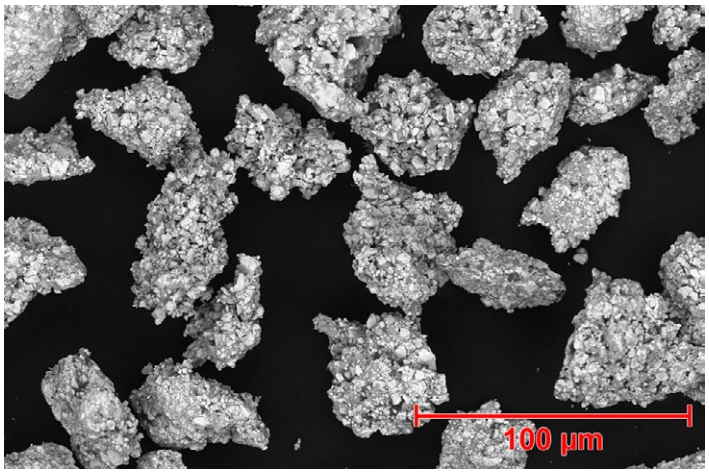
Different carbide sizes are used to affect the bulk coating properties. Depending on the application the coatings may be used as sprayed or finished by grinding.

1.1 Typical Uses and Applications

Typical applications include:

- Bearing surfaces in pulp and paper plants
- Various industrial wear applications where a more ductile carbide coating is desired
- Abrasive wear applications
- Wear-resistant anti-skid and gripping coatings(Amdry 5670)

Quick Facts	
Classification	Carbide, tungsten-based
Chemistry	80WC 20Co
Manufacture	Sintered and crushed
Morphology	Angular / blocky
Purpose	Abrasive, ductile wear resistance
Melting point	Approx. 1250 °C (2280 °F)
Service Temperature	≤ 500 °C (930 °F)
Process	Combustion Powder Thermospray™



SEM photomicrograph of Metco 76F-NS showing the powder exterior morphology typical of these products.

2 Material Information

2.1 Chemical Composition

Product	Weight Percent (nominal)				
	W	Co	C_{TOTAL}	Fe	Others
Metco 76F-NS	Balance	19.0 – 23.0	5.0 – 6.0 [a]	1.0 max	1.0 max
Amdry 5670	Balance	18.0 – 22.0	4.75 – 5.15	1.5 max	1.0 max

[a] Free carbon of 1.0 % max.

2.2 Particle Size Distribution and Apparent Density

Product	Nominal Range (µm)	Primary Carbide Grain Size
Metco 76F-NS	–53 +11	Fine and Coarse (bimodal)
Amdry 5670	–90 +38	Coarse

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).

2.3 Key Selection Criteria

- The choice between these materials primarily depends on the process and application.
- Partial dissolution of the fine carbide constituents during spraying of Metco 76F-NS is likely to result in a higher matix hardness.
- Conversely, coatings of Amdry 5670 will tend to have better ductility.
- The finer particle size distribution of Metco Metco 76F-NS will result in coatings with smoother as-sprayed surface finishes.
- Rough coatings can be applied using Amdry 5670 that are appropriate for gripping and anti-skid applications.

2.4 Related Products

- If post-coat fusing can be tolerated, a self-fluxing material with hard phase can be considered. Oerlikon Metco's portfolio of these products have tungsten carbide as the hard phase constituent, blended with various percentages of nickel-chromium matrixes, with additions of boron and silicon. Post-coat fusing densifies the coating to a nearly pore-free structure that is metallurgically bonded to the substrate. The coatings are resistant to abrasion, hard surfaces, fretting and particle erosion. However, these coatings are less ductile than Metco 76F-NS and Amdry 5670.
- When post-coat fusing cannot be tolerated self-fusing materials containing tungsten carbide can be considered such as Metco 439NS, Metco 439NS-2 and Metco 1123. These materials exothermically react during spraying to partially fuse the coating.
- When service temperatures exceed 700 °C (1290 °F), choose a chromium carbide material with a nickel-chromium matrix such as Woka 7215. Woka 7215 also offers better corrosion resistance and can be used in chloride, acidic and alkaline environments.
- When application using HVOF or atmospheric plasma spray is an option, Denser, more homogeneous and more wear-resistant tungsten carbide coatings can be produced. Some recommendations are:
- For very good impact resistance, choose a 83 % tungsten carbide – 17 % cobalt material.
- For better corrosion resistance, higher hardness or better abrasion resistance, choose a tungsten carbide product that contains chromium within the binder matrix such as Woka 365x series products, Metco 516x series products, Metco 5847 or Woka 360x series products.
- For higher hardness and better abrasion resistance, choose a tungsten carbide cobalt material with a lower matrix content such as Woka 31xx series materials, Metco 5810 or Metco 5812.

3 Coating Information

3.1 Key Thermal Spray Coating Information

Specification		Typical Data [a]	
Recommended Spray Process		Combustion Powder Thermospray™	
Surface Roughness RA	As-Sprayed	9 – 14 µm	350 – 550 µin
Microhardness	HV0.3	800 – 950	
Porosity		< 3 %	
Corrosion Resistance		Not recommended for corrosive media	
Finishing		Diamond grind	
Maximum Service Temperature		500 °C	930 °F

[a] Depending on the spray gun used, parameter used and coating thickness applied.

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 Combustion Powder Spray
Metco 6P-II series

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 76F-NS	1000799	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 5670	1001068	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 50-306 (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).

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