

# Material Product Data Sheet

## Martensitic Stainless Steel Powders for Thermal Spray

### Thermal Spray Powder Products: Metco 42C, Diamalloy 1002

#### 1 Introduction

Diamalloy™ 1002 is a martensitic chromium stainless steel powder, similar to type 420 stainless steel. It has been optimized for wear resistance while still offering fairly good corrosion resistance in general atmospheric and industrial environments. Coatings of Diamalloy 1002 have good strength and reasonable impact properties.

Metco™ 42C is a martensitic, high chromium stainless steel powder, similar to type 431 stainless steel. Metco 42C produces coatings that combine fair wear resistance and impact strength with the best corrosion resistance of any martensitic stainless steel.

Diamalloy 1002 and Metco 42C produce general purpose coatings that combine moderate to good wear and corrosion resistance, especially when heavy coating build-up is needed. They are recommended for applications where mild abrasive grains, particle erosion, fretting and hard surface wear are a problem. They can also be used for salvage and build-up of grindable carbon and corrosion resistant steels. These coatings are recommended to be used at temperatures below 540 °C (1000 °F).

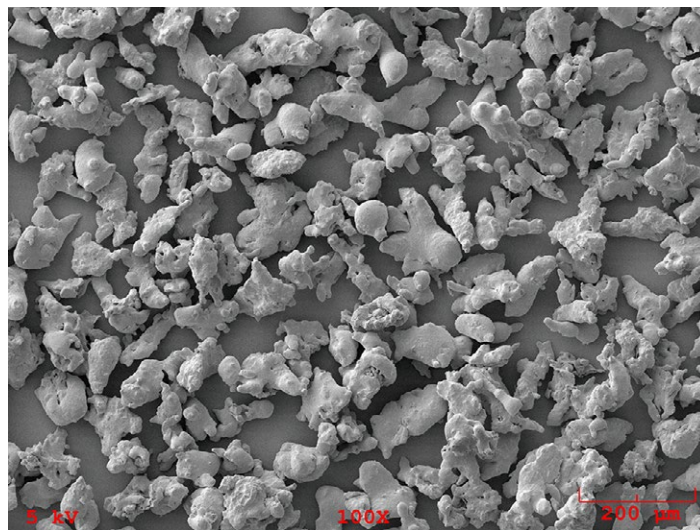
These materials can be sprayed very thick, allowing the coating to be utilized for rebuild or salvage of undersized parts that may require a coating. The coatings can be ground to a very good finish using silicon carbide wheels and small sections can be machined with carbide tools.

#### 1.1 Typical Uses and Applications

- Hard bearing surfaces: bearing journals, fuel pump rotors, sleeves
- Resist abrasive grains (low temperature): cylinder liners, pistons, pump plungers, hydraulic rams, crankshaft bearings
- Resist hard surfaces (low temperature): wire drawing capstans, pump seals, mechanical seals
- Resist fretting (intended or non-intended motion): machine bedways, wear rings, press fits bearing seats
- Resist particle erosion (low temperature): exhaust fans, hydroelectric valves
- Salvage and build-up of grindable steels: mis-machined parts, worn parts

#### Quick Facts

Classification	Alloy, iron-based
Chemistry	Martensitic steel
Manufacture	Water atomized
Morphology	Irregular
Purpose	Corrosion, wear resistance, salvage and restoration
Service Temperature	≤ 540 °C (1000 °F)
Process	Atmospheric plasma spray, combustion powder Thermo-spray™ or HVOF



SEM photomicrographs of Metco 42C, showing morphology that is typical for these products.

## 2 Material Information

### 2.1 Chemical Composition (nominal wt. %)

Product	Fe	Cr	Ni	Mn	C	Si	P	S
Metco 42C	Balance	17	2	---	0.18	---	---	---
Diamalloy 1002	Balance	12 – 14	---	1.0 max	0.15 min	1.0 max	0.03 max	0.03 max

### 2.2 Particle Size Distribution, Manufacturing Method, Morphology and Recommended Spray Process

Product	Nominal Particle Size Distribution (µm)	Manufacturing Method	Morphology	Recommended Spray Process
Metco 42C	-106 +45	Water Atomized	Irregular	CPS, APS
Diamalloy 1002	-45 +15	Water Atomized	Irregular	APS, HVOF

Particle size measurement of 45 µm and above via sieve analysis; below 45 µm via laser diffraction (Microtrac).

