

Material Product Data Sheet

Cobalt [Nickel] Chromium Aluminum Yttrium (Co[Ni]CrAlY) Thermal Spray Powders

Thermal Spray Powder Products:

**Amdry™ 9951, Amdry 9954, Amdry 995C,
Diamalloy™ 4454, Diamalloy 4700,
Metco™ 4451, Amdry 920**

1 Introduction

Products in this data sheet are premium grade CoNiCrAlY (cobalt nickel chromium aluminum yttrium) or CoCrAlY (cobalt chromium aluminum yttrium) gas atomized powders specifically designed to produce thermal sprayed coatings for surface protection against the corrosive effects of oxidation and sulfidation at high temperatures.

The outstanding technical performance of this family of superalloys is enhanced by their ability to generate a protective oxide scale that helps to retard chemical attack from corrosive environments. In addition, post-coating heat-treatment and/or high-temperature service conditions will promote the formation of corrosion-resistant intermetallics at the diffusion zone and further densify the coating, thereby enhancing its protective barrier characteristics.

Gas atomization ensures excellent chemical homogeneity and high purity which results in consistent coating results.

1.1 Typical Uses and Applications

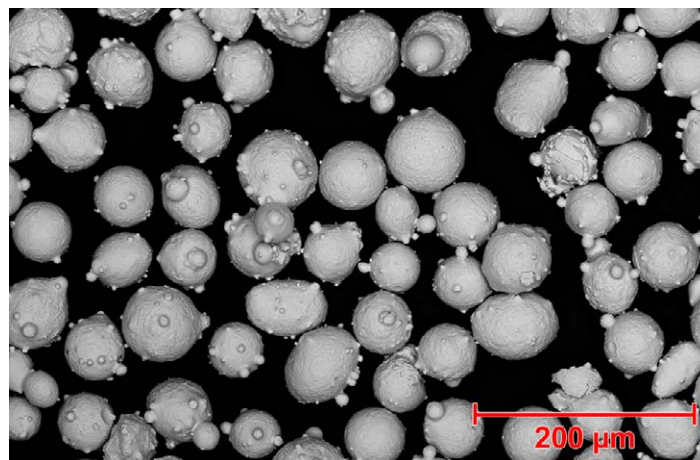
Generally used as a thermal sprayed coating for:

- Oxidation and hot corrosion resistance on gas turbine components such as airfoils, turbine buckets, turbine blades and shrouds
- Corrosion resistant bond coat layer for thermal barrier coatings and ceramic clearance control coatings
- Exhaust manifolds, ducts and components used in flue gas and fly ash systems

Quick Facts

Classification	Alloys, cobalt-based
Chemistry	Co 32Ni 21Cr 8Al 0.5Y or Co 29Cr 6Al 2Si 0.3Y
Manufacture	Gas atomized
Morphology	Spheroidal
Purpose	Oxidation and / or hot corrosion resistance
Service Temperature	
APS or HVOF:	≤ 850 °C (1560 °F)
ChamPro™*:	≤ 1050°C (1920°F)
Process	Atmospheric plasma spray, HVOF or Cham-Pro™ (LVPS, LPPS, VPS)

* Heat treated



SEM photomicrograph of Amdry 995C, showing the gas atomized morphology typical of these materials.

2 Material Information

2.1 Chemical Composition

Product	Chemical Composition (wt. %)						
	Co	Ni	Cr	Al	Si	Y	Other (max)
Amdry 9951	Bal.	29.0 – 35.0	18.0 – 24.0	5.0 – 11.0	---	0.1 – 0.8	1.0
Amdry 9954	Bal.	29.0 – 35.0	18.0 – 24.0	5.0 – 11.0	---	0.1 – 0.8	0.5
Amdry 995C	Bal.	29.0 – 35.0	18.0 – 24.0	5.0 – 11.0	---	0.1 – 0.8	1.0
Diamalloy 4454	Bal.	29.0 – 35.0	18.0 – 24.0	5.0 – 11.0	---	0.1 – 0.8	1.0
Diamalloy 4700	Bal.	29.0 – 35.0	18.0 – 24.0	5.0 – 11.0	---	0.1 – 0.8	1.0
Metco 4451	Bal.	29.0 – 35.0	18.0 – 24.0	5.0 – 11.0	---	0.1 – 0.8	1.0
Amdry 920	Bal.	---	27.0 – 31.0	5.0 – 7.0	1.0 – 3.0	0.05 – 0.5	1.0

2.2 Particle Size Distribution and Other Characteristics

Product	Nominal Particle Size Distribution (µm)	Morphology	Manufacturing Method
Amdry 9951	-38 +5.5	Spheroidal	Gas Atomized
Amdry 9954	-63 +11	Spheroidal	Gas Atomized
Amdry 995C	-90 +45	Spheroidal	Gas Atomized
Diamalloy 4454	-45 +22	Spheroidal	Gas Atomized
Diamalloy 4700	-45 +15	Spheroidal	Gas Atomized
Metco 4451	-38 +5.5	Spheroidal	Gas Atomized
Amdry 920	-38 +5.5	Spheroidal	Gas Atomized

Particle size equal to or above 45 µm determined by sieve analysis; below 45 µm by laser diffraction (Microtrac).

