oerlikon
metco

Material Product Data Sheet
Aluminium 12% Silicon Thermal Spray Powders

Thermal Spray Powder Products:
Metco 52C-NS, Amdry 355

1 Introduction

Metco™ 52C-NS and Amdry™ 355 are gas atomized powders of aluminum alloyed with 12 wt.% silicon. These materials are excellent general purpose materials for salvage and build-up of parts made of aluminum or magnesium and their alloys. Plasma sprayed coatings of aluminum silicon are also used for the repair of worn jet engine components and dimensional restoration of jet engine components mismachined in manufacture.

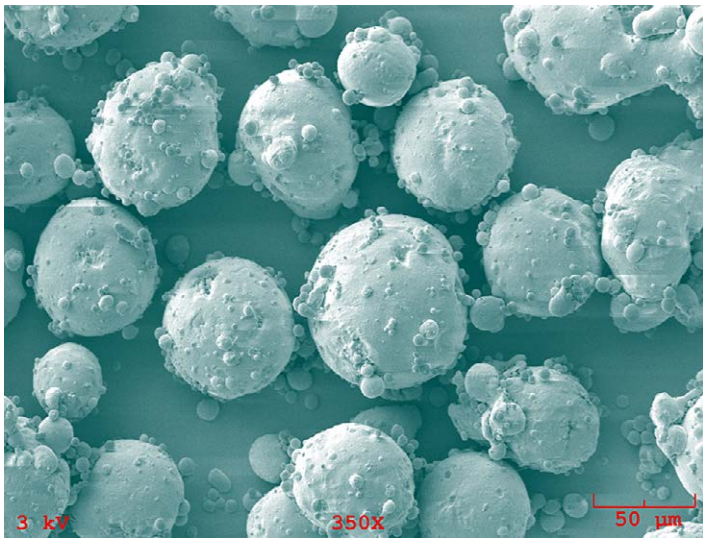
Aluminum with 12 wt.% silicon is a simple eutectic system with a low melting temperature. Silicon reduces the melting temperature to 577 °C (1071 °F) while increasing fluidity, specific gravity and the coefficient of thermal expansion. It also decreases the contraction associated with solidification.

The silicon present in the material is virtually pure, acting to increase the hardness of coatings produced from these materials and improving abrasion resistance. Aluminum silicon powders produce coatings that are harder and slightly denser than coatings produced from pure aluminum powder.

1.1 Typical Uses and Applications

- Salvage and build-up of aluminum or magnesium components or components of alloys of aluminum or magnesium
- Dimensional restoration of worn or mismachined components
- Repair of casting blow holes and voids

Quick Facts	
Classification	Alloy, aluminum-based
Chemical formula	Al 12Si
Manufacture	Gas atomized
Purpose	Salvage and build-up
Morphology	Spheroidal
Apparent density	1.3 g/cm^3 (typical)
Melting point	577 °C (1071 °F)
Process	ChamPro™ or Atmospheric Plasma Spray



SEM photomicrograph of gas atomized Al 12Si powder.

2 Material Information

2.1 Chemical Composition and Manufacturing Method

Product	Chemical Composition (nominal weight %)		Manufacturing Method
	Aluminum	Silicon	
Metco 52C-NS	Balance	12	Gas Atomized
Amdry 355	Balance	12	Gas Atomized

2.2 Chemical Composition, Particle Size Distribution and Manufacturing Method

Product	Nominal Distribution (µm)	D10 (µm)	D50 (µm)	D90 (µm)
Metco 52C-NS	-90 +45	48	71	106
Amdry 355	-45	8	23	48

Particle size analysis using sieve in accordance with AS™ B214

2.3 Key Selection Criteria

- Amdry 355 has a finer particle size than Metco 52C-NS, making it appropriate for use with ChamPro™ controlled atmosphere plasma spray processes. Amdry 355 can also be applied using atmospheric plasma spray.
- Metco 52C-NS has a particle size distribution appropriate for application using atmospheric plasma spray.
- Always choose the material that meets the customer material and process specifications.

2.4 Related Products

- Metco 54NS and Metco 54NS-1 are pure aluminum powder materials that can also be used for salvage of mismachined parts made of aluminum, magnesium and their alloys. These materials can be applied using atmospheric plasma spray.
- Coatings of Al 12Si have a lower melting temperature (577 °C / 1071 °F) than coatings of pure aluminum (660 °C / 1220 °F); therefore, Al 12Si is more suitable for co-spray with temperature sensitive materials.
- Pure aluminum coatings have better corrosion resistance and electrical conductivity than coatings of Al 12Si and should be used in applications where such characteristics are desirable.
- Aluminum silicon materials produce coatings that are harder and slightly denser than coatings of pure aluminum.
- Wire materials are available for coatings applications where the use of electric arc wire or combustion wire spray is preferred. These include Metco 8234 and Metco AlSi (Al 12Si) and Metco SF Aluminum and Metco SF-NS Aluminum (Al 6Si).

2.5 Customer Specifications

Product	Customer Specification
Metco 52C-NS	Canada Pratt & Whitney CPW 235 Chromalloy BZ-003 Type 48 GE B50TF92, Cl A GKN Aerospace PM 819-35 Honeywell EMS 57742 , Except Para 3.4 Honeywell M3962 MTU MTH 627 Pratt & Whitney PWA 1335 Rolls-Royce Corporation EMS 56766 Rolls-Royce plc MSRR 9507/60 Snecma DMR 33.027 U. S. Military MIL-P-83348 Type 1, Comp. E
Amdry 355	Pratt & Whitney PWA 1355

3 Coating Information

3.1 Key Thermal Spray Coating Information

Specification		Data	
Recommended Process		ChamPro™ controlled atmosphere plasma spray or atmospheric plasma spray	
Surface Roughness	As Sprayed (Ra) [a] Machined (Ra)	12.5 – 25 µm 0.8 – 1.6 µm	490 – 980 µin 32 – 63 µin
Macrohardness	HRH	90 – 100	
Microhardness	HV0.3	120 – 130	
Density	g/cm^3	2.0 – 2.5	
Porosity	vol. %	4 – 12	
Bond Strength		5 – 10 MPa	725 – 1500 psi
Thickness limitation		> 2.5 mm	> 0.100 in
Post Finishing Techniques		"D" shape tungsten carbide tool bit, surface speed of 0.94 m/s (3.1 ft/s), traverse speed of 0.06 mm/rev (0.0024 in/rev), in-feed of 0.05 mm (0.002 in)	

[a] Data for as-sprayed surface roughness is for Metco 56C-NS. As-sprayed roughness for Amdry 355 may be slightly lower.

3.2 Coating Parameters

Coating parameters for the following spray guns are available to Oerlikon Metco customers. Please contact your local Oerlikon Metco Account Representative. Please note that parameters may not be available for all guns listed for each material. Support for specific application requirements are available through Oerlikon Metco Coating Solutions Centers.

Recommended Spray Guns	
Atmospheric Plasma	**ChamPro**
TriplexPro	O3CP
SinplexPro	
Metco 3MB series	
Metco 9MB series	
Metco F4 series	

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 52C-NS	1000239	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 355	1000585	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 at temperatures below 38 °C (100 °F) 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 (Resources – Safety Data Sheets).

Product	SDS No.
Metco 52C-NS	50-117
Amdry 355	50-2029

Information is subject to change without prior notice.

www.oerlikon.com/metco
info.metco@oerlikon.com