

# Material Product Data Sheet

## Copper Nickel and Copper Nickel Indium Thermal Spray Powders

### Thermal Spray Powder Products: Metco 57NS, Metco 58NS, Amdry 500C, Amdry 500F

#### 1 Introduction

Copper-based Metco™ 57NS, Metco 58NS, Amdry™ 500C and Amdry 500F are inert gas atomized, alloyed powders developed to protect metal-to-metal wear of titanium alloy parts. Coatings made from these materials are dense, low in oxide content and reduce wear by fretting, adhesion, galling and cavitation.

These materials have a strong history in the aerospace industries, with Metco 58NS being the industry standard for anti-fretting wear applications approved by many major turbine engine OEMs.

These products usually are applied using atmospheric plasma spray (APS) or by combustion powder Thermospray™ with typical coating thicknesses as thin as 0.013 mm – 0.051 mm (0.0005 – 0.002 in). Because of the complexity of part configurations, the coating is used in the as-sprayed condition for most applications.

Metco 58NS, Amdry 500C and Amdry 500F contain indium, which improves the anti-galling and lubricity characteristics of the coating.

Near surface wear properties can be improved with the addition of a dry film lubricant applied to the coating surface after spraying.

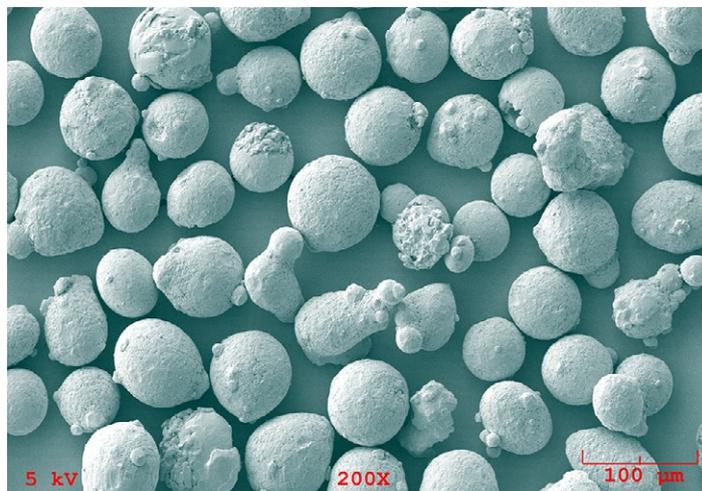
#### 1.1 Typical Use and Applications

Applied as a thermal sprayed coating to:

- Turbine engine blade roots or disks slots to resist fretting and galling wear
- Expansion joints or compressor air seals

#### Quick Facts

Classification	Alloy, copper based
Chemical formula	Cu 38Ni or Cu 36Ni 5 In
Manufacture	Gas atomized
Morphology	Spheroidal
Apparent density	3.2 – 3.5 g/cm <sup>3</sup>
Service temperature	≤ 315 °C (600 °F)
Melting point	
CuNi	1205 °C (2200 °F)
CuNiIn	1150 °C (2100 °F)
Purpose	Wear protection (fretting/galling)
Process	Atmospheric Plasma Spray or Combustion Powder Thermospray™



SEM photomicrographs of Metco 58NS, showing morphology that is typical for these products.

## 2 Material Information

### 2.1 Chemistry and Particle Size Distribution

Product	Nominal Chemical Composition (wt. %)			Nominal Size Distribution ( $\mu\text{m}$ )
	Cu	Ni	In	
Metco 57NS	Balance	38	–	-75 +45
Metco 58NS	Balance	36	5	-75 +45
Amdry 500C	Balance	36	5	-75 +45
Amdry 500F	Balance	36	5	-45 +11

Upper particle size analysis using sieve in accordance with ASTM B214; lower size analysis using laser diffraction (Microtrac).

