

# Material Product Data Sheet

## Aluminum Silicon Polymer Thermal Spray Powders

### Thermal Spray Powder Products:

**Metco™ 601NS, Amdry™ 2010, Amdry XPT 268, Amdry 2000**

### 1 Introduction

Aluminum Silicon – Polymer powders produce abradable coatings for clearance control applications where the rotating component 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.

The powders produce abradable coatings with excellent rub characteristics. They provide the optimum balance between the desired properties of abradability, erosion resistance and hardness.

These powders were specifically designed to meet current gas turbine Original Equipment Manufacturer (OEM) specifications for clearance control coatings. These products, and in particular, Metco 601NS, have long, proven track records and are well known, worldwide. In fact, Metco 601NS has an exemplary service reputation, with many thousands of engine components having been coated with this material and millions of flight hours logged, making Metco 601NS a mainstay product within the aerospace industry.

Coatings using these powder materials are best applied using the atmospheric plasma spray process.

### 1.1 Typical Uses and Applications:

Applications include lightweight clearance control coatings for:

- Aerospace turbine engine low pressure compressor
- Automotive and industrial turbochargers

Abradable coatings can be used against untipped titanium alloy, nickel alloy and steel blades at service temperatures up to:

- Metco 601NS and Amdry 2010: 325 °C (615 °F)
- Amdry 2000: 350 °C (660 °F)
- Amdry XPT 268: 345 °C (650 °F)

Metco 601NS and Amdry 2010 can also be used against untipped aluminum alloy radial impeller blading.

### Quick Facts

Classification	Abradable, aluminum based
Chemistry	AlSi-Polymer
Manufacture	Blended or mechanically clad
Morphology	Irregular, rounded
Apparent Density	~ 0.9 g/cm <sup>3</sup>
Service Temperature	≤ 325 – 350 °C (615 – 660 °F)
Melting Point (Al 12Si)	577 °C (1070 °F)
Purpose	Clearance control coatings
Process	Atmospheric Plasma Spray



## 2 Material Information

### 2.1 Chemical Composition

Product	Weight Percent (nominal)					
	Al	Si	Polyester	Polyimide	Boron Nitride	Organic Binder
Metco 601NS	Balance	7	40	---	---	---
Amdry 2010	Balance	7	40	---	---	---
Amdry XPT-268	Balance	9	20	---	6	---
Amdry 2000	Balance	6	---	47	---	6

### 2.2 Particle Size Distribution and Manufacturing Method

	Nominal Range $\mu\text{m}$	Manufacturing Method
Metco 601NS	-125 +11	Blended
Amdry 2010	-125 +11	Blended
Amdry XPT-268	-125 +11	Mechanically Clad and Blended
Amdry 2000	-149 +11	Mechanically Clad

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

### 2.3 Key Selection Criteria

- While Metco 601NS and Amdry 2010 are similar products, Metco 601NS is the recommended material of choice because it has the:
  - Best availability worldwide
  - Longest-standing track record in service with millions of reliable flight hours
  - Best availability in high volume to large-scale users
  - Highest number of customer specification (OEM) approvals (see Section 2.5)
  - Best technical and parameter support by Oerlikon Metco as a result of our long experience with this product
- Coatings of Amdry 2010 have higher erosion resistance than coatings of Metco 601NS when tested according to GE specification E50TF121. This is the result of different raw materials.
- Coatings of Amdry 2000 can be used at slightly higher temperatures than Metco 601NS or Amdry 2010; however, abrasability is not as good as for Metco 601NS.

- Coatings of Amdry XPT-268 exhibit the highest erosion resistance and bond strength, and can be used at temperatures up to 345 °C (650 °F) with little blade wear; however, abrasability is not as good as Metco 601NS and Amdry 2010 coatings.
- Always choose the material that meets the customer material and process specifications.

