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metco

Material Product Data Sheet
Nickel-Based Superalloy Powders and Wires

Powder Products:
Amdry™ 1718, Amdry 625, Amdry 718, Amdry 718 Cl. B, Diamalloy™ 1005, Diamalloy 1005A, Diamalloy 4004NS, Diamalloy 4006, Diamalloy 4276, Metco™ 1625 Series, Metco 1700 Series, Metco 1718A, Metco 1720B

Solid Wire Products:
Metco 8276, 8625, Metco 8718

Quick Facts	
Classification	Alloys, nickel-based
Chemistry	NiCrMo (various)
Manufacture	
Powder	Gas or water atomized
Wire	Solid drawn wire
Morphology (powder)	Spheroidal or irregular
Purpose	Corrosion and oxidation resistance
Service Temperature	
Oxidation:	≤ 980 °C (1800 °F)
Corrosion & Wear:	≤ 875 °C (1600 °F)
Process	Atmospheric plasma spray, high velocity oxy-fuel spray, electric arc wire spray

1 Introduction

Nickel-based superalloy products are well known for their resistance to many types of corrosive media, oxidation and creep at elevated temperatures.

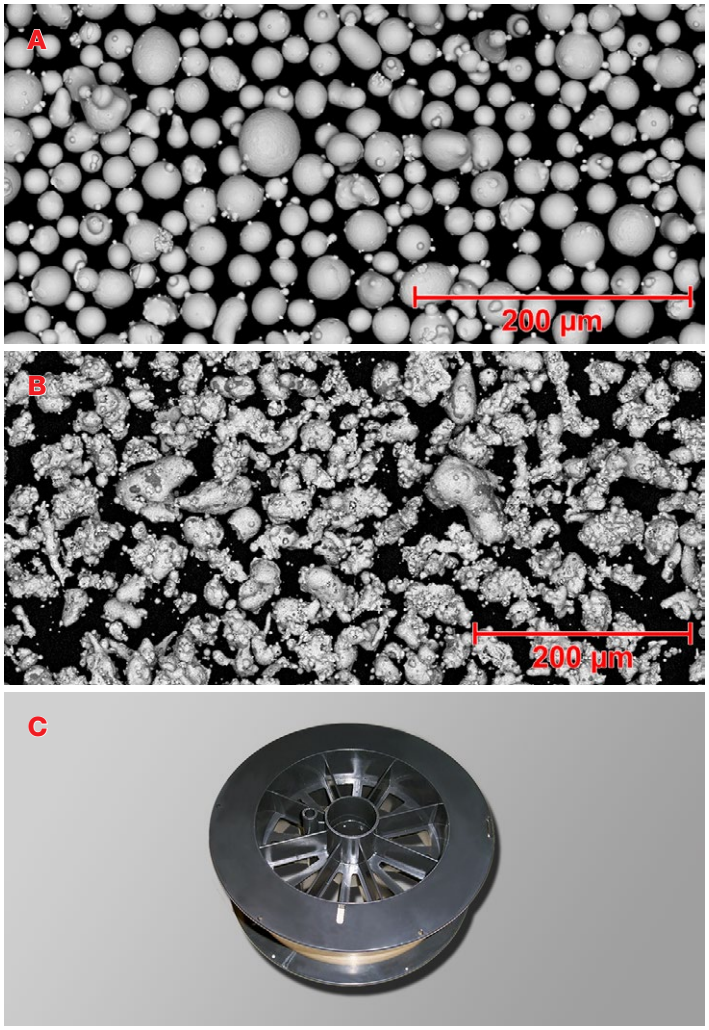
Oerlikon Metco manufactures a wide range of products for surfacing and restoration having compositions that are similar to well-known nickel-based superalloys on the market. In addition, our portfolio of products covers products optimized for thermal spray processes.

When choosing a composition from this portfolio, customers should consider the service environment and corrosive media involved. Some products in this portfolio contain hard phase components, or develop hard phase components during processing , that impart a degree of wear resistance, as well. Please see Section 2.4 for more information.

Powder products are atomized alloys ensuring that particles have a consistent composition. Wire products are all drawn solid alloys for best surfacing results.