### 2.2 Key Selection Criteria

- Choose the product that meets the required customer material specification.
- Metco 57NS has a slightly higher melting temperature than the copper nickel indium products.
- The copper nickel indium materials exhibit higher coating bond strength and slightly better machinability. The addition of indium improves the anti-galling, lubricity and bearing characteristics of the coatings.
- Amdry 500F has the finest particle size distribution, which can produce coatings that are slightly harder and denser than the other materials and is generally used for applications where thinner coatings are needed. The maximum coating thickness for Amdry 500F is significantly less than Metco 57NS, Metco 58NS and Amdry 500C.
- Plasma sprayed coatings of these materials produce higher hardness with somewhat higher oxide content compared to coatings applied using combustion powder Thermospray™.
- Metco 57NS and Metco 58NS coatings applied using combustion powder Thermospray™ show higher deposition rates than atmospheric plasma sprayed coatings.
- Metco 57NS and Metco 58NS have been sprayed using the TriplexPro™ series plasma spray gun for improved coating throughput.

### 2.3 Related Products

- Coatings of Amdry 958 (cobalt alloy with hexagonal boron nitride) have demonstrated better performance than copper nickel indium or copper nickel coatings in several gas turbine applications.
- Amdry 958 coatings contain solid lubricant in various amounts depending on the thermal spray application process (atmospheric plasma spray or HVOF).
- Amdry 958 coatings exhibit better compressive strength than copper-based anti-fretting coatings, making Amdry 958 more suitable for high compressive stress applications such as gas turbine fan blade roots when plastic deformation of the copper-based coatings is an issue.
- It is recommended that new turbine engine applications compare HVOF and APS applied coatings of Amdry 958 to copper-based coatings.
- More information on Amdry 958 is available in the appropriate product data sheet and Solutions Flash SF-0003.

## 2.4 Customer Specifications

Product Name	Customer Specifications	
Metco 57NS	GE B50TF42, CI A Pratt & Whitney PWA 1369	GKN Aerospace PM 819-42
Metco 58NS	Boeing BMS10-67, Type XIV GE B50TF72, CI A Rolls-Royce Corporation EMS 56786 Rolls-Royce plc MSRR 9507/31 Siemens PD13445	CFM International CP 6003 Honeywell EMS 52417, Table 1, Class R Rolls-Royce OMAT 328 Rolls-Royce plc RRMS 40005 Snecma DMR 33.016
Amdry 500C	CFM International CP 6003 Honeywell EMS 52432, CI XXXII Rolls-Royce plc MSRR 9507/31 Siemens PD13445DB	GE B50TF72, CI A Rolls-Royce Corporation EMS 56786 Rolls-Royce plc RRMS 40005 Snecma DMR 33.016
Amdry 500F	GE B50TF72, CI B Rolls-Royce plc MSRR 9507/55	GKN Aerospace PM 819-48

## 3 Coating Information

### 3.1 Key Thermal Spray Coating Information

Specification		Metco 57NS	Metco 58NS	Amdry 500C	Amdry 500F
Recommended Process		Atmospheric plasma spray or combustion powder Thermospray™			
Bond Strength	MPa	20.0 – 24.1	17.2 – 27.6	17.2 – 27.6	N.R.
	psi	2900 – 3500	2500 – 4000	2500 – 4000	
Thickness Limitation	mm	0.89	0.89	0.89	0.25
	in	0.035	0.035	0.035	0.010
Coating Density	g/cm <sup>3</sup>	7.9 – 8.1	7.8 – 7.9	7.8 – 7.9	7.9 – 8.1
Coating Porosity	%	< 0.5	< 0.5	< 0.5	N.R.
Surface Roughness					N.R.
	As sprayed	µm Ra	10 – 15	10 – 15	10 – 15
		µin Ra	400 – 600	400 – 600	400 – 600
	Ground/lapped	µm Ra	0.03 – 0.08	0.03 – 0.08	0.03 – 0.08
µin Ra		2 – 3	2 – 3	2 – 3	

All reported values are nominal based on standard spray conditions and parameters.  
N.R. = not reported

### 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
Metco F4 series	Metco 6P-II series
TriplexPro series	

## 4 Commercial Information

### 4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 57NS	1000131	5 lb (approx. 2.25 kg)	Stock	Global
Metco 58NS	1000132	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 500C	1001043	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 500F	1001044	5 lb (approx. 2.25 kg)	Stock	Global

### 4.2 Handling Recommendations

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

### 4.3 Safety Recommendations

See the SDS (Safety Data Sheet) in the version localized for 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 57NS	50-121
Metco 58NS	50-122
Amdry 500C	50-122
Amdry 500F	50-122