

Material Product Data Sheet

Fine Gadolinium Zirconate Powder for Thermal Spray

Powder Products: Metco 6041A

1 Introduction

Metco™ 6041A is an agglomerated and plasma-densified (HOSP™) gadolinium zirconate ($Gd_2-Zr_2O_7$) powder. Metco 6041A is specifically designed for use as a top coat for thermal barrier applications that require dense or dense, segmented microstructures applied using atmospheric plasma spray technology. It can be used as a top coat in a coating system to combat CMAS attack.

The main advantages of this material over 7 to 8 wt% yttria-stabilized zirconia materials are its lower conductivity and its phase stability at elevated engine temperatures that extend the service life of the coating. However, this material has limitations in erosion resistance compared to 7 to 8 wt% yttria-stabilized zirconia having the same particle size and morphology (ex. Metco 204F).

The gadolinium zirconate chemistry also offers resistance to molten sand and ash (known as CMAS). The material is optimized for depositing top coats with very low porosity, which enables the potential to create dense, segmented microstructures.

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 to 8 wt% yttria-stabilized zirconia (YSZ).

1.1 Typical Uses and Applications

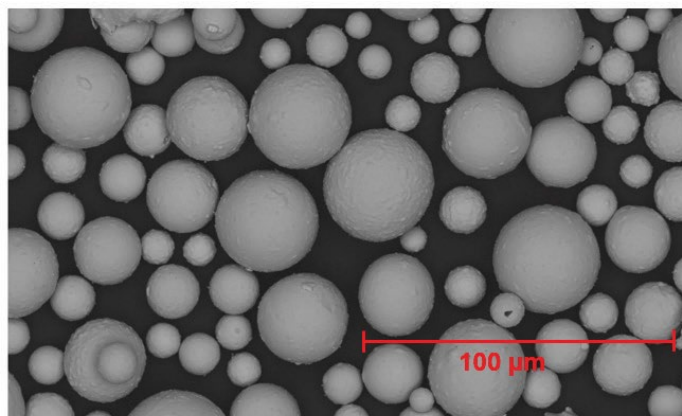
Typically used on aero engine turbine components such as:

- Turbines blades and vanes
- Combustion section components
- Transition liners

Quick Facts

Classification	Oxide Ceramic, GdZr-based
Chemical formula	$Gd_2Zr_2O_7$
Manufacture	Agglomerated and HOSP
Morphology	Spheroidal
Service Temperature	$\leq 1500\text{ }^\circ\text{C}$ ($2730\text{ }^\circ\text{F}$)*
Purpose	Thermal Barrier
Process	Atmospheric Plasma Spray

*With a suitable bond coat and interlayer



Typical SEM photograph of Metco 6041A, 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 6041A	Gd ₂ Zr ₂ O ₇	-45 +15	Agglomerated and HOSP	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 Metco 6041A for applications where high temperature insulation (thermal barrier) coating is needed. Also select this powder when the application calls for:
 - Dense TBC coatings with a segmented structure
 - The top coat in a multi-layer coating system that is CMAS (molten sand and ash) resistant
 - Lower thermal conductivity than achievable using 7 to 8 wt% yttria stabilized zirconia materials with similar coating microstructures
 - Excellent phase stability resulting in longer service life
 - Top coat layer for advanced TBC systems.
- Oerlikon also offers a wide-range of MCrAlY bond coat materials in various chemistries and particle size distributions appropriate for application using various thermal spray processes.
- Oerlikon Metco also offers an ethanol-based suspension of the gadolinium zirconate chemistry as Metco 6610A which contains 20% powder by weight and ethanol as the liquid carrier. The choice of the solid loading and the alcohol carrier is a common configuration for thermal barrier coating development using suspension plasma spray.

2.3 Related Products

- Oerlikon Metco offers a wide range of legacy 8% yttria-stabilized zirconia products along with an array of powders with advanced chemistries to enable the design of advance multi-layer TBC systems
- Oerlikon Metco also offers various products for lower thermal conductivity topcoat materials such as Metco 205NS and Metco 206A.

3 Coating Information

3.1 Coating Parameters

Please contact your Oerlikon Metco Account Representative for parameter availability. For specific coating application requirements, including the development of advanced, segmented TBCs, the services of Oerlikon Metco's Coating Solution Centers are available.

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 6041A	1535692	12.5 lb (approx 5.7 kg)	Stock	Global

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 50-2691 (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 (Resources – Safety Data Sheets).