1.1 Typical Uses and Applications

- Surface restoration of nickel-based superalloy components
- Repair of nickel-based superalloy components with similar base composition
- Overlay coatings to protect less noble substrates from corrosion and oxidation



A: Typical morphology of gas-atomized products. **B:** Typical morphology of water-atomized products. **C:** Dorn-style spool for wire products.

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2 Material Information

2.1 Chemical Composition (nominal wt. %)

Product	Ni	Cr	Mo	Fe	W	Nb +Ta	Co	Ti	Cu	Al	Mn	C	Si	Zr	Other (max)
Powders:															
Diamalloy 4006	Bal.	20.5	9.0	< 0.10	10.0	---	---	---	4.0	---	---	0.75	---	---	N.R.
Diamalloy 4276	Bal.	15.5	16.0	4.0	4.5	---	---	---	---	---	---	---	---	---	N.R.
Metco 1700A	Bal.	15.5	16.0	4.0	4.5	---	---	---	---	---	---	---	---	---	1.0
Metco 1700B	Bal.	15.5	16.0	4.0	4.5	---	---	---	---	---	---	---	---	---	1.0
Amdry 625	Bal.	21.5	9.0	2.5	---	3.7	---	---	---	---	---	---	---	---	N.R.
Diamalloy 1005	Bal.	21.5	9.0	2.5	---	3.7	---	---	---	---	---	---	---	---	N.R.
Diamalloy 1005A	Bal.	21.5	9.0	2.5	---	3.7	---	---	---	---	---	---	---	---	N.R.
Metco 1625B	Bal.	21.5	9.0	≤ 5.0	---	4.0	---	---	---	---	---	---	---	---	2.0
Metco 1625F	Bal.	21.5	9.0	≤ 5.0	---	4.0	---	---	---	---	---	---	---	---	2.0
Amdry 1718	Bal.	19.0	3.0	18.0	---	5.1	0.95	---	---	0.5	---	0.05	---	---	N.R.
Amdry 718	Bal.	19.0	3.0	18.0	---	5.1	0.95	---	---	0.5	---	0.05	---	---	N.R.
Amdry 718 Cl. B	Bal.	19.0	3.0	18.0	---	5.1	0.95	---	---	0.5	---	0.05	---	---	N.R.
Metco 1718A	Bal.	19.0	3.0	18.0	---	5.0	---	1.0	---	---	0.08	0.05	0.2	---	<0.5
Diamalloy 4004NS	Bal.	14.0	4.0	---	4.0	---	9.5	5.0	---	3.0	---	---	0.015	0.03	N.R.
Metco 1720N	Proprietary														
Wires:															
Metco 8276	Bal.	15.0	16.0	6.0	4.0	---	---	---	---	---	0.5	---	---	---	0.2
Metco 8625	Bal.	21.0	9.0	---	---	4.0	---	---	---	---	---	---	---	---	N.R.
Metco 8718	Bal.	19.0	3.0	---	---	5.0	---	---	---	< 0.5	< 0.35	< 0.08	---	---	N.R.

N.R. = Not Reported

2.2 Particle Size Distribution (Powders) and Other Characteristics

Product	Nominal Particle Size Distribution (µm) or Wire Diameter	Morphology	Manufacturing Method	Similar To
Powders:				
Diamalloy 4006	–53 +11	Irregular	Water Atomized	---
Diamalloy 4276	–53 +20	Spheroidal	Gas Atomized	
Metco 1700A	-125 +53			Hastelloy C-276
Metco 1700B	-125 +45			
Amdry 625	-90 +45			
Diamalloy 1005	-45 +11			
Diamalloy 1005A	-53 +20			Inconel 625
Metco 1625B	-90 +45			
Metco 1625F	-53 +20			
Amdry 1718	-45 +15			
Amdry 718	-125 +45			Inconel 718
Amdry 718 Cl. B	-90 +45			
Metco 1718A	-90 +45			
Diamalloy 4004NS	-45 +11			René 80
Metco 1720B	-53 + 20			----
Wires:				
Metco 8276	1.6 mm (14 gauge / 0.063 in)	Solid Wire	Drawn	Hastelloy C-276
Metco 8625	1.6 mm (14 gauge / 0.063 in)			Inconel 625
Metco 8718	1.6 mm (14 gauge / 0.063 in)			Inconel 718

