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metco

Material Product Data Sheet
Tungsten Carbide 12 % Cobalt + Self-Fusing Nickel Alloy Thermal Spray Powder Blends

Thermal Spray Powder Products:
Metco 439NS, Metco 439NS-2, Metco 1123

1 Introduction

Metco™ 1123 is a blend of tungsten carbide cobalt powder and a self-fluxing alloy. Similarly, Metco 439NS and Metco 439NS-2 are blends with tungsten carbide cobalt and a self-fluxing alloy, but have the addition of a nickel-aluminum powder that, in combination with the self-fluxing alloy, creates a self-fusing matrix.

The coatings are usually used in the as-sprayed condition. This allows the coatings to be used in applications where fusing of the coating is not feasible, such as on thin-wall components or substrates that may distort during fusing.

While coatings of Metco 1123 are sprayed relatively thick and porous, coatings of Metco 439NS and Metco 439NS-2 can be sprayed only as thin and dense coatings. This is a result of fusing and associated coating shrinkage caused by an exothermic reaction of the nickel-aluminum component and presence of the self-fluxing alloy.

All of these materials produce coatings that are erosion and abrasion resistant due to their tungsten carbide content and hard nickel based matrix with precipitates of secondary phases.

Coatings of Metco 1123 are well-suited to resist severe erosion and abrasion by exhaust gas entrained ash and soot. Coatings of Metco 439NS and Metco 439NS-2 can be ground to very smooth finishes thanks to their low porosity and relatively low carbide content.

1.1 Typical Uses and Applications

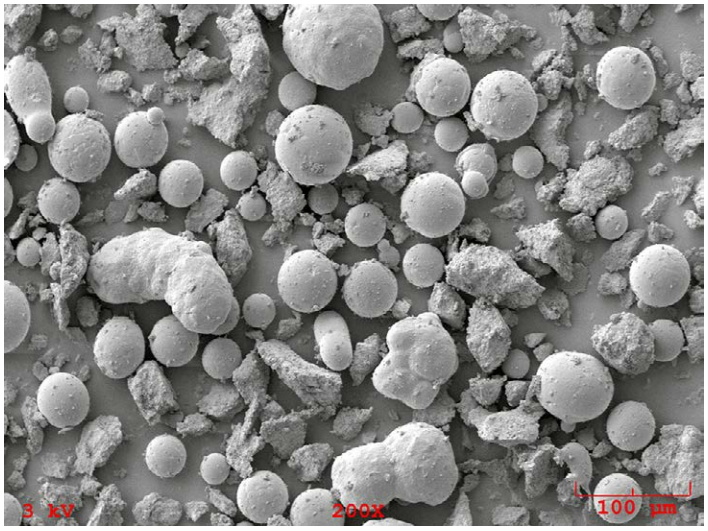
Metco 439NS and Metco 439NS-2:

- As an alternative to self-fluxing materials when fusing is not desirable due to the substrate material properties or part geometry.
- Thermal sprayed alternative for hard chromium plating.
- Pulp and paper manufacture: digesters, liquor tanks.
- Gas turbine applications: ducts, bleed manifold rings.

Metco 1123:

- Induced draft centrifugal fan blades in coal, oil, and gas-fired power plants.
- General purpose, hard, wear resistant tungsten carbide coating.

Quick Facts	
Classification	Carbide, tungsten-based
Chemistry	WC 12Co + self-fusing Ni alloy
Manufacture	Blended
Morphology	Spheroidal / angular and blocky
Purpose	Wear and corrosion protection
Service Temperature	≤ 500 °C (930 °F)
Process	Atmospheric plasma spray or combustion powder Thermospray™



Morphology of Metco 439NS powder blend

2 Material Information

2.1 Chemical Composition

Product	Chemical Composition (nominal wt. %)							
	WC 12Co	Ni	Cr	Al	Fe	Si	B	C
Metco 439NS	50	Bal.	5.8	2.8	1.4	1.4	1.3	0.3
Metco 439NS-2	50	Bal.	5.8	0.7	1.4	1.4	1.3	0.3
Metco 1123	75	Bal.	4.3	–	1.0	1.0	0.9	0.2