Other particle size distributions are available on request.

2.3 Key Selection Criteria

- For CoNiCrAlY products in this datasheet, choose the product that meets the required customer material specification or is suitable for the spray process being utilized (see Section 2.5).
- CoNiCrAlY products offer balanced protection against both oxidation and hot corrosion.
- For applications where hot corrosion or sulfidation is the primary concern, choose Amdry 920.
- Diamalloy 4700 is a tightly controlled HVOF cut that results in generally higher deposition efficiencies.
- Metco 4451 is similar to Amdry 9951 but with a lower level of fine particles.

2.4 Related Products

- Oerlikon Metco is a well-known supplier of MCrAlY materials for thermal spray. In addition to materials in this datasheet, our portfolio includes NiCrAlY, FeCrAlY and NiCoCrAlY products. We are also a trusted supplier to many

OEM and manufacture a portfolio of MCrAlY materials on a proprietary basis.

- Coatings of nickel-based NiCrAlY powders in the Oerlikon Metco product portfolio provide superior high temperature oxidation resistance while coatings of cobalt-based CoCrAlY (Amdry 920) powders provide excellent hot corrosion protection. The CoNiCrAlY products in this data sheet combine the benefits of both NiCrAlY (see Data Sheet DSMTS-0102) and CoCrAlY superalloys, resulting in the popularity and broad use of these products. NiCoCrAlY products (see Data Sheet DSMTS-0093), also offer these balanced benefits, with more emphasis on oxidation protection.
- Oerlikon Metco also offers a broad range of thermal barrier and abradable oxide ceramic materials, for which the CoNiCrAlY materials are often used as an oxidation resistant bond coat. Please contact your Oerlikon Metco Sales Representative for more information on our thermal barrier and abradable portfolios.

2.5 Recommended Spray Processes

Product	Atmospheric Plasma	Controlled Atmosphere Plasma	HVOF
Amdry 9951		●	
Amdry 9954			●
Amdry 995C	●		
Diamalloy 4454			●
Diamalloy 4700			●
Metco 4451		●	
Amdry 920		●	

2.6 Customer Specifications

Product	Specification
Amdry 9951	Rolls-Royce plc MSRR 9507/73 Siemens CT-102 Snecma DMR 33.095 Turbine Airfoil Coating and Repair TACR 05-367 Type 8
Amdry 9954	GE B50TF195, CI A GKN Aerospace PM 819-86 Honeywell EMS 57741, Class B Howmet CD 1128 IHI Corporation ISAJT-M914
Amdry 995C	GKN Aerospace PM 819-58 Power Systems Manufacturing LLC PSM-410 Appendix I Rolls-Royce Corporation EMS 56769 Rolls-Royce plc MSRR 9507/47 Rolls-Royce plc RRMS 40001 Siemens PD83336AB Turbomeca LA 657 PE1 Ind. 0
Diamalloy 4700	Canada Pratt & Whitney CPW 528-3 GE B50TF195, Class A Honeywell EMS 57741, Class B Rolls-Royce Corporation EMS 39664. Class II Rolls-Royce plc MSRR 9507/86

3 Coating Information

3.1 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	HVOF	ChamPro
Metco 9MB series	DiamondJet series	O3CP
Metco F4 series	WokaJet series	F4-VB
TriplexPro series	WokaStar series	
SimplexPro series		

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Amdry 9951	1001059	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 9954	1001060	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 995C	1001061	5 lb (approx. 2.25 kg)	Stock	Global
Diamalloy 4454	1006158	10 lb (approx. 4.5 kg)	Stock	Global
Diamalloy 4700	1001609	10 lb (approx. 4.5 kg)	Stock	Global
Metco 4451	1006159	10 lb (approx. 4.5 kg)	Stock	Global
Amdry 920	1019811	5 lb (approx. 2.25 kg)	Stock	Global

4.2 Handling Recommendations

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

4.3 Safety Recommendations

See the appropriate SDS (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).

Product	SDS Index No.
Amdry 9951	50-743
Amdry 9954	50-743
Amdry 995C	50-743
Diamalloy 4454	50-743
Diamalloy 4700	50-743
Metco 4451	50-743
Amdry 920	50-835

Information is subject to change without prior notice.