

Material Product Data Sheet

20 % Ytria Stabilized Zirconia Powders

Thermal Spray Powder Products: Metco 202NS, Metco 6620A, Metco 6620C

1 Introduction

Metco™ 202NS, Metco 6620A and Metco 6620C are zirconium oxide powders stabilized with 20% yttrium oxide ($ZrO_2-20Y_2O_3$) suitable to produce thermal sprayed coatings.

Metco 202NS is an agglomerated (spray dried) materials, whereas Metco 6620A and Metco 6620C are agglomerated and plasma densified. The spherical shape of the particles offers excellent flowability.

Yttrium oxide is a superior stabilizer for zirconia. Metco 6620A and Metco 6620C are a fully stabilized powders. Metco 202NS stabilizes during plasma spraying. These coatings have better chemical and thermal stability than calcium oxide stabilized zirconium oxide coatings. Properly applied coating systems using these products are appropriate for applications up to 1500 °C (2730 °F).

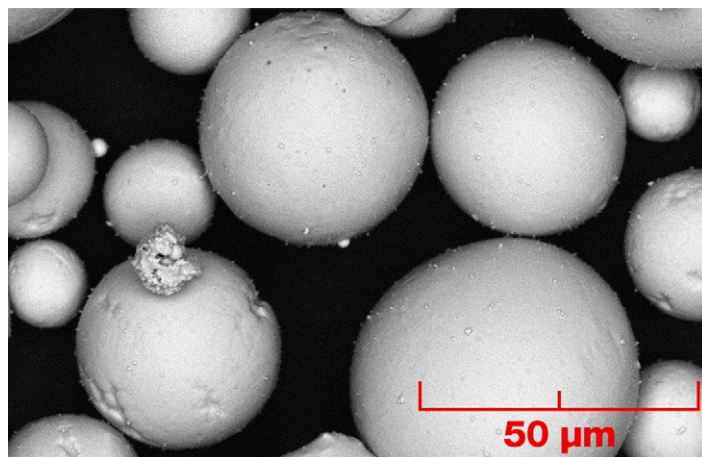
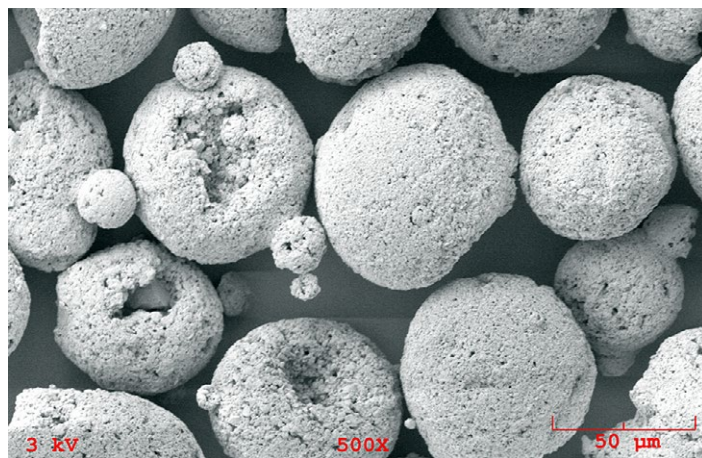
All of these products are certified for use by turbine engine manufacturers. Metco 6620A and Metco 6620C are proprietary to GE and available only to qualified buyers.

1.1 Typical Uses and Applications

- Thermal barrier coatings for rocket engine, aero turbine and industrial gas turbine components.
- Particle erosion resistant coatings for rocket nozzles and missile nose cones.

Quick Facts

Classification	Oxide ceramic, zirconia based
Chemistry	$ZrO_2-20Y_2O_3$
Manufacture	Agglomerated or agglomerated and plasma densified
Morphology	Spheroidal
Apparent density	1.6 - 2.6 g/cm ³
Flow rate	30 – 65 s / 50 g
Melting point	2480 °C (4500 °F)
Service Temperature	≤ 1500 °C (2730 °F)
Purpose	Thermal protection
Process	Atmospheric Plasma Spray



Photomicrographs of Metco 202NS (top) and Metco 6620C (bottom).

