

Material Product Data Sheet

Chromium Oxide Thermal Spray Powders

Thermal Spray Powder Products:
Amdry™ 6415, Amdry 6420, Metco™ 106,
Metco 106F, Metco 106NS, Metco 6155,
Metco 6156, Metco 6416, Metco 6445

1 Introduction

Chromium oxide produce the most chemically inert and wear resistant thermal spray coating of all the oxides within the Oerlikon Metco product line. Typically, these materials are chosen for applications where a hard, wear resistant and chemically inert surface is needed. The coatings can be used at service temperatures of 540 °C (1000 °F) or higher.

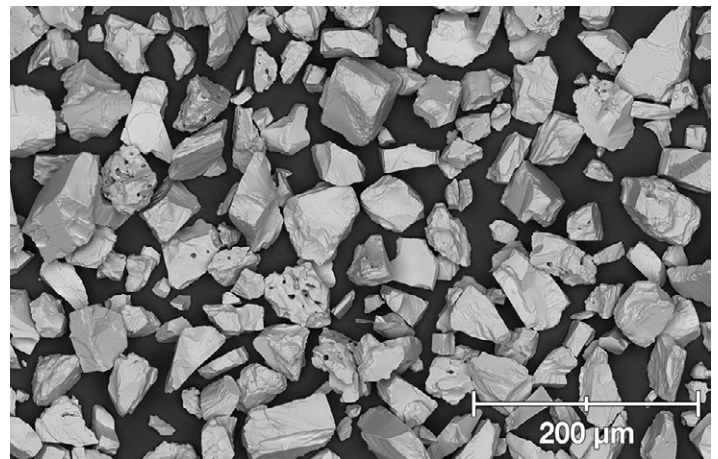
Excellent coatings are achieved using the atmospheric plasma process. Addition of titanium oxide in some of these products results in coatings with improved cohesive strength and higher fracture toughness. Compared to zirconia-based ceramic coatings, chromium oxide coatings have higher microhardness and macrohardness; however, they exhibit higher thermal conductivity and are, therefore, not as thermally insulative.

1.1 Typical Uses and Applications

- Laser engraved Anilox rollers
- Large roller coverings for the paper and pulp industry
- Pump seals, shafts and wear rings
- Chemical industry components
- Textile industry components
- Biomedical implants

Quick Facts

Classification	Oxide ceramic, chromia based
Chemistry	Cr ₂ O ₃ and Cr ₂ O ₃ 4TiO ₂
Manufacture	Fused, sintered and crushed
Morphology	Angular, blocky
Purpose	wear and corrosion resistance
Service Temperature	≤ 540 °C (1000 °F)
Melting Point	2435 °C (4415 °F)
Process	Atmospheric plasma spray or combustion powder Thermospray™



SEM photomicrograph of Metco 106NS showing the typical morphology of these materials

2 Material Information

2.1 Chemical Composition

Product	Chemical Composition (nominal wt. %)						
	Cr ₂ O ₃ (typical)	TiO ₂ (max)	Fe ₂ O ₃ (max)	SiO ₂ (max)	Al ₂ O ₃ (max)	Free Metallic Cr (max)	Total All Others (max)
Amdry 6415	99.0	0.1	0.45	0.40	0.25	0.1	0.25
Amdry 6420	99.5	0.1	0.40	0.45	0.20	0.1	0.25
Metco 106	95.0	4.25	0.25	0.50	0.25	N.R.	0.5
Metco 106F	95.8	4.25	0.50	0.50	0.25	0.1	0.5
Metco 106NS	99.0	N.R.	1.0	0.25	N.R.	N.R.	0.5
Metco 6155	99.7	0.1	0.1	0.1	0.1	0.1	0.25
Metco 6156	99.7	0.1	0.1	0.1	0.1	0.1	0.25
Metco 6416	99.7	0.1	0.1	0.1	0.1	0.1	0.25
Metco 6445	99.7	0.1	0.1	0.1	0.1	0.1	0.25

N.R. = Not Reported

2.2 Particle Size Distribution and Other Characteristics

Product	Nominal Particle Size Distribution (µm)	Color	Morphology	Manufacturing Method
Amdry 6415	-15 +5	Dark Grey / Green	Blocky / Smooth	Specially Treated
Amdry 6420	-45 +22	Dark Grey / Green	Blocky / Smooth	Specially Treated
Metco 106	-90 +11	Dark Grey / Green	Angular / Blocky	Sintered and Crushed
Metco 106F	-53 +5	Dark Grey / Green	Angular / Blocky	Sintered and Crushed
Metco 106NS	-90 +11	Dark Grey / Green	Angular / Blocky	Sintered and Crushed
Metco 6155	-45 +15	Dark Grey / Green	Blocky / Smooth	Sintered and Crushed
Metco 6156	-35 +15	Dark Grey / Green	Blocky / Smooth	Sintered and Crushed
Metco 6416	-30 +10	Dark Grey / Green	Blocky / Smooth	Sintered and Crushed
Metco 6445	-45 +20	Dark Grey / Green	Blocky / Smooth	Sintered and Crushed

