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metco

Material Product Data Sheet
Austenitic Stainless Steel Powder for Thermal Spray

Thermal Spray Powder Products:
Metco 41A, Metco 41C, Diamalloy 1003, Diamalloy 1003-1, Diamalloy 1013

1 Introduction

Metco™ 41 series and Diamalloy™ 1003 series and Diamalloy 1013 products are austenitic, nickel-chromium stainless steel powders, similar to Type 316L. They produce thermal sprayed coatings that are bright, dense and resistant to corrosion and wear. These coatings can easily be machined to a very good finish with ordinary steel tools.

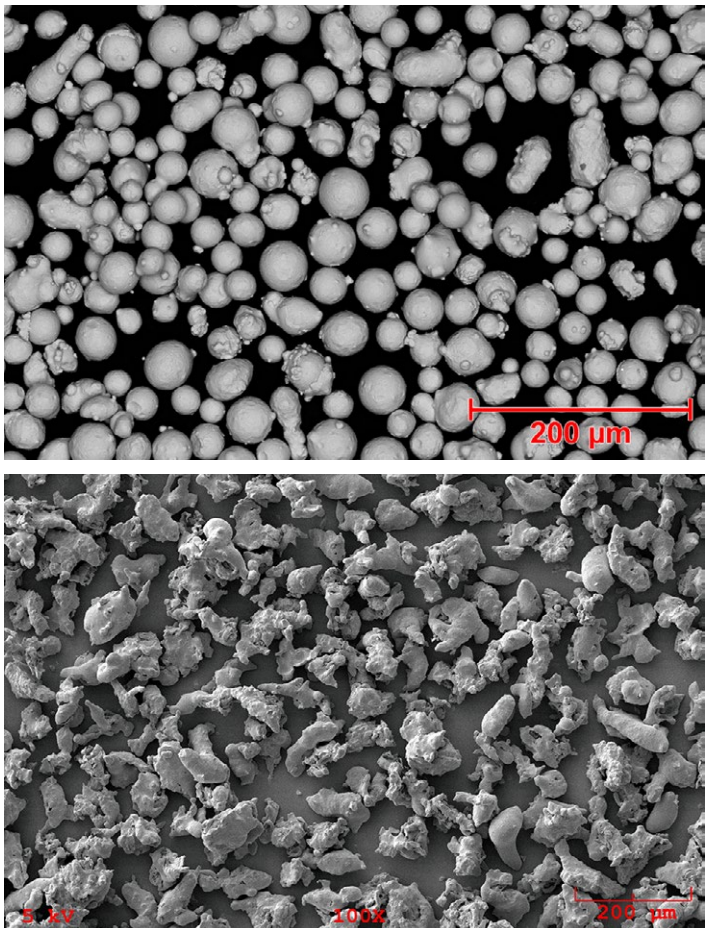
The dense coatings produced by these products are particularly recommended for applications that require protection against corrosion, cavitation and mild particle erosion at temperatures less than 540 °C (1000 °F). These coatings are also used for the salvage and build up of worn or mismachined steel parts. In addition, these coatings work-harden in service, making them suitable for packing areas on pump shafts and bearing surfaces on motor shafts.

Coatings of these materials contain enough molybdenum to guarantee particularly high resistance to pitting and crevice corrosion in chloride environments, and they also exhibit high impact resistance and tensile strength at elevated temperatures.

1.1 Typical Uses and Applications

- Corrosion:
  - Rolls used in the printing industry
  - Pump plungers
  - Shafts
  - Seal rings
  - Impellers
  - Hydraulic rams
- Cavitation:
  - Wear rings on hydraulic turbines
  - Diesel engine cylinder liners
  - Pumps
- Low temperature particle erosion:
  - Exhaust fans
  - Hydraulic valves
  - Cyclone dust collectors
  - Dump valve plugs and seats
- Salvage/buildup on mismachined or worn steel parts

Quick Facts	
Classification	Alloy, iron-based
Chemistry	Austenitic steels (see section 2.1)
Manufacture	Inert gas or water atomized
Morphology	Spheroidal or irregular
Purpose	Corrosion and erosion protection
Service Temperature	≤ 540 °C (1000 °F)
Process	Atmospheric plasma spray, combustion powder Thermospray™ or HVOF



SEM photomicrographs of Diamalloy 1003-1 (top) and Metco 41C (bottom) showing morphology of these products.