2 Material Information

2.1 Chemical Composition

	Chemical Composition (wt. %)		
	ZrO ₂ (min) ¹	Y ₂ O ₃	Other Oxides (max)
Metco 202NS	75	18–22	8.0
Metco 6620A	Proprietary		
Metco 6620C	Proprietary		

¹ Including a maximum of 2.5% HfO₃, counted as ZrO₂

2.2 Particle Size Distribution

	Nominal Range (µm)	Microtrac Analysis (%)		Apparent Density g/cm ³
		-125 µm	-16 µm	
Metco 202NS	-90 +16	85 min	5 max	1.6
Metco 6620A	Proprietary	Proprietary		Proprietary
Metco 6620C	Proprietary	Proprietary		Proprietary

Microtrac by laser light diffraction per ASTM C 1070

Note: Other particle size distributions are available on request for Metco 202NS.

2.3 Key Selection Criteria

- Choose the product that meets the required customer material specifications.
- Coatings produced from these materials can provide particle erosion resistance above 845 °C (1550 °F).
- Coatings provide high thermal shock resistance.
- These materials can be used as matrix materials for high-temperature abrasable coatings.

2.4 Related Products

- Metco 204 series materials are 7 – 8 wt.% yttria stabilized zirconia powders, manufactured by Oerlikon Metco's HOSP™ process, which ensure the powder is spherical with excellent flow and high deposit efficiency during the coating process. Also the coatings are more stable at

high temperatures than coatings of Metco 202NS and can be used at higher service temperatures with longer thermal cyclic service life.

- Coatings of Metco 202NS have a lower thermal conductivity than coatings of Metco 204 series materials.
- Metco 222A, Metco 231A, Metco 233A, Metco 233B, Metco 233C, Metco 234A are agglomerated and sintered 7 - 8 wt. % yttria stabilized zirconia materials that are designed to produce coatings with higher porosity than the HOSP materials.
- Coatings of Metco 143 are more resistant to high temperature erosion and scuffing, and harder than coatings of Metco 202NS.
- Coatings of Metco 205NS provide superior hot corrosion resistance over coatings of Metco 202NS.

2.5 Customer Specifications

Product	Customer Specifications
Metco 202NS	Chromalloy BZ-003 Type 51 GE A50TF204, CI A Honeywell M3966, Type I Pratt & Whitney PWA 36087 Rolls-Royce plc MSRR 9507/37
Metco 6620A	GE A50AG4, CI A ^a
Metco 6620C	GE A50AG4, CI C ^a

^a Conforms to these specifications, but not able to be certified

3 Coating Information

3.1 Key Thermal Spray Coating Information

Specification			Typical Data (for Metco 202NS)	
Recommended Process			Atmospheric Plasma Spray	
Bond Coat			A high temperature bond coat is required, Metco 450NS, Amdry 956, Metco 443NS, Amdry 960, Amdry 962 or Amdry 995 are recommended choices.	
Macrohardness	HR15N	as sprayed	78 – 83	
Microhardness	HV0.3	as sprayed	500 – 600	
Coating Density			4.9 – 5.1 g/cm ³	
Maximum Service Temperature			≤ 980 °C	≤ 1800 °F
Porosity			6 – 12 vol.%	
Machining Recommendation			Wet grind	
Surface Roughness	As sprayed	Ra	6 – 12 µm 0.4 – 1.0 µm	
	Ground (150 grit)	Ra		
			250 – 500 µin	15 – 40 µin

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 9MB series	Metco F4 series
Metco 3MB series	TriplexPro series
Metco 11MB	SinplexPro series

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 202NS	1000354	5 lb (approx. 2.25 kg)	Stock	Global
	1000587	12.5 lb (approx. 5.7 kg)	Stock	Global
Metco 6620A ^a	1092195	12.5 lb (approx. 5.7 kg)	Stock	Global
Metco 6620C ^a	1092198	12.5 lb (approx. 5.7 kg)	Special Order	Global
	1096957	5 kg (approx. 11 lb)	Stock	Global

^a Only available to GE-qualified buyers.

4.2 Handling Recommendations

- Store in the original container in a dry location.
- Tumble contents gently prior to use to prevent segregation and also avoid breakdown of the powder particles.
- Open containers should be stored in a drying oven to prevent moisture pickup.

4.3 Safety Recommendations

See the SDS (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).

Product	SDS No.
Metco 202NS	50-148
Metco 6620A	50-1955
Metco 6620C	50-1955

Information is subject to change without prior notice.