CPS = Combustion Powder Thermospray™; APS = Atmospheric Plasma Spray; HVOF = High Velocity Oxy-Fuel Spray

### 2.3 Key Selection Criteria

- Coatings of Diamalloy 1002 offers moderate corrosion resistance whereas Metco 42C offers better corrosion resistance while maintaining fairly high hardness and wear resistance.
- Coatings of Diamalloy 1002 deposited using the HVOF spray process have the highest hardness, with lower porosity and the best wear resistance. These coatings are smoother, denser and less oxidized.
- Diamalloy 1002 coatings are hard, making them suitable for applications where wear resistance is required and for dimensional repair of steel parts. Metco 42C coatings are more suitable for parts that require a combination of high tensile strength, good toughness and good corrosion resistance.
- Better wear resistance and acceptable corrosion resistance can be achieved with atmospheric plasma sprayed self-fluxing alloys such as Metco 12C, Metco 14E, Metco 15E, Metco 15F or Metco 16C-NS. For HVOF spray, Diamalloy 2001 can be used. When fused, coatings are fully dense, virtually free of porosity and metallurgically bonded to the substrate. However, these materials can also be used in the as-sprayed condition provided that coating wear properties and bond strength are sufficient for the application.
- For aggressive aqueous acidic or alkaline media, Hastelloy-type materials such as Diamalloy 4006, Diamalloy 4276 and Metco 700 [NiCrWMo] should be considered. Coatings of these materials also offer sliding wear protection, high hot hardness, scuffing and galling resistance.
- If significantly higher wear resistance is required for applications below 500 °C (930 °F), tungsten carbide cobalt powders such as WOKA 31XX and WOKA 32XX series products should be chosen.
- Amdry 5843, Diamalloy 5849, WOKA 365X series, Metco 5847 and Metco 5842 [WC 10Co 4Cr] are recommended for applications where both wear and corrosion resistance are required for service temperatures below 500 °C (930 °F).

### 2.4 Related Products

- For best corrosion resistance, coatings of Metco 42C should be sealed, particularly when the substrate material is not itself corrosion resistant. Metcoseal AP is recommended.
- If better corrosion resistance is required and wear resistance is not a critical factor, austenitic steel powders such as Metco 42C or Diamalloy 1003 should be used.
- Excellent wear resistance and fair corrosion resistance can be obtained from electric arc wire sprayed Metcoloy 2 or Metco 8222 wires.

### 2.5 Customer Specifications

Product	Customer Specification
Metco 42C	MTU MTS 1049 Rolls-Royce OMAT 3/45A Rolls-Royce OMAT 3/103

### 3 Coating Information

#### 3.1 Key Thermal Spray Coating Information

Specification		Metco 42C	Diamalloy 1002	
Spray Process		APS	APS	HVOF
Spray Gun		TriplexPro-210	TriplexPro-210	DiamondJet 2600
Deposit Efficiency (approx.)	%	71	70	72
Macrohardness	HR15N	65	79	84
Microhardness	HV0.3	271	536	520 – 560
Porosity	vol. %	1.5	< 2	< 2

Data is provided for reference. Results are typical using Oerlikon Metco starting parameters with the coating process and spray gun listed here. Variations in spray parameters or the use of different equipment can result in significant differences in coating results.

APS = Atmospheric Plasma Spray; HVOF = High Velocity Oxy-Fuel Spray

#### 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
Metco 3MB series	DiamondJet series (water-cooled)
Metco 9MB series	
Metco F4 series	
SimplexPro series	
TriplexPro series	

### 4 Commercial Information

#### 4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 42C	1000025	5 lb (approx. 2.25 kg)	Stock	Global
	1031731	20 lb (approx. 9 kg)	Stock	Global
Diamalloy 1002	1063494	10 lb (approx. 4.5 kg)	Stock	Global

#### 4.2 Handling Recommendations

- Store in the original container in a dry location.
- Tumble contents prior to use to prevent segregation.
- Open containers should be stored in a drying oven to prevent moisture pickup.

#### 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](http://www.oerlikon.com/metco) (Resources – Safety Data Sheets).

Product	SDS
Metco 42C	50-111
Diamalloy 1002	50-1262

Information is subject to change without prior notice.