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

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2.3 Recommended Processes

Product	APS	HVOF-GF	HVOF-LF	EAW
Powders:				
Diamalloy 4006		●	●	
Diamalloy 4276		●	●	
Metco 1700A	●			
Metco 1700B	●			
Amdry 625	●			
Diamalloy 1005		●	●	
Diamalloy 1005A		●	●	
Metco 1625B	●			
Metco 1625F			●	
Amdry 1718	●	●	●	
Amdry 718	●			
Amdry 718 Cl. B	●			
Metco 1718A	●			
Diamalloy 4004NS		●		
Metco 1720B			●	
Wires:				
Metco 8276				●
Metco 8625				●
Metco 8718				●

APS = Atmospheric Plasma Spray; **HVOF-GF** = Gas-Fuel High Velocity Oxygen Fuel Spray (water-cooled); **HVOF-LF** = Liquid-Fuel High Velocity Oxygen Fuel Spray; **EAW** = Electric Arc Wire Spray

2.4 Key Selection Criteria

- In general, choose the product best suited to the application and processing requirements. When applicable, choose the product specified by the OEM.

Diamalloy 4006

- Diamalloy 4006 forms glassy (amorphous/microcrystalline) phases during the coating process that gives these coatings excellent resistant to scuffing, sliding wear abrasion and galling in addition to providing corrosion resistance in saline, aqueous acidic and alkaline mediums.
- Consider these products for pump applications such as plungers, pump liners or sleeves, gas turbine applications such as ducts and bleed manifold rings, chemical processing components such as compressor rods and gate valves as well as pulp and paper applications such as digesters and liquor tanks.

Diamalloy 4276, Metco 1700 series and Metco 8276 (similar to Hastelloy C-276)

- Coatings of these materials exhibit excellent corrosion protection in a wide range of mediums and applications. Coatings are resistant to crevice corrosion, pitting, sulfuric acid, sour gas, chlorine and other halides.
- Consider these materials for components exposed to these environments, such as pulp digesters, bleach plants, flue gas desulfurization equipment, evaporators, heat exchangers or mixers.

Amdry 625, Diamalloy 1005, Diamalloy 1005A, Metco 1625B, Metco 1625F and Metco 8625 (similar to Inconel 625)

- These products produce coatings that are resistant to oxidation and hot gas corrosion at elevated temperatures. They are also resistant to a wide range of corrosive media and protect against inter crystalline, pitting and crevice corrosion. When heated, coatings of these materials may form a stable passive film that protects the surface against additional chemical attack.
- Choose these products for applications exposed to seawater, mechanical stresses, oil and gas applications where sulfur is present, flue gas and flare stacks and hydrocarbon processing in tar sands and oil-shale recovery equipment.

Amdry 1718, Amdry 718, Amdry 718 Cl. B, Metco 1718A, Metco 8625 (similar to Inconel 718)

- These products are appropriate for resistance to corrosion in a variety of media, creep resistance and excellent oxidation resistance up to 700 °C (1290 °F).
- Amdry 718 Cl. B is resistant to creep and stress rupture

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at elevated temperatures
- Consider these products for repair of nickel-based superalloys gas turbine and high-speed air frame parts, coatings for chemical processing equipment, and as a corrosion-resistant coating on steel components.

Diamalloy 4004NS (similar to René 80)
- Diamalloy 4004NS produces coatings that have excellent oxidation, erosion and hot gas corrosion resistance at temperatures up to 1000 °C (1830 °F).
- Diamalloy 4004NS has proven to be an effective oxidation- and hot corrosion-resistant coating with on gas turbine components, chemical processing equipment and rocket engine components where erosion is also a concern.

2.5 Related Products

- For materials similar to Stellite, Ultimet or MarM-509, please refer to our portfolio of cobalt-based superalloy materials designed for a variety of coating and industrial processes.
- Oerlikon Metco also offers a wide range of standard nickel-chromium and and stainless steel powders and wires that can be used for bond coats, salvage or restoration, or as oxidation-resistant coatings.
- For higher temperature coatings that resist oxidation and hot corrosion, choose one of our MCrAlY materials. These materials provide excellent protection for gas turbine hot section components, such as on blades and vanes, or as a bond coat material for ceramic thermal barrier coatings used on combustor components, after burners, blades and vanes, as well as ceramic abradables used on shrouds and seals.