2.2 Particle Size Distribution and Other Characteristics

Product	Nominal Particle Size Distribution (µm)	Morphology	Manufacturing Method
Metco 439NS	–63 +11	Spheroidal / angular and blocky	Blended
Metco 439NS-2	–75 +11	Spheroidal / angular and blocky	Blended
Metco 1123	–90 +31	Spheroidal / angular and blocky	Blended

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

2.3 Key Selection Criteria

- Choose Metco 439NS to meet required customer material and process specifications. Metco 439NS-2 or Metco 1123 should be used for economical, general-purpose tungsten carbide coatings which do not require OEM certifications.
- Choose Metco 439NS or Metco 439NS-2 for very smooth coating finishes, reasonable wear resistance and thin coatings.
- Metco 439NS and Metco 439NS-2 are designed to produce thin coatings. Coatings thicker than 0.13 mm (0.005 in) are not recommended on ground surfaces and coatings thicker than 0.38 mm (0.015 in) are not recommended on grit blasted surfaces. Metco 1123 can be sprayed to thicknesses exceeding 1.8 mm (0.070 in) on grit blasted surfaces.
- Metco 439NS and Metco 439NS-2 coatings are self bonding to ferrous, titanium and aluminum materials.
- Metco 439NS and Metco 439NS-2 are self-fusing materials and coatings shrink nearly 10 % as they are applied. Therefore the substrate must be preheated before and during spraying. Substrate preheating is also recommended for Metco 1123.

2.4 Related Products

- Metco 430NS produces self-fusing, chromium carbide – nickel aluminide coatings that are less wear resistant than Metco 439NS, Metco 439NS-2 and Metco 1123, but they can be used up to 820 °C (1500 °F).
- Significantly better wear resistance can be achieved with WC 12Co and WC 17Co powders such as WOKA 31XX and WOKA 32XX series products and other Metco, Amdry or Diamalloy tungsten carbide cobalt products.
- Choose WC 10Co 4Cr powders, such as Amdry 5843, Diamalloy 5849, Diamalloy 5847-1, WOKA 36XX series, Metco 5847 and Metco 5842, for applications where both wear (abrasion, erosion, fretting) and corrosion resistance below 500 °C (930 °F) are required.
- If solid particle erosion, high temperature wear and oxidation resistance up to approximately 800 °C (1470 °F) is required, Cr_3C_2-NiCr products, such as WOKA 71XX, WOKA 72XX or WOKA 73XX series, can be used.

2.5 Customer Specifications

Product	Customer Specification
Metco 439NS	GE B50TF30, Class A Honeywell EMS 52417, Class I Honeywell M3954 Pratt & Whitney PWA 1322

3 Coating Information

3.1 Key Thermal Spray Coating Information

Specification		Typical Data			
		Metco 439NS and Metco 439NS-2		Metco 1123	
Recommended Process		Atmospheric plasma spray or combustion powder Thermospray™			
Deposit Efficiency	%	55 – 70		70 – 75	
Macrohardness	HRC	45 – 50		45 – 47	
Porosity	vol. %	< 1		10 – 13	
Density	g/cm^3	9.5		8.9 – 9.4	
Shrinkage	vol. %	approx. 10		none	
Surface Roughness Ra	as sprayed ground lapped	5 – 10 µm 0.2 – 0.3 µm 0.05 – 0.1 µm	200 – 400 µin 8 – 12 µin 2 – 4 µin	10 – 13 µm 0.4 – 1.0 µm ---	400 – 500 µin 16 – 40 µin ---
Preheat Recommendation		Substrate should be preheated and temperature maintained during spraying. The preheat temperature depends on the substrate material and part geometry.			

Data provided is typical and variability can be expected. Changes in spray process, spray equipment or spray parameters can significantly change coating results.

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 Spray Guns	
Atmospheric Plasma	Combustion Powder
Metco 3MB series	Metco 5P-II
Metco 9MB series	Metco 6P-II series
Metco F4 series	
SinplexPro series	
TriplexPro series	

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 439NS	1000061	5 lb (approx. 2.25 kg)	Stock	Global
Metco 439NS-2	1000128	5 lb (approx. 2.25 kg)	Stock	Global
Metco 1123	1000572	5 lb (approx. 2.25 kg)	Special Order	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.
- Remove desiccant prior to use, if applicable.

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 (Resources – Safety Data Sheets).

Product	SDS No.
Metco 439NS	50-168
Metco 439NS-2	50-168
Metco 1123	50-378

Information is subject to change without prior notice.

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