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metco

Material Product Data Sheet
Pure Titanium Oxide Powders

Powder Products:
Metco™ 102, Amdry™ 6505, Amdry 6510

1 Introduction

Titanium oxide coatings are used for a wide variety of applications that include wear resistant coatings, electrically conductive coatings, dry lubricious coatings and decorative coatings.

Coatings of these materials are resistant to abrasive grains, hard surfaces and sliding wear. They are also corrosion resistant.

Overall, coatings of pure titanium oxide exhibit very good toughness for a ceramic material. Further, finer cuts can produce relatively dense coatings with good as-sprayed surface finishes.

Low electrical resistivity and favorable sputtering properties allow their use as sputter targets to deposit thin films of titania on architectural and automotive glass. The electrical properties of the coatings are strongly influenced by the stoichiometry (x-factor) of the powder.

1.1 Typical Uses and Applications

- Electrically conductive coatings for sputter targets for use in thin film processes to produce thin titania films on architectural and automotive glass
- Sliding wear resistance for automotive applications such as cylinder bore liners
- Oxygen sensors
- Decorative coatings having a dark gray color
- Mandrels for the production of dry cell batteries
- Biomedical implants
- Filter elements and membranes

Quick Facts	
Classification	Oxide ceramic, titania based
Chemistry	TiO_2 99.0 +
Manufacture	Fused and crushed
Morphology	Angular, blocky
Purpose	Wear and corrosion resistance, decorative, electrical conductance
Melting Point	1843 °C (3350 °F)
Service Temperature	≤ 540 °C (1000 °F)
Process	Atmospheric plasma spray, combustion powder Thermospray™

SEM Photomicrograph of Metco 102 showing typical fused and crushed morphology of these materials.

2 Material Information

2.1 Chemical Composition

	Chemical Composition (wt. %)					
	TiO_2	Al_2O_3	Fe_2O_3	SiO_2	All Others	x-factor
Metco 102	Balance	< 0.1	< 0.1	< 0.1	< 0.5	1.9
Amdry 6505	Balance	< 0.2	< 0.2	< 0.2	< 0.5	1.9
Amdry 6510	Balance	< 0.1	< 0.1	< 0.2	< 0.5	1.9

[a] Indicates the total of all remaining oxides which includes Al_2O_3, Fe_2O_3, SiO_2 and other trace oxides

2.2 Particle Size Distribution and Other Characteristics

	Nominal Particle Size Distribution	Color	Morphology	Manufacturing Method
Metco 102	–45 +11 µm	Dark Grey	Angular / Blocky	Fused and Crushed
Amdry 6505	–45 +5 µm	Dark Grey	Angular / Blocky	Fused and Crushed
Amdry 6510	–106 +38 µm	Dark Grey	Angular / Blocky	Fused and Crushed

Particle size of 45 µm and above determined by sieve analysis, lower particle sizes below 45 µm determined by laser diffraction (Microtrac).

2.3 Recommended Spray Process

	Atmospheric Plasma Spray	Combustion Powder Thermospray™
Metco 102	✓	✓
Amdry 6505	✓	✓
Amdry 6510	✓	✗

2.4 Key Selection Criteria

- Metco 102, Amdry 6505 and Amdry 6510 are are similar in chemistry, manufacturing process and morphology. They differ, however, in particle size distribution, which will have an affect on the density and as-sprayed surface finish of the coating. In general, finer cuts result in denser, smoother coatings.
- For wear and corrosion resistance, harder and denser coatings are preferred. For applications requiring thick coatings, some level of porosity must be present in the coating. Choose finer materials for dense, thinner coatings and coarser materials for thicker coatings.

2.5 Related Products

- Oerlikon Metco's product portfolio includes products that combine titania with either chromia or alumina. The addition of chromia or alumina to titania increases hardness and wear resistance of the coating. For example:
  - Coatings of products that combine chromia and titania feature increased hardness, wear resistance and corrosion resistance compared to coatings or pure titania. These products include Metco 111 (TiO_2-45CrO_3) and Metco 6482 (Cr_2O_3-40TiO_2).
  - Coatings of products that combine alumina and titania feature increased hardness and wear resistance proportional to the amount of alumina in the materials, but coating toughness decreases as titania is reduced. These products include Amdry 6240, Amdry 6244, Amdry 6250, Amdry 6254, Amdry 6257 and Metco 131VF (all Al_2O_3 – 40TiO_2), Amdry 6220, Amdry 6224, Amdry 6228, Metco 130, Metco 130SF (all Al_2O_3 – 13TiO_2), Metco 101SF, Amdry 6200, Metco 6203, Metco 101NS, Amdry 6204, Metco 101B-NS, Amdry 187, Amdry 6208 (all Al_2O_3– 3TiO_2).
  - Coatings of pure chromia materials or chromia materials containing very small amounts of titania can be used for applications requiring high wear and chemical resistance. Pure chromia coatings can withstand higher service temperatures compared to pure titania coatings. These products include Amdry 6415, Amdry 6420, Metco 6156, Metco 106NS, Metco 106, Metco 106F and XPT-D-062.
- Coatings of pure alumina can be used in many applications that require abrasive, sliding or erosive wear resistance such as wear pads, seal rings and liners. These products include Amdry 6060, Amdry 6062, Metco 105NS, Metco 105SFP, and Metco 6103. Materials of high purity alumina (Metco 105SFP and Metco 6103) are suitable for electrical, thermal and biomedical applications such as high tension and high temperature insulators, electronic uses, and medical implants.

3 Coating Information

3.1 Key Thermal Spray Coating Information

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

[a] Atmospheric plasma spray will produce denser coatings that can be ground to smoother finishes than coatings produced using combustion powder spray.
[b] Do not use these coatings at higher temperatures to avoid potential cracking as a result of phase transformation.

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 Thermal Spray Guns	
Combustion Powder	**Atmospheric Plasma**
Metco 6P-II series	Metco 9MB series
Metco 5P-II	Metco F4MB-XL series
	TriplexPro series
	SinplexPro series

4 Commercial Information

4.1 Ordering Information and Availability

	Order No.	Package Size	Availability	Distribution
Metco 102	1000079	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 6505	1005562	10 kg (approx. 22 lb)	Stock	Global
Amdry 6510	1002834	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

See the SDS 50-136 (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).

www.oerlikon.com/metco
info.metco@oerlikon.com