

# Material Product Data Sheet

## Gadolinia-Containing Zirconium Oxide Powder for Thermal Spray

### Powder Products: Metco 6042

#### 1 Introduction

Oerlikon Metco's gadolinium-zirconium oxide powder is designed to produce coatings for advanced thermal barrier applications when applied using the atmospheric plasma thermal spray (APS) process.

Metco™ 6042 conforms to the Pratt and Whitney specifications. This powder is an agglomerated and plasma-densified (HOSP™) material.

Coatings of these products exhibit low thermal conductivity and improved CMAS resistance compared to APS coatings of legacy YSZ materials.

For maximum effectiveness and mechanical durability, these products should be applied as the top coat in a three-layer coating system that also consists of an appropriate MCrAlY bond coat layer and an intermediate layer of a 7% – 8% yttria-stabilized zirconia (YSZ).

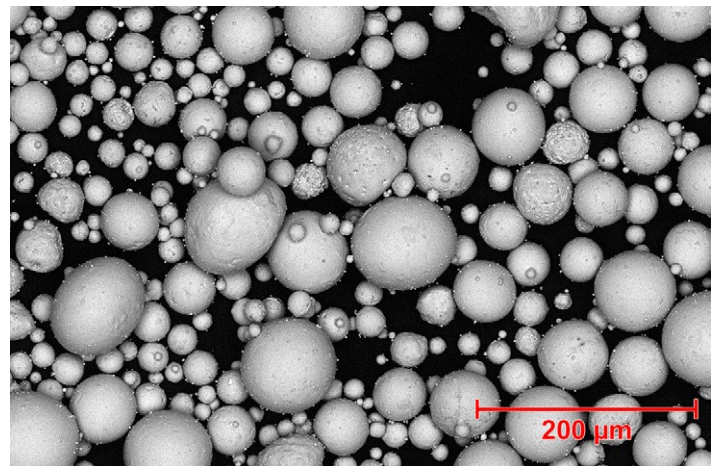
#### 1.1 Typical Uses and Applications

Typically used on industrial gas turbine or aero engine turbine components such as:

- Various types of buckets and vanes
- Combustion liners
- Transition ducts

#### Quick Facts

Classification	Oxide Ceramic, GdZr-based
Chemical formula	$Gd_2O_3-ZrO_2$
Manufacture	Agglomerated and Sintered or Agglomerated and Plasma Densified
Morphology	Spheroidal
Service Temperature	$\leq 1500\text{ }^\circ\text{C}$ (2730 °F)
Purpose	Thermal Barrier
Process	Atmospheric Plasma Spray



Typical SEM photograph of Metco 6042, a spherical, agglomerated and plasma-densified Gadolinium Zirconate powder.

## 2 Material Information

### 2.1 Chemical Composition, Size Distribution and Other Properties

Product	Chemistry	Nominal Size Distribution (µm)	Manufacturing Method	Morphology
Metco 6042	Proprietary	-120 +16	Agglomerated and Plasma Densified	Spheroidal

Particle size equal to or above 45 µm determined by sieve analysis; below 45 µm by laser diffraction (Microtrac)

### 2.2 Key Selection Criteria

- Choose the appropriate product to meet the required OEM specifications
- Metco 6042 is an excellent choice for top coats in a thermal barrier coating system where moderate to high porosity is required (5% to 20% by volume) to provide enhanced thermal insulation in conjunction with CMAS resistance.
- For high purity HOSP materials, please refer to the materials designated as "Premium" products. These products are recommended for thermal barrier coatings with standard porosity levels.
- Metco 206A is designed to produce advanced low-K thermal barrier coatings. It is also manufactured using high-purity raw materials.
- Metco 6700 is a fine, agglomerated and sintered YSZ material designed for applications using the PS-PVD spray process to produce coatings with structures similar to those produced using EB-PVD.
- YSZ coatings and coatings of Metco 143 typically exhibit good erosion resistance.
- Oerlikon Metco also offers a complete portfolio of bond coat materials, including MCrAlY materials most often used as a bond coat for these thermal barrier materials.

### 2.3 Related Products

- Oerlikon Metco offers 8 % yttria-stabilized zirconia powders manufactured from high purity raw materials include HOSP™ (agglomerated and plasma densified) and agglomerated and sintered materials. These high purity YSZ products produce coatings with enhanced structural stability, thermal shock and insulation properties.

### 2.4 Customer Specifications

Product	Customer Specifications
Metco 6042	Pratt and Whitney PWA 36390

## 3 Coating Information

### 3.1 Key Thermal Spray Coating Information

Coating properties and parameters are proprietary to Siemens Energy or Pratt and Whitney.

#### Recommended Atmospheric Plasma Spray Guns

Metco F4MB-XL series

Metco 9MBM

SinplexPro series

TriplexPro series

## 4 Commercial Information

### 4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 6042	1092338	12.5 lb (approx 5.7 kg)	Stock	Global

Note: This material is only available to OEM-qualified buyers.

#### **4.2 Handling Recommendations**

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

#### **4.3 Safety Recommendations**

See SDS 50-1791 (Safety Data Sheet) in the version localized for 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).