Material Product Data Sheet
Nickel-Aluminum Hexagonal Boron Nitride Abradable Powder

Powder Products: Metco 1707A

1 Introduction

Metco 1707A is a lightweight cermet nickel-aluminium alloy powder composited with hexagonal boron nitride. It is designed for use as an abradable coating material for clearance control applications, particularly in the high-pressure compressor section of aerospace gas turbine engines, where rotating components may come into contact with the coating as a result of design intent or operational surges. The coatings are designed to minimize the wear to the rotating components while maximizing gas path efficiency by providing clearance control in seal areas.

Coatings of Metco 1707A have excellent resistance to oxidation for service temperatures that typically fall in a range of 450 °C to 800 °C (840 °F to 1470 °F). The hexagonal boron nitride (hBN) filler phase is an inert solid lubricant that enhances abradability.

Coatings applied using atmospheric plasma spray (APS) demonstrate the optimum balance between the desired properties of abradability, solid particle erosion resistance and low surface roughness. The coatings are readily cut by bare, untipped nickel alloy blade components. For use under extreme environmental conditions which typically demand the use of a harder, more erosion resistant coating, hard tipped mating blades are recommended to mitigate the risk blade damage as a result of a rub.

Metco 1707A is most efficiently applied using Oerlikon Metco's cascading arc gun technology (e.g., SinplexPro™ or TriplexPro™) and requires no post-deposition heat treatment.

1.1 Typical Uses and Applications:

- Gas turbine high pressure compressor seals and shrouds against untipped or tipped nickel-alloy blades

Quick Facts	
Classification	Abradable, nickel based
Chemistry	Ni 12Al 21BN
Manufacture	Chemically clad
Morphology	Rounded
Apparent Density	0.9 to 1.5 g/cm^3
Service Temperature	typical: 450 °C to 800 °C (840 °F to 1470 °F) max: < 850 °C (1560 °F)
Purpose	Clearance control coatings
Process	Atmospheric Plasma Spray

2 Material Information

2.1 Chemical Composition and Particle Size Distribution

Product	Chemical Composition (weight percent nominal)			Nominal Particle Size Distribution (µm)
	Ni	Al	BN (hexagonal)	Per ASTM B214
Metco 1707A	Balance	12	21	-177 +45

2.2 Other Properties

	Morphology	Manufacturing Method	Apparent Density (g/cm^3)
Metco 1707A	Rounded	Chemically Clad and Blended	1.2 ± 0.3

2.3 Key Selection Criteria

- High temperature applications using bare nickel alloy blades or tipped blades depending on engine design requirements.
- Low surface roughness in the as-sprayed as well as post-rub conditions.
- Deposited using the APS process (e.g., SinplexPro or TriplexPro) with demonstrated robustness and high spraying productivity.
- Manufactured using binder-free technology where coatings do not require any post-spray heat treatments

2.4 Related Products

- Metco 1707A is a plasma-sprayed alternative to combustion sprayed products such as Metco 301NS, Metco 301C-NS, Metco 312NS and Metco 314NS.
- Coatings of Metco 1707A can operate at higher service temperatures and exhibit much improved oxidation resistance versus typical high-pressure compressor coatings.
- Oerlikon Metco manufacturers and sells appropriate MCrAlY bond coat materials for use with Metco 1707A, including OEM-proprietary bond coat materials that are only available to qualified buyers. Please contact your Oerlikon Metco account representative for details and availability.

3 Coating Information

3.1 Key Thermal Spray Coating Information

Characteristic		Typical Data for Metco 1707A	
Recommended Process		Atmospheric Plasma	
Recommended APS Guns		See Section 3.3	
Recommended Bond Coat Material [a]		Amdry 386-4, Amdry 995C, Amdry 962 or proprietary MCrAlY as recommended by the OEM	
Surface Roughness (Ra)	as-sprayed	20 to 25 µm	800 to 1000 µin
	machined	5 to 10 µm	200 to 400 µin
	post-rub	10 to 15 µm	400 to 600 µin
Service Temperature	typical range	450 to 800 °C	840 to 1470 °F
	max	850 °C	1560 °F
Oxidation Resistance		Excellent	
Incursion Rub Performance [c]		Excellent	
Deposition Efficiency [b]		> 60 %	
Post Finishing Technique		Machine (tungsten carbide tool), avoid grinding	
		Against bare Ni alloy blades	Against tipped Ni alloy blades
Macrohardness [b]	as-sprayed	45 to 60 HR15Y	55 to 70 HR15Y
Coating Density [b]		3.0 to 3.4 g/cm^3	3.2 to 3.7 g/cm^3
Fugitive Phase Porosity		55 to 65 vol. %	45 to 68 vol. %
Erosion Resistance [c]		80 to 120 s/mm (2.0 to 3.0 s/0.001 in)	110 to 160 s/mm (2.8 to 4.0 s/0.001 in)

[a] Many customer coating specifications specify a proprietary MCrAlY bond coat material available to authorized users. Please check with your Oerlikon Metco Account Representative for availability
[b] Data provided for reference only
[c] In accordance with GE test procedure E50TF121

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 Spray (APS) Guns
TriplexPro series (11.0 mm nozzle)
SinplexPro series (11.0 mm nozzle)
Metco 9MBM (9.5 mm nozzle)
Metco 3MBM (9.5 mm nozzle)

4 Commercial Information

4.1 Ordering Information and Availability

	Order No.	Package Size	Availability	Distribution
Metco 1707A	2283364	2.5 kg (approx. 5.5 lb)	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 at temperatures below 38 °C (100 °F) to prevent moisture pickup.

4.3 Safety Recommendations

See the correct SDS 50-2692 (Safety Data Sheet) 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).

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