

Material Product Data Sheet

99 % Aluminum Powder for Thermal Spray

Thermal Spray Powder Products: Metco 54NS, Metco 54NS-1

1 Introduction

Metco™ 54NS and Metco 54NS-1 are high purity, spheroidal aluminum powders produced by gas atomization. Aluminum coatings are nonmagnetic, have good electrical and thermal conductivity, radio frequency shielding ability, corrosion resistance in coastal and industrial atmospheric conditions and good shock resistance.

Coatings of Metco 54NS and Metco 54NS-1 are useful for salvage and buildup on substrates of aluminum, magnesium and their alloys. Metco 54NS and Metco 54NS-1 powders can be applied using atmospheric plasma spray (APS). However, for corrosion application on large structures, wire sprayed coatings of aluminum are usually preferred because of the portability of the equipment and ease of application.

1.1 Typical Uses and Applications

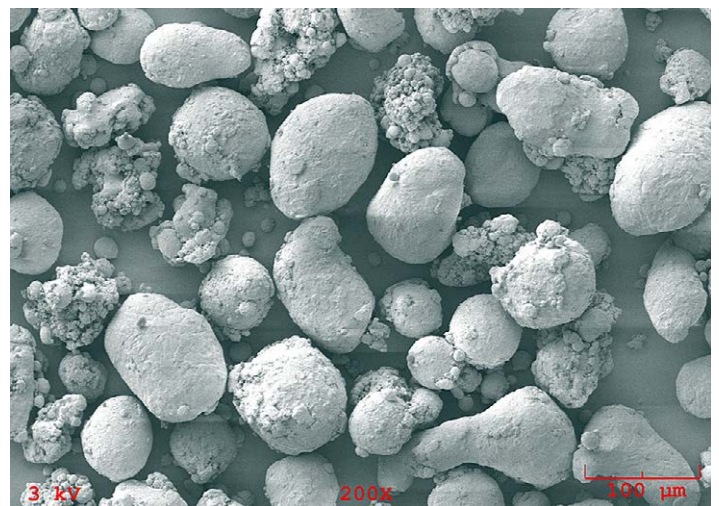
- Salvage and buildup on components made of aluminum, magnesium and their alloys
- Corrosion protection
- Electrical conductivity
- Thermal conductivity
- Radio frequency (RF) shielding

Typical coated components include:

- Locomotive axle grounds
- Lightning arrestors
- RF Shielding for instrument nuts and cases
- RF Shielding for missile systems
- Salvage of worn or mismachined parts
- Repair of casting blowholes and other defects

Quick Facts

Classification	Powder, pure aluminum
Chemistry	99.0%+ Al
Manufacture	Gas atomized
Morphology	Rounded
Apparent Density	1.3 g/cm ³
Purpose	Salvage, corrosion resistance, conductivity, RF shielding
Melting Point	660 °C (1220 °F)
Process	Atmospheric plasma spray



2 Material Information

2.1 Chemical Composition, Particle Size Distribution and Manufacturing Method

Product	Chemical Composition (wt. %)	Nominal Particle Size Distribution (µm)	Manufacturing Method
	Al (min)		
Metco 54NS	99.0	-90 +45	Gas Atomized
Metco 54NS-1	99.0	-75 +45	Gas Atomized

Particle size measured by sieve analysis

2.2 Key Selection Criteria

- Metco 54NS and Metco 54NS-1 are chemically identical materials. They differ only in particle size distribution with Metco 54NS-1 having a narrower range than Metco 54NS.
- Always choose the material that meets the customer material and process specifications.

2.3 Related Products

- Metco 52C-NS and Amdry 355 are Al 12Si gas atomized powders that can be used for salvage of worn or mismatched parts made of aluminum, magnesium or their alloys.
- Metco 52C-NS is suitable for atmospheric plasma spray (APS). Amdry 355 is suitable for either atmospheric plasma spray or controlled atmosphere plasma spray (ChamPro™).

- Al 12Si has a lower melting temperature of 577 °C (1071 °F) compared to 660 °C (1220 °F) for pure aluminum. The lower melting temperature makes Al 12 Si more suitable for co-spraying with temperature sensitive materials.
- Coatings of pure aluminum have better corrosion resistance than Al 12Si, however, coatings of Al 12Si are somewhat harder than coatings of pure aluminum and produce very good machined finishes.
- Thermal spray wires are available for coatings where application using electric arc wire or combustion wire spray is preferred. These include Metco Aluminum (99.0%+ Al), Metco SF Aluminum (Al 6Si), Metco SF-NS Aluminum (Al 6Si) and Metco 8234 (Al 12Si).
- For galvanic protection of iron and steel structures in seawater, Metco AlMg (Al 5Mg) may be preferred. This material is available in wire form for the electric arc wire spray process.

2.4 Customer Specifications

Product	Customer Specification
Metco 54NS	Boeing BMS 10-67, Type VII Canada Pratt & Whitney CPW 220 Honeywell EMS 57743 Pratt & Whitney PWA 1320 Saab STD 113969 Snecma DMR 33.012 U. S. Military USAF 67A60753, Type P-2 Voight 207-2-402
Metco 54NS-1	Aviation Product Support PM 0021 CFM International CP 6028 GE B50TF57, CI A GKN Aerospace PM 819-23 Jet Avion JA 1320 MTU MTS 1052 Pratt & Whitney PWA 1320 Praxair PS-031004-RM Rolls-Royce plc MSRR 9507/13

3 Coating Information

3.1 Key Thermal Spray Coating Information

Specification	Typical Data (depending on spray gun and spray parameters used)		
Recommended Spray Process	Atmospheric Plasma Spray		
Preparation Recommendations	Prepare aluminum and aluminum alloy substrates using steel grit. Metcolite grit is not recommended.		
Surface Roughness Ra	As-Sprayed	12.5 – 25 µm	490 – 980 µin
	Ground	0.8 µm	32 µin
Macrohardness	80 – 90 HR15Y		
Microhardness	33 – 45 HV0.3		
Density	2.48 g/cm ³		
Porosity	5 – 10 vol. %		
Bond Strength ^a	15 – 20 MPa	2175 – 2900 psi	
Recommended Machining	High speed steel or carbide tools		

^a On grit-blasted low carbon steel.

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. Please note that parameters for Metco 54NS and Metco 54NS-1 are classified as ECCN 1E101 within the US Export Administration regulation. See Section 4.4, Export Control for more information..

Recommended Atmospheric Plasma Spray Guns

Metco 3MB series

Metco 9MB series

Metco F4 series

SinplexPro series

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 54NS	1000422	5lb (approx. 2.25kg)	Stock	Global
Metco 54NS-1	1000435	5lb (approx. 2.25kg)	Stock	Global

4.2 Handling Recommendations

- Store in the original container in a dry location.
- Tumble contents prior to use to prevent segregation.
- Store open containers in a drying oven at temperatures below 38 °C (100 °F) to prevent moisture pickup.

4.3 Safety Recommendations

See SDS 50-118 (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).

4.4 Export Control

Metco 54NS and Metco 54NS-1 are subject to the US Export Administration Regulation (EAR). These products are classified as ECCN 01C111.a.1 within the regulation. All shipments of Metco 54Ns or Metco 54NS-1 outside of the United States, in any quantity, require an export license through BIS (Bureau of Industry and Security, US Department of Commerce). Complete information regarding licensing requirements and policies, as well as the full EAR text, can be found at www.bis.doc.gov.

Information is subject to change without prior notice.