

# Material Product Data Sheet

## Magnesium Zirconate – Nickel Chromium Cermet Blends

### Thermal Spray Powder Products: Metco 303NS-1, Metco 441NS-1

#### 1 Introduction

Metco™ 303NS-1 and Metco 441NS-1 are blends of magnesium zirconate and nickel-chromium alloy powders. They are used as thermal sprayed intermediate coatings in a three layer quasi-graded coating system that would also consists of an underlying bond coat of a nickel-chromium alloy, such as Metco 443NS, and a final top coat of a magnesium-zirconate ceramic, such as one of the Metco 210 series materials or Amdry 333.

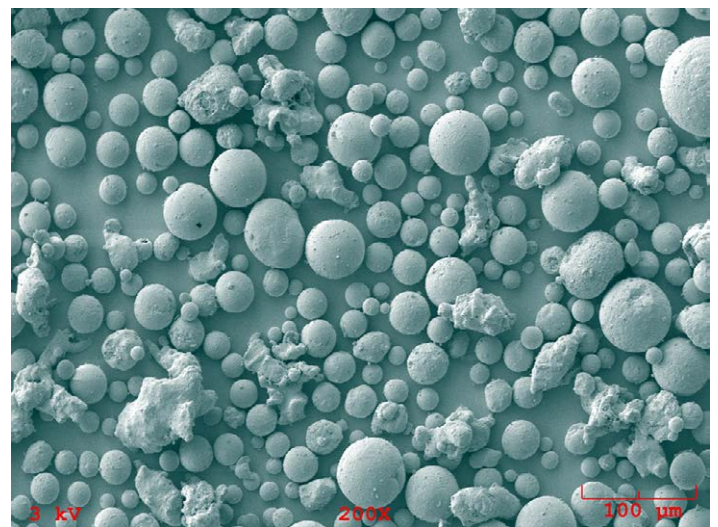
Coatings of Metco 303NS-1 or Metco 441NS-1 as an intermediate layer in such a coating system are characterized by a coefficient of expansion between that of the metallic bond coat and the oxide ceramic top coat. Thus, thermal stresses are well-distributed throughout the three-layer coating system. As a result, the quasi-graded coating is highly resistant to spalling and other thermal shock effects, creating an excellent thermal barrier coating.

#### 1.1 Typical Uses and Applications

- Thermal sprayed coatings of Metco 303NS-1 or Metco 441NS-1 are used as an intermediate layer in a three-part graded, thermal barrier coating system on jet engine combustion chambers.

#### Quick Facts

Classification	Cermet
Chemistry	MgZrO <sub>3</sub> NiCr (or NiCrAl)
Manufacture	Blended
Purpose	Thermal barrier intermediate layer
Morphology	Angular and blocky / spheroidal
Service Temperature	≤ 900 °C (1650 °F)
Process	Atmospheric plasma spray



SEM photomicrograph of Metco 303NS-1 showing the morphology typical of these cermet blend materials

## 2 Material Information

### 2.1 Chemical Composition

Product	Chemical Composition (nominal weight %)						
	Oxide Ceramic (64% – 66% of Blend)			Metallic Constituent (34% – 36% of Blend)			
	ZrO <sub>2</sub>	MgO	Other Oxides (max)	Ni	Cr	Al	Other (max)
Metco 303NS-1	Balance	15 – 30	7	72 – 85	13 – 25	–	10
Metco 441NS-1	Balance	15 – 30	7	65 (min)	15 – 22	2 – 10	10

### 2.2 Particle Size Distribution

Product	Nominal Distribution (µm)
Metco 303NS-1	–90 +11
Metco 441NS-1	–90 +11

Particle size analysis using sieve in accordance with ASTM B214 (upper range) and laser diffraction (lower range). Other particle size distributions are available on request.

### 2.3 Key Selection Criteria

- Choose the product that meets the required customer material specification.
- Choose Metco 303NS-1 when the metallic bond coat product used is a nickel-chromium powder.
- Choose Metco 441NS-1 when the metallic bond coat used is a nickel-chromium-aluminum powder.

### 2.4 Related Products

- Metco 43C-NS, Metco 43F-NS, Metco 43VF-NS, Metco 4548, Metco 5640NS, Amdry 4532 and Amdry 4535 are nickel -chromium materials that can be used as a compatible bond coat with an intermediate coat of Metco 303NS-1

- Metco 443NS and Amdry 960 are nickel-chromium-aluminum materials that can be used as a compatible bond coat with an intermediate coat of Metco 441NS-1.
- Metco 210, Metco 210NS-1, Metco 210NS-1-G, and Amdry 333 are magnesia-stabilized zirconium oxide materials that can be used as a compatible top coat with either Metco 303NS-1 or Metco 441NS-1.
- Metco 410 is an alumina-nickel-aluminum cermet material. Coatings sprayed with Metco 410 have a higher wear resistance compared to those sprayed with magnesium zirconate-nickel-chromium cermets. Metco 410 should be used with a top coat of an alumina material such as Metco 105SFP, Metco 105NS, Amdry 6060 or Amdry 6062.

### 2.5 Customer Specifications

Product	Customer Specification
Metco 303NS-1	Jet Avion JA 1346 Pratt & Whitney PWA 1346 Rolls-Royce plc MSRR 9507/28
Metco 441NS-1	Rolls-Royce OMAT 3/137 Rolls-Royce plc MSRR 9507/20

## 3 Coating Information

### 3.1 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 3MB series  
Metco 9MB series  
Metco F4 series  
SinplexPro series

## 4 Commercial Information

### 4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 303NS-1	1000583	5 lb (approx. 2.25 kg)	Special Order	Global
Metco 441NS-1	1000604	5 lb (approx. 2.25 kg)	Special Order	Global

### 4.2 Handling Recommendations

- Store in the original container in a dry location.
- Open 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 the SDS (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).

Product	SDS No.
Metco 303NS-1	50-154
Metco 441NS-1	50-171

Information is subject to change without prior notice.