

Material Product Data Sheet

Self-Fusing Chromium Carbide – Nickel Aluminide Blend

Thermal Spray Powder Products: Metco 430NS

1 Introduction

Metco 430NS is a self-fusing chromium carbide – nickel aluminide powder blend.

Metco 430NS may be considered as an alternative to self-fluxing materials when the heat required to fuse the coating is undesirable or impossible because of the properties of the substrate material, dimensions of the part or for other reasons. However, unlike a fused, self-fluxing coating, self-fusing materials produce coatings that are not metallurgically bonded to the substrate and are not quite as dense. Metco 430NS partially fuses during the spray process without the need for a post-coat fusing operation. This is achieved through the use of mechanical mixtures of powders consisting of an alloy and a high enthalpy material, such as molybdenum, an exothermically reacting composites such as nickel-aluminum and low melting point phase formers such as boron and silicon.

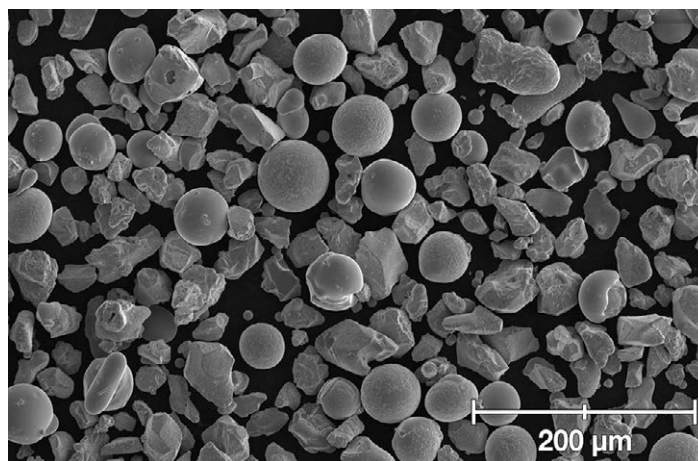
The coating structure produced by Metco 430NS consists of a chromium carbide-nickel matrix and hard phases of nickel and chromium borides, carbides, and carboborides. This ensures a combination of good resistance to wear and corrosion.

1.1 Typical Uses and Applications

- Fuel rod mandrels
- Hot crushing rolls
- Forging tools
- Exhaust valves
- Exhaust valve seats
- Turbine baffle dampeners

Quick Facts

| | |
|---------------------|--|
| Classification | Carbide, chromium-based |
| Chemistry | Cr_3C_2 7(Ni 20Cr) + self-fusing nickel alloy |
| Manufacture | Blended |
| Morphology | Spheroidal / angular and blocky |
| Purpose | High temperature wear and hot corrosion resistance |
| Service Temperature | ≤ 820 °C (1500 °F) |
| Process | Atmospheric plasma spray, combustion powder Thermospray™ or HVOF |



Morphology of Metco 430NS

2 Material Information

2.1 Chemical Composition and Phase Constituents

| Product | Chemical Composition (wt. %) | | | | | | | |
|-------------|------------------------------|----|----|---|----|----|---|----|
| | Co | Cr | Ni | C | Al | Mo | B | Si |
| Metco 430NS | Balance | 48 | 28 | 6 | 2 | 2 | 1 | 1 |

2.2 Particle Size Distribution

| Product | Nominal Particle Size Distribution |
|-------------|------------------------------------|
| Metco 430NS | -75 +10 µm |

Upper particle size analysis via sieve. Lower size analysis via laser diffraction (Microtrac).

2.3 Key Selection Criteria

- High toughness, without cracking, and high hardness are supported by an optimum composition of metallic elements with carbon, boron and silicon.
- Metco 430NS is designed to produce thin coatings. Coatings thicker than 0.38 mm (0.015 in) are not recommended.
- Coatings applied using the HVOF process are dense and very well-bonded, with a more homogeneous microstructure than can be obtained using air plasma spray or combustion powder spray processes.

2.4 Related Products

- Chromium carbide materials such as Metco 81NS and Metco 81VF-NS are superior in oxidation and erosion resistance to Metco 430NS, and can be used at higher

service temperatures up to 870 °C (1600 °F). However, self-fusing coatings of Metco 430NS generally have better abrasion resistance and produce a smoother as-sprayed surface.

- Coatings of Metco 430NS are more resistant to oxidation than coatings of Metco 404NS and Metco 450NS, but less resistant than coatings of Metco 43C-NS in air up to 925 °C (1700 °F).
- Metco 439NS and Metco 439NS-2 are tungsten carbide cobalt – self-fusing nickel alloys. These self-fusing coatings are harder and more wear resistant than coatings of Metco 430NS, but have much lower service temperature limit of 500 °C (930 °F). At the same time, the matrix materials used for Metco 439NS and Metco 439NS-2 are not as oxidation or corrosion resistant as the nickel-chromium matrix of Metco 430NS.

2.5 Customer Specifications

| Product | Customer Specification |
|-------------|---|
| Metco 430NS | Avio 4800M/17 Chromalloy RCC No. 3Chromalloy RCC No. 4 GE B50TF28, CI A GKN Aerospace PM 819-36 Jet Avion JA 13006 MTU MTS 1074 Rolls-Royce plc MSRR 9507/34 Snecma DMR 33.014 Solar Turbines ES6-423 |

3 Coating Information

3.1 Key Thermal Spray Coating Information

| Specification | Typical Data (depending on spray process and gun chosen) | |
|-----------------------------|--|--------------------|
| Recommended Spray Process | Atmospheric Plasma Spray, Combustion Powder Thermospray™ or HVOF | |
| Macrohardness | HR15N HRC ¹ | 83 – 84 45 – 47 |
| Microhardness | HV0.3 | 250 – 400 |
| Coating Density | 6.2 – 6.5 g/cm ³ | |
| Porosity | < 5% | |
| Bond Strength ² | 20.7 – 44.8 MPa | 3000 – 6500 psi |
| Maximum Service Temperature | 820 °C | 1500 °F |

¹ Converted and provided for reference only.

² On grit-blasted substrates; varies depending on substrate composition.

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 | HVOF | Combustion Powder |
|--------------------|-------------------|-------------------|
| Metco 3MB series | WokaJet series | Metco 6P-II |
| Metco 9MB series | WokaStar series | Metco 5P-II |
| Metco F4 series | DiamondJet series | |

4 Commercial Information

4.1 Ordering Information and Availability

| Product | Order No. | Package Size | Availability | Distribution |
|-------------|-----------|-----------------------|--------------|--------------|
| Metco 430NS | 1000069 | 5 lb (approx. 2.3 kg) | 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 50-166 (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).

Information is subject to change without prior notice.