

Material Product Data Sheet

48 % Yttria Stabilized Zirconia Fused and Crushed Thermal Spray Powders

Powder Products: Metco 215A

1 Introduction

Metco™ 215A is a fused and crushed 48 wt % yttria-stabilized zirconia (48Y₂O₃ ZrO₂). Metco 215A 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 also be used as a top coat in a coating system to combat CMAS attack.

This high percentage of Y₂O₃ fully stabilizes the ZrO₂ at approximately 48 wt. % Y₂O₃. The main advantages of this material over the conventional 7 to 8 wt % yttria-stabilized zirconia materials is its low conductivity and its phase stability at elevated engine temperatures that extend the service life of the coating. However, the material has limitations in erosion resistance compared to 7 to 8 wt % yttria-stabilized zirconia (Metco™ 214A) having the same irregular morphology.

The presence of higher Y₂O₃ also offers resistance to molten sand and ash (also known as CMAS). The fused and crushed manufacturing method and the angular morphology produces a thermal sprayed TBC top coat with very low porosity, which gives rise to the potential to create dense, segmented microstructures.

It is recommended that an intermediate layer of 7 to 8 wt % yttria-stabilized zirconia is applied when using Metco 215A.

Potential users of this material are advised to review existing intellectual property before developing and optimizing multi-layer TBC systems.

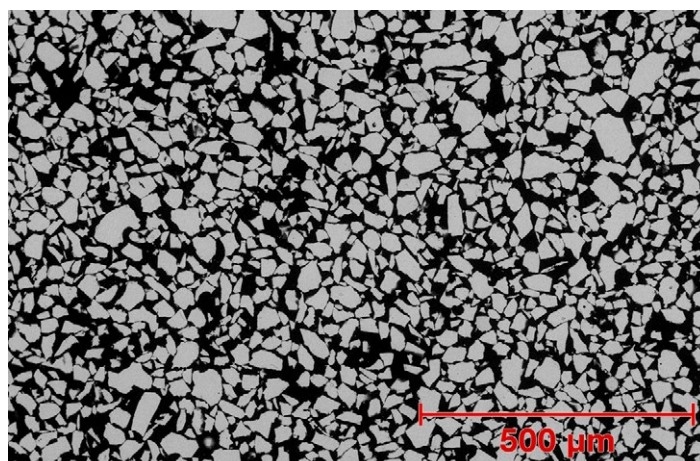
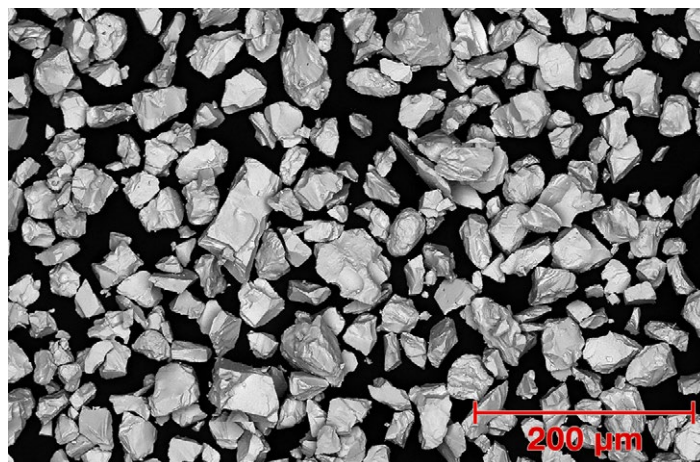
1.1 Typical Uses and Applications:

Hot section components of gas turbines, such as:

- Turbine blades and vanes
- Combustion section components
- Transition liners
- Augmenters

Quick Facts

Classification	Ceramic, zirconia-based
Chemical Formula	ZrO ₂ 48Y ₂ O ₃
Manufacture	Fused and crushed
Morphology	Irregular
Melting Point (typical)	2700 °C (5072 °F)
Purpose	Thermal insulation
Process	Atmospheric plasma spray



Metco 215A morphology. Top: outer morphology. Bottom: inner morphology showing dense structure.

2 Material Information

2.1 Chemical Composition

Product	Weight Percent (typical)									Monoclinic ZrO ₂ (vol. % max)
	ZrO ₂	HfO ₂ (max)	Y ₂ O ₃	Al ₂ O ₃ (max)	SiO ₂ (max)	Fe ₂ O ₃ (max)	TiO ₂ (max)	Other Oxides (max)	U + Th (max)	
Metco 215A	Balance	2.5	45 – 51	1.0	1.0	0.5	0.5	1.0	0.2	< 6

2.2 Particle Size Distribution and other physical characteristics

Product	Nominal Particle Size Distribution (µm)	Color	Morphology
Metco 215A	-63 +11 µm	White	Angular

2.3 Key Selection Criteria

- Choose Metco 215A 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-resistant
 - Lower thermal conductivity than achievable using 7 to 8% YSZ materials with similar coating microstructures
 - Excellent phase stability resulting in longer service life
 - Application cost savings resulting from high deposition efficiencies
 - TBC coating thickness up to 1 mm (0.40 in)
 - Top coat layer for advanced TBCs

2.4 Related Products

- Oerlikon Metco offers a wide range of 7 to 8 wt% yttria-stabilized zirconia powders. For multilayer systems

using Metco 215A as a top coat material recommended intermediate coating materials include Metco 204B, Amdry 204NS-1, Metco 204F, Metco 204H and Metco 214A.

- Metco 207 and Metco 208 are fully-stabilized zirconia materials manufactured using the HOSP process (agglomerated and plasma densified) that can be used for CMAS resistance in GE applications.
- Oerlikon Metco 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.

2.5 Recommended Spray Processes

Product	Atmospheric Plasma Spray
Metco 215A	✓

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.

3.2 Key Thermal Spray Coating Information

Recommended Atmospheric Plasma Spray Guns	
Standard Microstructures	Dense Segmented Microstructures
TriplexPro series	TriplexPro series
SinplexPro series	SinplexPro series
F4MB-XL series	
9MB series	

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 215A	1306717	5 kg (approx. 11 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 SDS 50-2471 (Safety Data Sheet) in the localized version applicable to the product and 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).