2.6 Customer Specifications

Product	Specification
Diamalloy 4276	
Amdry 625	MTU MTS 1438 Rolls-Royce OMAT 3/270
Amdry 1718	Canada Pratt & Whitney MS 2025 CFM International CP 6032 GE B50A917 GE B50TF202, Cl D MTU MTS 1604 Snecma DMR 33.502
Amdry 718	Canada Pratt & Whitney MS 1088 GE B50TF202, Cl A
Amdry 718 Cl. B	CFM International CP 6025 GE B50TF202, Cl B GKN Aerospace PM 819-59 MTU MTS 1376 MTU MTS 1439
Diamalloy 4004NS	GE B50TF183, Cl C

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.

3.2 Recommended Spray Guns

For thermal spray application, the following spray guns are recommended:

APS	TriplexPro-210 SinplexPro series F4MB-XL series 9MBM
HVOF-GF	DiamondJet series (water-cooled)
HVOF-LF	WokaStar series WokaJet series Praxair / Tafa JP5000
EAW	SmartArc PPG LD/ Schub 5

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4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Wire Diameter (if applicable)	Package Size	Availability	Distribution
Diamalloy 4006	1000797	---	5 lb (approx. 2.25 kg)	Stock	Global
Diamalloy 4276	1076125	---	10 lb (approx. 4.5 kg)	Stock	Global
Metco 1700A	2280104	---	5 kg (approx. 12 lb)	Stock	Global
Metco 1700B	2280148	---	5 kg (approx. 12 lb)	Stock	Global
Amdry 625	1001045	---	5 lb (approx. 2.25 kg)	Stock	Global
Diamalloy 1005	1000784	---	5 lb (approx. 2.25 kg)	Stock	Global
Diamalloy 1005A	1085778	---	10 lb (approx. 4.5 kg)	Stock	Global
Metco 1625B	2295585	---	5 kg (approx. 12 lb)	Stock	Global
Metco 1625F	2280146	---	5 kg (approx. 12 lb)	Stock	Global
Amdry 1718	1001063	---	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 718	1001047	---	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 718 Cl. B	1001048	---	5 lb (approx. 2.25 kg)	Stock	Global
Metco 1718A	2277038	---	5 kg (approx. 12 lb)	Stock	Global
Diamalloy 4004NS	1001611	---	10 lb (approx. 4.5 kg)	Special Order	Global
Metco 8276	1092444	1.63 mm (14 ga / 0.063 in)	15 kg (approx. 33 lb)	Stock	Global
Metco 8625	1001594	1.63 mm (14 ga / 0.063 in)	25 lb (approx. 11.3 kg)	Stock	Global
	1083493	1.63 mm (14 ga / 0.063 in)	60 lb (approx. 27 kg)	Stock	Global
Metco 8718	1020242	1.63 mm (14 ga / 0.063 in)	30 lb (approx. 13.5 kg)	Special Order	Global
Metco 1720B	1538353		5 kg (approx. 11 lb)	Stock	Global

Notes:
1. All wire products shipped on Dorn-style spools (plastic reels).
2. When purchasing many of these products from an Oerlikon Metco facility in Germany, an authorized German export license (BAFA) is required. Please contact your Oerlikon Metco Account Representative or Customer Service for more information.

4.2 Handling Recommendations

- Store in the original container in a dry location.
- For powder products, tumble contents gently prior to use to prevent segregation.
- Open containers of powder 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 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.
Diamalloy 4006	50-287
Diamalloy 4276	50-1324
Metco 1700A	50-1324
Metco 1700B	50-1324
Amdry 625	50-310
Diamalloy 1005	50-310
Diamalloy 1005A	50-310
Metco 1625B	50-1470
Metco 1625F	50-1470
Amdry 1718	50-789
Amdry 718	50-789
Amdry 718 Cl. B	50-789
Metco 1718A	50-789
Diamalloy 4004NS	50-775
Metco 8276	50-577
Metco 8625	50-708
Metco 8718	50-1850
Metco 1720B	50-2704

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Inconel is a registered trademark of Huntington Alloys Corp.
Rene is a registered trademark of Teledyne Industries, Inc.
Stellite is a registered trademark of Kennametal Inc.

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