

# Material Product Data Sheet

## High Purity Aluminum Oxide Powder for Thermal Spray

### Thermal Spray Powder Products: Metco™ 6103

#### 1 Introduction

Metco 6103 is the highest purity aluminum oxide (alumina) powder available in the Oerlikon Metco product portfolio. The coatings made from this material, typically applied by plasma spray, exhibit excellent electrical insulation in terms of dielectric characteristics and thermal conductivity. In addition, the coatings are hard, wear resistant, chemically inert and stable at high temperatures.

In addition, coatings of Metco 6103 are resistant to plasma etching, making this an ideal material for use in chambers used for semi-conductor production. The coating characteristics are well-suited to withstand such operating environments and the very high purity of the material ensures that it will not contaminate semi-conductor components.

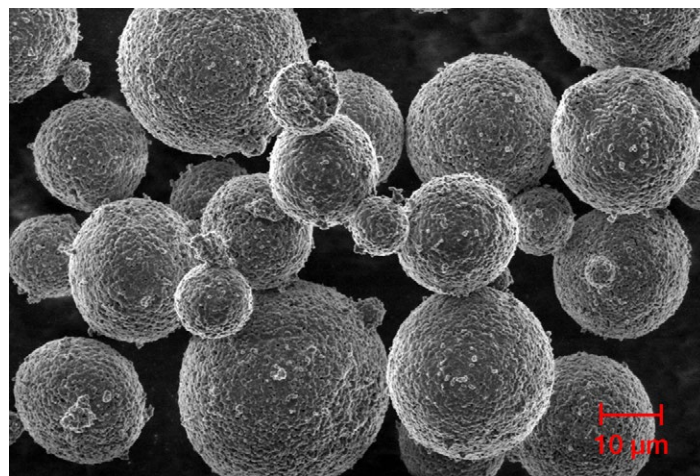
As a result of these characteristics, Metco 6103 is suitable for electrical, electronic and semiconductor manufacturing tooling applications, where the very high purity of the surfacing material is a critical factor for the application.

Metco 6103 is typically applied using atmospheric plasma spray. The agglomerated and sintered manufacturing method forms spheroidal powder particles, which are freely flowing and feed consistently well during spray processing.

#### 1.1 Typical Uses and Applications

- Vacuum chamber liners
- Electrostatic chucks and capacitors
- Current-insulating bearings
- Electrical insulators

Quick Facts	
Classification	Ceramic, alumina
Chemistry	Al <sub>2</sub> O <sub>3</sub> 99.9+
Manufacture	Agglomerated and sintered
Morphology	Spheroidal
Apparent Density	1.0 to 1.6 g/cm <sup>3</sup> (typical)
Service Temperature	≤ 1650 °C (3000 °F)
Melting Point	2054 °C (3729 °F)
Purpose	Electrical insulation; resistance to plasma etching
Process	Atmospheric plasma spray



SEM Photomicrograph of Metco 6103 showing the spheroidal morphology of this agglomerated and sintered product

## 2 Material Information

### 2.1 Chemical Composition

Product	Chemical Composition (wt. % nominal)						
	Al <sub>2</sub> O <sub>3</sub>	Na	Mg	Si	K	Ca	Fe
Metco 6103	99.9+	0.0050	0.0010	0.01	0.0045	0.01	0.0070

### 2.2 Particle Size Distribution and Other Physical Properties

Product	Nominal Particle Size Distribution (µm)	Color	Typical Apparent Density (g/cm <sup>3</sup> )	Manufacturing Method	Phase Composition
Metco 6103	-45 +15	White	1.3	Agglomerated & Sintered	Alpha Aluminum

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

### 2.3 Key Selection Criteria

- Metco 6103 has the highest purity and is suitable for PVD chamber linings, electrostatic chucks, electrical and electronic components, and current-insulation coatings on bearings.

### 2.4 Related Products

- Other Oerlikon Metco alumina products include Metco 105SFP, Metco 105NS and Amdry 6060 and Amdry 6062. These materials are suitable for electronic components where requirements are less stringent than that for coatings of Metco 6103. Please refer to data sheet DSMTS-0005.
- Alumina-titania materials produce coatings having a higher toughness and grindability than pure alumina products. However, they are not as hard, erosion resistant and insulating as pure alumina.
- Please see the appropriate data sheet for Oerlikon Metco alumina-titania products, with titania content of 3%, 13% and 40%.

## 3 Coating Information

### 3.1 Key Thermal Spray Coating Information

Specification	Typical Data	
Recommended Spray Process	Atmospheric plasma spray or HVOF	
Deposition Efficiency	65 to 73%	
Surface Profile	As-sprayed (Ra)	4 to 8 µm 158 to 315.0 µin
Macrohardness	89 – 90 HR15N	
Dielectric Strength	@ 25 °C (77 °F)	> 17.7 kV/mm 450 kV/in
Volume Resistivity	@ 25 °C (77 °F)	3.8 x 10 <sup>10</sup> Ω·cm 1.5 x 10 <sup>10</sup> Ω·in

Data provided is typical, but will vary significantly depending on the spray process, spray parameters and spray gun used.

### 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 Atmospheric Plasma Spray Guns

Metco F4MB-XL series

TriplexPro series

SinplexPro series

## 4 Commercial Information

### 4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 6103	1081244	2.5 kg (approx. 5.5 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 50-1482 (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](http://www.oerlikon.com/metco) (Resources – Safety Data Sheets).