oerlikon
metco

Material Product Data Sheet
Titanium Oxide 45% Chromium Oxide Powder

Thermal Spray Powder Products: Metco 111

1 Introduction

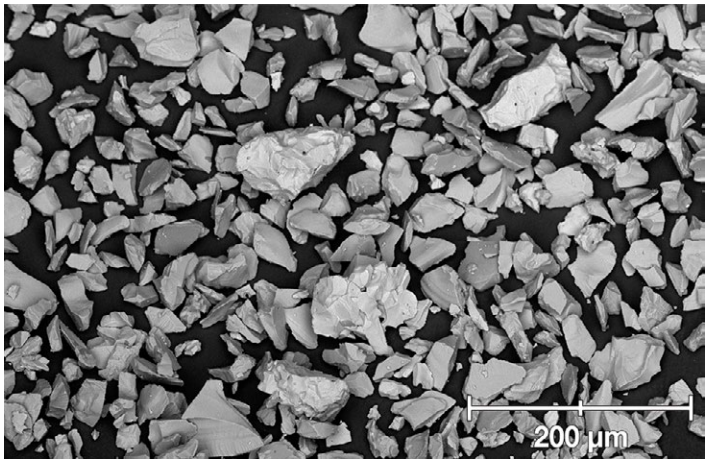
Pure titania (titanium oxide, TiO_2) is synonymous with dense, smooth and relatively ductile oxide ceramic coatings. However, these coatings are exhibit lower hardness and wear resistance compared to other ceramics. Addition of chromia (chrome oxide, Cr_2O_3) improves hardness and enhances the abrasion, wear, heat and corrosion resistance of these coatings.

Metco™ 111 is a powder blend of TiO_2 and 45 wt.% Cr_2O_3 powder that was originally developed for thermal spray coating applications in textiles industry. Since then it has found applications in a number of other industries.

1.1 Typical Uses and Applications

- Resistance to abrasive grains in applications such as mandrels for dry cell battery cores and oil industry sucker rod couplings
- Resistant to hard surfaces in applications such as drum doctor blades and machine tool chip breakers
- Provides a combination of low friction and wear resistance in applications such as cylinder bore liners

Quick Facts	
Classification	Oxide ceramic, titania based
Chemistry	TiO_2 45Cr_2O_3
Manufacture	Blend
Morphology	Angular, blocky
Purpose	Wear, heat and corrosion resistance
Service Temperature	≤ 540 °C (1000 °F)
Process	Atmospheric plasma spray or combustion powder Thermospray™



SEM Photomicrograph showing the morphology of Metco 111

2 Material Information

2.1 Chemical Composition

Product	Chemical Composition (wt. %)							
	TiO_2		Cr_2O_3 (44 – 46 %)					
	TiO_2	All Others	Cr_2O_3	TiO_2	SiO_2	Al_2O_3	Fe_2O_3	All Others
Metco 111	Balance	< 1	Balance	< 4.25	< 0.50	< 0.25	< 0.25	< 0.5

2.1 Chemical Composition

Product	Nominal Particle Size Distribution	Color	Morphology	Manufacturing Method
Metco 111	–63 +11 µm	Dark Grey	Angular / Blocky	Blend

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

2.3 Key Selection Criteria

- Choose Metco 111 when a coating that is harder and more wear, heat and corrosion resistant than pure titania is needed.
- Choose Metco 111 when a coating showing a higher fracture toughness, higher density and smoother surface finish than pure chromia is needed.

2.4 Related Products

Oerlikon Metco offers a variety of chromium oxide and titanium oxide materials, as well as various chromium oxide-titanium oxide compositions that can be used in a range of applications:

- For applications where hardness, wear and corrosion resistance are of primary importance, pure chromium oxide materials such as Amdry 6415, Amdry 6420, Metco 6156 and Metco 106NS can be applied. However, coatings of these materials exhibit lower impact resistance and fracture toughness than Metco 111.
- Chromia-titania compositions such as Cr_2O_3 40TiO_2 (Metco 6483), Cr_2O_3 5SiO_2 3TiO_2 (Metco 136CP, Metco 136F and Amdry 6462) and Cr_2O_3 2TiO_2 (Metco 106 and Metco 106F) produce coatings that exhibit progressively higher wear and corrosion resistance as the proportion of chromia increases, but their fracture toughness is generally not as high as that of Metco 111 coatings.
- For applications requiring dense, smooth coatings with moderate hardness and abrasive wear resistance, pure TiO_2 powders such as Metco 102, Amdry 6505 and Amdry 6510 can be used. Coatings of these materials also have moderate electrical conductivity that eliminates issues with static charge buildup. However, these coatings have lower hardness than coatings of Metco 111.

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.

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

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 111	1000080	5 lb (approx. 2.3 kg)	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

See SDS 50-141 (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).

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