### 2.4 Related Products

- When coatings with service temperatures above 350 °C (660 °F) for use against untipped titanium blades are required, then abrasable coating materials such as Metco 320NS, Metco 2042 or Metco 610NS are recommended.
- AlSi-polymer coatings have better galvanic corrosion resistance compared to coatings of AlSi-graphite, such as Metco 311NS and Metco 313NS, but worse than CuAl-polyester, such as Metco 604NS, Metco 605NS and Metco 610NS.

## 2.5 Customer Specifications

Product	Customer Specification	
Metco 601NS	Avio 4800M/23 Canada Pratt & Whitney CPW 928 GKN Aerospace PM 819-30 Honeywell 91547-M3955 Honeywell FP 5091 Pratt & Whitney PWA 1349 Rolls-Royce Corporation PMI 1210 Rolls-Royce plc MSRR 9507/15 Snecma DMR 33.087	Canada Pratt & Whitney CPW 517 Chromalloy BZ-003 Type 34 GE B50TF222, CI A Honeywell EMS 57735 MTU MTS 1081 Rolls-Royce Corporation EMS 38900 Rolls-Royce OMAT 3/143 Rolls-Royce plc RRMS 40019 Turbomeca LA 657 Ed. 1 PW1 Ind. 0
Amdry 2010	Canada Pratt & Whitney CPW 517 Honeywell EMS 57735, Type 1 Pratt & Whitney PWA 1349 Rolls-Royce OMAT 3/143B	GE B50TF222, CI A & C Honeywell 91547-M3955 Praxair PAB360
Amdry XPT-268	Rolls-Royce Corporation EMS 56723 Rolls-Royce plc RRMS 40021	Rolls-Royce Corporation PMI 1364
Amdry 2000	Rolls-Royce Corporation EMS 56767	Rolls-Royce Corporation PMI 1332

## 3 Coating Information

### 3.1 Key Thermal Spray Coating Information

Characteristic	Typical Data			
	Metco 601NS	Amdry 2010	Amdry XPT-268	Amdry 2000
Recommended Process	Atmospheric Plasma Spray (all materials)			
Macrohardness HR15Y	70	70	75	60
Bond Strength (nominal)	9.7 MPa (1400 psi)	9.7 MPa (1400 psi)	23.4 MPa (3400 psi)	9.7 MPa (1400 psi)
Coating Density	1.55 g/cm <sup>3</sup>	1.55 g/cm <sup>3</sup>	1.86 g/cm <sup>3</sup>	1.2 g/cm <sup>3</sup>
Post Finishing Technique	Use a sharply pointed, high-speed steel bit, light feeds, fast work speed and traverse rate			
Deposition Efficiency *	≤ 65 %	≤ 65 %		
Maximum Service Temperature	325 °C (615 °F)	325 °C (615 °F)	345 °C (650 °F)	350 °C (660 °F)
Thermal Conductivity	0.53 W/m·K	0.53 W/m·K		
Thermal Expansion	20 – 30 x 10 <sup>-6</sup> /K	20 – 30 x 10 <sup>-6</sup> /K	20 – 30 x 10 <sup>-6</sup> /K	

\* Significantly higher deposit efficiencies can be expected using Metco's TriplexPro™ series plasma spray guns.

### 3.3 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 Atmospheric Plasma Spray Guns

Metco 3MB series

Metco 9MB series

Metco F4 series

TriplexPro™ series

Metco SM F-100 CONNEX

Metco SM F210

## 4 Commercial Information

### 4.1 Ordering Information and Availability

	Order No.	Package Size	Availability	Distribution
Metco 601NS	1000298	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 2010	1001065	5 lb (approx. 2.25 kg)	Stock	Global
Amdry XPT-268	1002392	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 2000	1001064	5 lb (approx. 2.25 kg)	Special Order	Global

### 4.2 Handling Recommendations

- Store in the original container in a dry location.
- Tumble contents prior to use to prevent segregation.
- Remove desiccant bag prior to use, where applicable.
- 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 (Safety Data Sheet) for the product of interest 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 No.
Metco 601NS	50-189
Amdry 2010	50-189
Amdry XPT-268	50-821
Amdry 2000	50-819