

# Material Product Data Sheet

## Pure Copper Materials

**Powder Products:**  
**Diamalloy™ 1007, Metco™ 55**

**Wire Products:**  
**Metco Copper**

**1 Introduction**

Diamalloy 1007 and Metco 55, and Metco Copper Wire are essentially pure copper products that are known for their excellent electrical and thermal conductivities.

Diamalloy 1007 and Metco 55 are gas atomization materials that ensures excellent chemical homogeneity and high purity for consistent processing results. The spheroidal shape of the powder particles ensures good powder feeding characteristics during powder-fed thermal spray processing. Diamalloy 1007 and Metco 55 are designed to produce thermal sprayed coatings suitable for restoration, particularly on copper-alloy substrates, electrical applications where a coating with very good conductivity is needed, or for EMI/RFI shielding applications.

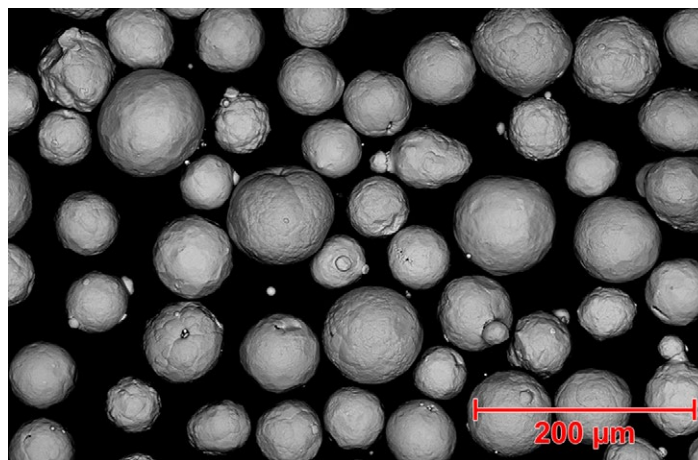
Metco Copper is designed for use with wire feedstock thermal spray coating processes. Metco Copper Wire is a corrosion resistant material in a non-oxidizing environment; generally resistant to neutral atmospheric conditions and sea water environments.

**1.1 Typical Uses and Applications**

- Diamalloy 1007 and Metco 55:
  - Restoration of worn non-ferrous components
  - Applications that require thermal management or electrical conductivity
  - Paper and printing industry to resist corrosive inks
  - Excellent choice for electromagnetic / radio frequency (EMI/RFI) shielding
  - Electrical contacts and ground connectors
  - Self lubricating bearings
  - Friction components, such as alternator brushes etc.
- Metco Copper:
  - Applications where electrical conductance is required such as on carbon brushes, resistors.
  - Placement of copper for brazing applications
  - Decorative coatings

**Quick Facts**

Classification	Metal, copper-based	
Chemistry	Cu 99.3+ or Cu 99.9+	
Manufacture	Powders:	Gas atomized
	Wires:	Solid drawn wires
Morphology:	Powders:	Spheroidal
	Wires:	Solid
Apparent density	Powders	3.0 to 4.0 g/cm <sup>3</sup>
Purpose	Corrosion protection, restoration, electrical and thermal conductivity	
Process	Powders:	HVOF, Atmospheric Plasma Spray or Combustion Powder Thermospray™
	Wires:	Combustion Wire Spray or Electric Arc Wire Spray



**Top:** Typical spheroidal morphology for powder products: **Bottom:** Packaging availability for Metco Copper..

## 2 Material Information

### 2.1 Chemical Composition

Product	Nominal Composition	Chemical Composition (wt. % nominal)	
		Cu	Other (max)
<b>Powder Products</b>			
Diamalloy 1007	Cu 99+.3	99.0	0.7
Metco 55	Cu 99.3+	99.0	0.7
<b>Wire Products</b>			
Metco Copper	Cu 99.9+	99.9 (min)	0.1

### 2.2 Additional Material Characteristics

#### 2.2.1 Powder Products

Product	Nominal Range (µm)	Apparent Density (g/cm <sup>3</sup> )	Manufacturing Method	Morphology
Diamalloy 1007	-75 +31	3.0 to 4.0	Gas Atomized	Spheroidal
Metco 55	-90 +38	3.0 to 4.0	Gas Atomized	Spheroidal

Particle sizes equal to or above 45 µm determined by sieve analysis per ASTM B214; sizes below 45 µm determined by laser diffraction (Microtrac) analysis per ASTM C 1070.