2 Material Information

2.1 Chemical Composition

Product	Nominal Chemical Composition (wt. %)					
	Iron	Cr	Ni	Mo	Si	C
Metco 41A	Balance	17	12	2.5	2.3	0.03
Metco 41C	Balance	17	12	2.5	2.3	0.03
Diamalloy 1003	Balance	17	12	2.5	2.3	0.03
Diamalloy 1003-1	Balance	17	12	2.5	2.3	0.03
Diamalloy 1013	Balance	17	12	2.5	0.75	< 0.03

2.2 Particle Size Distribution, Morphology and Manufacturing Method

Product	Nominal Particle Size Distribution	Morphology	Manufacturing Method
Metco 41A	–90 +45 µm	Spheroidal	Gas Atomized
Metco 41C	–106 +45 µm	Irregular	Water Atomized
Diamalloy 1003	–45 +11 µm	Spheroidal	Gas Atomized
Diamalloy 1003-1	–53 +20 µm	Spheroidal	Gas Atomized
Diamalloy 1013	–53 +20 µm	Spheroidal	Gas Atomized

Upper particle size determined by sieve analysis, lower particle size analysis by laser diffraction (Microtrac).

2.3 Key Selection Criteria

- Metco 41A and Metco 41C can be applied using atmospheric plasma spray or combustion powder Thermospray™. They are not designed for application using HVOF.
- Diamalloy 1003, Diamalloy 1003-1 and Diamalloy 1013 are designed for application using HVOF. They produce coatings that are smoother, denser and less oxidized than coatings of Metco 41-series, and are more suitable for corrosion applications.
- The high silicon content in Metco 41 series and Diamalloy 1003 series products provides enhanced oxidation and sulfidation resistance comparted to Diamalloy 1013.
- The low carbon and silicon content of Diamalloy 1013 produces coatings with better corrosion protection in weld-type applications (less prone to sensitization).

2.4 Related Products

- For applications where the base material is not itself corrosion resistant, the coating should be sealed with an Oerlikon Metco sealer such as Metcoseal SA or Metcoseal AP to enhance corrosion resistance.
- Superalloy powders such as Amdry 625, Diamalloy 1005, Diamalloy 1006 and nickel-chromium alloys such as Metco 43C-NS, 43F-NS and 43VF-NS should be used if better corrosion resistance is required. For chloride containing mediums, HVOF sprayed nickel alloy powders such as Diamalloy 4006 or Diamalloy 4276 are particularly recommended.
- Better wear resistance can be achieved with Metco 42C and Diamalloy 1008.
- Excellent wear resistance and fair corrosion resistance can be obtained with Metcoloy 2 and Metco 8222 wires using electric arc wire spray.
- Austenitic or nickel-base wires are an alternative, although not as corrosion resistant as their powder sprayed counterparts.

3 Coating Information

3.1 Key Thermal Spray Coating Information

Specification		Typical Data [a]		
		Metco 41A and Metco 41C	Diamalloy 1003 and Diamalloy 1003-1	
Recommended Spray Process		Atmospheric Plasma Spray or Combustion Powder Thermospray	HVOF (liquid-fuel)	HVOF (gas-fuel)
Deposit Efficiency (approx.)	%	---	70	78
Porosity	vol. %	---	< 1	1 – 2
Surface Roughness Ra [b]	µm µin	--- ---	5.3 – 6.6 210 – 260	5.3 – 6.6 210 – 260
Macrohardness	HR15N	---	92.5 – 93.5	71 – 72
Microhardness	HV0.3	---	320 – 390	300 – 350

[a] Results using Oerlikon Metco standard parameters. Considerable variation in results can be expected when using different spray parameters and spray guns.
[b] As-sprayed

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	HVOF
Metco 9MB series	Metco 6P-II series	WokaJet series
Metco F4 Series		DiamondJet 2700
TriplexPro series		Praxair / Tafa JP 5000
SinplexPro series		

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 41A	1078423	5 kg (approx. 11 lb)	Special Order	Global
Metco 41C	1000024	5 lb (approx. 2.25 kg)	Stock	Global
Diamalloy 1003	1078421 1000782	5 kg (approx. 11 lb) 5 lb (approx 2.25 kg)	Stock Stock	Global Global
Diamalloy 1003-1	1078416	5 kg (approx. 11 lb)	Stock	Global
Diamalloy 1013	1092413	5 kg (approx. 11 lb)	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.

4.3 Safety Recommendations

See SDS 50-110 (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).

www.oerlikon.com/metco
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