

Material Product Data Sheet

Nickel Aluminum Thermal Spray Wires

Thermal Spray Wire Products:

Solid Wires (alloyed): Metco™ 8400

Cored Wires (powder-filled): Metco 8405, Metco 405-1, Metco 405NS, Metco 8447

1 Introduction

Oerlikon Metco's portfolio of nickel aluminum pre-alloyed and powder-filled (cored) wires are products appropriate for general use. During the spray process, these materials exhibit an exothermic reaction, producing coatings with exceptionally high bond strengths that self-bond to most metallic substrates, with the exception of copper and tungsten based materials.

The nickel alloy coatings produced have a high degree of structural integrity, are dense and can tolerate elevated temperatures and oxidizing atmospheres.

In most cases, material selection is dependent on the specific coating environment; however, all of these materials can be use as bond coatings and for machine element restoration.

1.1 Typical Uses and Applications

- Bond Coatings under ceramic top coatings
- Salvage and build-up of machinable carbon steel and corrosion-resistant steels
- Fretting resistance at high and low temperatures
- Particle erosion resistance at high temperatures
- Metco 8443 is appropriate for resistance against oxidation and hot gas corrosion at elevated temperatures

Quick Facts

Classification	Wire, Ni-based alloy or composite
Chemical formula	NiAl (various)
Manufacture	Drawn or powder-filled wire
Purpose	Bond coat and machine element restoration
Process	Electric Arc Spray or combustion wire Thermospray™



2 Material Information

2.1 Chemical Composition, Morphology and Recommended Spray Process

Product	Nominal Chemistry	Weight Percent (nominal)				Morphology	Recommended Spray Process
		Ni	Al	Mo	Other		
Metco 8400	Ni 5Al	Bal.	5	---	---	●	⚡
Metco 8405	Ni 20Al	Bal.	20	---	≤ 1	○	⚡
Metco 405-1	Ni 20Al	Bal.	20	---	---	○	🔥
Metco 405NS	Ni 20Al	Bal.	20	---	---	○	🔥
Metco 8447	Ni 5.5Al 5Mo	Bal.	5.5	5	---	○	⚡

● Solid wire ○ Cored wire ⚡ Electric Arc Wire Spray; available in 1.6 mm (14 ga) diameter 🔥 Combustion Wire; available in 3.2 mm (1/8 in) diameter

2.2 Key Selection Criteria

- Choose the wire product that meets customer specifications, when necessary.
- Metco 8400 is a good candidate for bond coats and dimensional restoration on nickel and nickel alloy substrates. Coatings are easily machined.
- Metco 405NS should be chosen over Metco 405-1 when tighter controls for customer specifications are required.
- Metco 8405, Metco 405NS and 405-1 produce dense coatings resistant to oxidation and high temperature corrosion.
- Metco 8447 is recommended for salvage and build-up on carbon steel substrates. For a wire coating, it provides good wear and solid particle erosion resistance with high strength and low shrinkage.

2.3 Related Products

- Metco 470 AW is used as a bond coat or dimensional restoration coating on hardened steels, aluminum alloys, cast iron, nickel alloys, titanium alloys and alloys containing columbium or tantalum.
- Metco 8443 provides high temperature oxidation and hot gas corrosion resistance at temperatures up to 980 °C (1800 °F).
- Metco 8448 can be used as a bond coat in alkaline conditions.
- For thermal spray powder processes, Metco 450NS, Metco 480NS and Amdry 956 are chemically similar to Metco 8400.
- Metco 2101 and Metco 404NS are powder products for atmospheric plasma spray or combustion powder spray chemically similar to Metco 8405, Metco 405-1 and Metco 405NS.
- Metco 443NS and Amdry 960 are powder materials for atmospheric plasma spray or combustion powder spray chemically similar to Metco 8443.
- For increased wear resistance, HVOF applied carbide powder materials should be considered. For improved sliding wear resistance at higher temperatures, consider atmospheric plasma sprayed ceramic materials. Oerlikon Metco has a large number of carbide and ceramic materials in our standard materials portfolio.

2.4 Customer Specifications

Product	Customer Specification	Certification When Origin Is:	
		U.S.A.	Germany
Metco 8400	GE B50TF56 *	●	●
	GE Std. Prac. 70-49-39 C07-042	●	●
	GKN Aerospace PM 819-70	●	●
	Honeywell FP 5045, Type XV	●	
	Pratt & Whitney PWA 36937	●	
	Rolls-Royce OMAT 3/229A		●
Metco 405NS	American Welding Society (AWS) C2.25/C2.25M W-Ni-Al-2	●	
	GE B50TF69, CI A	●	
	GKN Aerospace PM 819-08	●	
	Honeywell FP 5045, Type II	●	
	Honeywell M3952	●	
	MTU MTS 1229	●	●
	Pratt & Whitney PWA 1334	●	
	Rolls-Royce Corporation EMS 70013	●	
	Rolls-Royce OMAT 3/90	●	
	Rolls-Royce plc MSRR 9507/101	●	
	Rolls-Royce plc RRMS 40016	●	●
	Snecma CFM CP 5021	●	
Snecma DMR 33.050	●		
Metco 405-1	Turbine Airfoil Coating and Repair	●	●
Metco 8447	Rolls-Royce OMAT 3/272A		●

* Meets the requirements of the specification except chemistry "total all others" = 1.2%. Not approved for this specification.

3 Coating Information

3.1 Key Thermal Spray Coating Information

- Coating properties can vary significantly as they are dependant on the chosen equipment, gun hardware, coating parameters and coating thickness.
- When properly applied, these coatings are exothermic, producing very good self-bonding properties.
- Maximum coating service temperature to retain oxidation resistance is 650 °C (1200 °F).
- In general, deposit efficiencies of $\geq 65\%$ can be achieved, when correctly sprayed.
- In general, these coatings are used for bond coats in the as-sprayed condition. Machine and/or grind when control of dimension or surface finish is required.
- See Section 2.2 for additional coating selection criteria.

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

Electric Arc Wire	Combustion Wire
SmartArc PPG	Metco 16E Series
Metco LD/U2	Metco 5K
Metco LD/U3	
Metco LD/Schub 5	
Tafa (Praxair) Arc Spray Guns	

4 Commercial Information

4.1 Ordering Information and Availability

	Order No.	Wire Diameter	Package Size	Package Type	Availability	Dist.	Origin
Metco 8400	1001075	1.6 mm (14 ga)	25 lb (11.3 kg)	Dorn Spool	Stock	Global	U.S.A.
Metco 8405	1071795	1.6 mm (14 ga)	15 kg (33 lb)	Dorn Spool	Special Order	Global	Germany
Metco 405-1	1001033	3.2 mm (1/8 in)	10 lb (4.5 kg)	Special Plastic Spool	Stock	Global	U.S.A.
Metco 405NS	1000082	3.2 mm (1/8 in)	10 lb (4.5 kg)	Special Plastic Spool	Stock	Global	U.S.A.
Metco 8447	1019951	1.6 mm (14 ga)	25 lb (11.3 kg)	Dorn Spool	Stock	Global	U.S.A.

4.2 Handling Recommendations

Store in the original container in a dry location.

4.3 Safety Recommendations

See the correct SDS (Materials Safety Data Sheet) for the product of interest 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 8400	50-516
Metco 8405	50-215
Metco 405-1	50-215
Metco 405NS	50-215
Metco 8447	50-568

Information is subject to change without prior notice.