#### 2.2.1 Wire Products

Product	Available Wire Diameters	Manufacturing Method	Morphology
Metco Copper	1.6 mm (0.063 in) 3.2 mm(0.126 in)	Drawn	Solid

### 2.3 Recommended Process

Product	APS	HVOF	CPS	CWS	EAW
Diamalloy 1007		✓			
Metco 55	✓		✓		
Metco Copper				✓	✓

**APS** = Atmospheric Plasma Spray, **HVOF** = High Velocity Oxygen Fuel Spray; **CPS** = Combustion Powder Thermospray; **CWS** = Combustion Wire Spray; **EAW** = Electric Arc Wire Spray

## 2.4 Key Selection Criteria

- Choose the product that meets the required customer material specification.
- Diamalloy 1007 is recommended for application using HVOF spray processes.
- Metco 55 is designed for application using atmospheric plasma spray or combustion powder Thermospray™.
- Diamalloy 1007 produces coatings that are generally denser than those of Metco 55 or Metco Copper and should be considered with optimal thermal or electrical conductivity is required.
- Choose Metco Copper for applications where a high electrical conductance is required. This material is a good choice for decorative applications, particularly when a copper patina is desired.

## 2.5 Related Products

- Oerlikon Metco's family of Sprabronze materials are copper-based thermal spray wires that are appropriate for

machine element repair and bearing surfaces. They have higher hardness and strength than pure copper materials.

- Aluminum bronze powders, such as Diamalloy 1004, Metco 51NS, Metco 51F-NS, and Metco 445, can be used when better corrosion resistance is needed as a result of to the presence of aluminum in these bronze powders
- Copper-nickel-indium products like Metco 58NS, Amdry 500C and Amdry 500F are recommended to combat fretting, adhesion, galling and cavitation. These materials exhibit more machinable and higher bond strength. Presence of indium helps in improving anti-galling, lubricity and bearing characteristics of the coatings.
- Metco 57NS (copper-nickel) has a slightly higher melting temperature than either the pure copper or the above indium-containing powders and is recommended when higher service temperatures are needed
- If corrosion protection in lye, brine or saltwater at higher temperatures is needed with good bearing properties, consider Metco NiCu.

## 2.6 Customer Specifications

Product	Customer Specification
Metco 55	Rolls-Royce Corporation PMI 1173
Metco Copper	Rolls-Royce plc MSRR 9507/110

## 3 Coating Information

### 3.1 Key Thermal Spray Coating Information

Product	Maximum Service Temperature		Recommended Finishing Method
	°C	°F	
Diamalloy 1007	750	1380	High speed steel or carbide tools
Metco 55	750	1380	High speed steel or carbide tools
Metco Copper	750	1380	Machine or Grind

### 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.

### 3.3 Recommended Spray Guns

Atmospheric Plasma	Combustion Powder	HVOF	Electric Arc Wire	Combustion Wire
Metco 3MBM	Metco 5P-II	DiamondJet series	SmartArc PPG	Metco 16E
Metco 9MBM	Metco 6P-II series	WokaJet series	Metco LD/U2	Metco 5K
Metco 11MB		WokaStar series	Metco LD/U3	
Metco F4MB-XL series			Metco LD/Schub 5	
Metco SM F-100 Connex				
Metco SM F-210				
TriplexPro series				
SinplexPro series				

## 4 Commercial Information

### 4.1 Ordering Information and Availability

Product	Order No.	Wire Diameter (if applicable)	Package Size	Package Type	Availability	Distribution
<b>Powders:</b>						
Diamalloy 1007	1000786	---	5 lb (approx. 2.25 kg)	Plastic Jar	Special Order	Global
Metco 55	1000056	---	5 lb (approx. 2.25 kg)	Plastic Jar	Special Order	Global
<b>Wires:</b>						
Metco Copper	1000446	1.6 mm (0.063 in)	25 lb (11.3 kg)	Dorn Spool	Stock	Global
	1002514	1.6 mm (0.063 in)	12 kg (26.5 lb)	Wire Basket Reel	Stock	Europe
	1030420	3.2 mm (0.126 in)	50 lb (22.7 kg)	Coil	Stock	Global
	1002467	3.2 mm (0.126 in)	25 kg (55 lb)	Coil	Stock	Europe

### 4.2 Handling Recommendations

- Store in the original container in a dry location.
- For powder products, carefully tumble contents prior to use to prevent segregation, but avoid breakdown of friable components for mechanically clad products.
- Open containers of powder should be stored in a drying oven at temperatures 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 Metco web site at [www.oerlikon.com/metco](http://www.oerlikon.com/metco) (Resources – Safety Data Sheets).

Product	SDS No.
Diamalloy 1007	50-119
Metco 55	50-119
Metco Copper	50-232

Information is subject to change without prior notice.