Upper particle size determined by sieve analysis, lower particle size analysis by laser diffraction (Microtrac)

2.3 Key Selection Criteria

- Amdry 6415, Amdry 6420, Metco 6156 and Metco 106NS are all pure chrome oxide powders but they differ in their particle sizes and size distributions. In general, the coatings made with these powders can withstand temperatures up to approximately 815 °C (1500 °F) depending on the substrate and the operating conditions.
- Amdry 6415, Metco 6155, Metco 6156, Metco 6416 and Metco 6155 have tightly controlled particle size distributions. Their relatively fine size allows for coatings with smoother surface finishes whereas Metco 106NS, with its coarser particle size, should be selected if thicker coatings are desired. Amdry 6420 is suitable for coatings of intermediate thicknesses.
- In addition, Amdry 6420, Metco 6155, Metco 6156, Metco 6416 and Metco 6155 are products with somewhat

higher purity with nearly no free chromium. This makes them particularly suitable for applications such as anilox rolls where laser engraving is required.

- Metco 106 and Metco 106F powders typically contain approximately 2 wt.% TiO₂. These powders are designed to produce coatings that are denser, with smoother as-sprayed surface roughness and higher toughness compared to pure chromium oxide materials. Metco 106F, being finer than Metco 106, produces coatings that are harder, denser, smoother as-sprayed and more abrasion resistant than coatings of Metco 106. These coatings should not be used at service temperatures in excess of 540 °C (1000 °F).

2.4 Related Products

Oerlikon Metco portfolio has a variety of chromia-titania and pure titania compositions, that can be used in a range of applications:

- For applications requiring a combination of high wear, corrosion resistance and resistance to mechanical shock, coating products of Cr₂O₃ 5SiO₂ 3TiO₂ (Metco 136CP, Metco 136F and Amdry 6462) are recommended. Coatings of these products also exhibit good frictional characteristics, but have lower hardness, wear resistance, corrosion resistance and lower maximum operating temperatures than coatings of pure chromium oxide.
- For denser, smoother coatings with higher toughness, chromium oxide materials with higher compositions of titanium

oxide are preferred. These materials include Metco 6482 [Cr₂O₃ 40TiO₂] and Metco 111 [TiO₂ 45Cr₂O₃]. However, these materials produce coatings of lower hardness, wear resistance and corrosion resistance compared to chromium oxide compositions with lower titanium oxide content.

- For applications requiring dense, smooth coatings with moderate hardness and abrasive wear resistance, pure TiO₂ powders such as Metco 102, Amdry 6505 and Amdry 6510 can be used. However, coatings produced from these products have lower hardness, wear resistance, corrosion resistance and cannot be used at temperatures as high as coatings chromium oxide materials.

2.5 Customer Specifications

Product	Specification
Amdry 6420	Eurocopter DHS122-103 40
Metco 106NS	Pratt & Whitney PWA 1325 Rolls-Royce plc MSRR 9507/53 Rolls-Royce plc RRMS 40039

3 Coating Information

3.1 Key Thermal Spray Coating Information

Specification	Typical Data
Recommended Spray Process	Atmospheric Plasma Spray or Combustion Powder Thermospray™
Maximum Service Temperature	540 °C 1000 °F
Finishing Method	Wet grind (aluminum oxide or silicon carbide wheels)

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.

TriplexPro™ parameters offer significantly better throughput that reduce processing time and material use.

Recommended Spray Guns

Atmospheric Plasma	Combustion Powder
Metco 9MB series	Metco 5P-II
Metco F4 series	Metco 6P-II series
SinplexPro series	
TriplexPro series	

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Amdry 6415	1050449	10 lb (approx. 4.5 kg)	Stock	Global
Amdry 6420	1001070	10 lb (approx. 4.5 kg)	Stock	Global
Metco 106	1000306	5 lb (approx. 2.25 kg)	Stock	Global
Metco 106F	1000307	5 lb (approx. 2.25 kg)	Stock	Global
Metco 106NS	1004640	5 kg (approx. 11 lb)	Special Order	Europe
Metco 6155	1020419	10 kg (approx. 22 lb)	Stock	Global
Metco 6156	1059695	5 kg (approx. 11 lb)	Stock	Global
Metco 6416	1075720	5 kg (approx. 11 lb)	Stock	Global
Metco 6445	1069985	10 kg (approx. 22 lb)	Stock	Global

4.2 Handling Recommendations

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

4.3 Safety Recommendations

Please see the SDS (Safety Data Sheet) in the localized version applicable to 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).

Product	SDS No.
Amdry 6415	50-139
Amdry 6420	50-139
Metco 106	50-139
Metco 106F	50-139
Metco 106NS	50-139
Metco 6155	50-139
Metco 6156	50-1172
Metco 6416	50-1172
Metco 6445	50-1172

Information is subject to change without prior notice.