

Material Product Data Sheet

Amdry 93X Series Braze Filler Metal

Products:

Amdry 9300, Amdry 9301, Amdry 9300B, Amdry 931A

1 Introduction

The Amdry™ 93X series of braze filler metals are spheroidal, inert gas-atomized, nickel-based braze alloys containing silicon and manganese as temperature suppressants. The carbon content in these materials is very low, which, coupled with the addition of copper, produces strong, ductile and corrosion-resistant joints.

Amdry 93X materials exhibit excellent flow and non-aggressive wetting characteristics, making them good choices for joining thin section components or very large components where longer braze cycles may be required.

Amdry 931A is a new braze filler metal that offers braze properties very similar to those of the Amdry 930 materials, but at a lower brazing range.

Gas atomization ensures excellent chemical homogeneity and high purity for consistent braze process results.

1.1 Typical Use and Applications

Usually used as a brazed filler metal for:

- Joining thin section components such as honeycomb assemblies, heat exchangers, gas turbine recuperators and small diameter wire screens
- Joining applications where erosion from the filler metal during brazing cannot be tolerated
- Joining applications requiring post-braze operations such as welding and machining where a more ductile joint is desirable
- Joining of complex assemblies that are exposed to thermal stress, cyclic loading or impact situations where the ductility of Amdry 93X braze filler metals is beneficial
- Successful brazing of stainless steels, low alloy steels, nickel and cobalt based metals

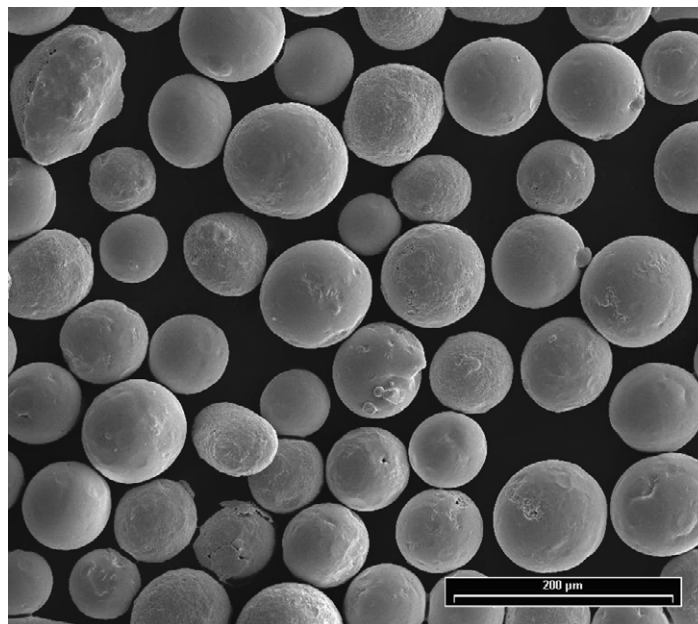
Amdry 931A Patent Applications:

US: 62/940,533

WIPO: WO/2021/108578

Quick Facts

Classification	Nickel-based alloy
Chemistry	NiMnSiCu
Manufacture	Gas Atomization
Morphology	Spheroidal
Melting range	Amdry 930 series: 982 to 1010 °C (1800 to 1850 °F) Amdry 931 series: 971 to 1015 °C (1780 to 1859 °F)
Purpose	Joining
Process	Braze
Gap Size	0.012 – 0.1 mm (0.0005 – 0.004 in)
Viscosity	Free-flowing
Joint Strength	Good
Ductility	Excellent



SEM of typical gas atomized braze filler metal powder particles

2 Material Information

2.1 Chemical Composition

Product	Weight Percent			
	Ni	Mn	Si	Cu
Amdry 9300	Balance	23.5 – 25.0	6.6 – 7.2	4.6 – 5.4
Amdry 9301	Balance	22.5 – 23.5	6.0 – 8.0	4.0 – 5.0
Amdry 9300B	Balance	21.5 – 23.5	6.5 – 7.5	4.5 – 5.0
Amdry 931A	Balance	26.5 – 27.5	6.6 – 7.2	4.5 – 5.5

2.2 Particle Size Distribution

Product	Nominal Range		
	Micrometers (µm)	Mesh (ASTM)	AWS Grade
Amdry 9300	-106 +45	-140 +325	140C
Amdry 9301	-106 +45	-140 +325	140F
Amdry 9300B	-106 +53	-140 +270	–
Amdry 931A	-106 +45	-140 +325	140C

Other particle size distributions may be available on request. Please contact your Oerlikon Metco Account Manager.

2.3 Key Selection Criteria

- Choose the powder that meets the required customer material specification, and/or the particle size distribution suitable to the application method to be used.
- Amdry 9300 is recommended for new applications as it is the most readily available of the Amdry 930 series of products.
- Amdry 931A brazes at a similar temperature range as the Amdry 930 materials. However, it exhibits better wettability and spreading on stainless steels, thereby providing better joining results for some applications.
- The Amdry 93X series of materials are available as powders. Paste, tape or preforms are available on a special order basis. Please see Section 4 of this document and our materials product datasheets for paste or tape and preforms for additional information.

2.4 Related Products

- Before considering an alternative product, customers should also review product compliance with required specifications.
- Amdry 770 that melts in the same temperature range as the Amdry 93X materials, but can be chosen when a non-manganese material is desired.
- Amdry 105 is another braze filler metal without boron that can be used when a more corrosion and oxidation resistant material is required.
- Oerlikon Metco has a broad portfolio of nickel-based braze filler metals that cover a wide variety of applications and service conditions. Please consult with us on your specific needs.

2.5 Customer Specifications

Amdry 9300	UTC Aerospace Systems HS 6800
Amdry 9301	American Welding Society AWS A5.8 BNi8
Amdry 9300B	Aeronca AIMS 7-71, Type B

3 Braze Processing and Joint Information

3.1 Key Processing Information

		Amdry 930 Series		Amdry 931 Series	
Substrate preparation		Clean and dry, free of oxides and organic contaminants. Nickel flash substrates rich in titanium or aluminum to improve flow through the joint.			
Flux requirements		None		None	
Recommended atmospheres		Vacuum		Vacuum	
Other atmospheres	Type	Ar , N ₂ , pure dry H ₂ or disassociated NH ₃		Ar , N ₂ , pure dry H ₂ or disassociated NH ₃	
	Dew point	≤ -52 °C	≤ -60 °F	≤ -52 °C	≤ -60 °F
Melting range	Solidus	982 °C	1800 °F	971 °C	1780 °F
	Liquidus	1010 °C	1850 °F	1015 °C	1859 °F
Braze range		1010 – 1093 °C	1850 – 2000 °F	1015 – 1075 °C	1859 – 1967 °F
Recommended diffusion cycle		2 – 4 h @ 1080 °C	1975 °F	1080 °C	1975 °F
Viscosity		Free-flowing		Free-flowing	
Recommended gap size		0.012 – 0.1 mm	0.0005 – 0.004 in	0.012 – 0.1 mm	0.0005 – 0.004 in

3.2 Key Braze Joint Information

Joint strength	Good
Joint ductility	Excellent
Corrosion resistance	Good
Oxidation resistance	Good

3.3 Rebrazing

During the braze cycle, the braze filler metal interacts metallurgically with the substrate to alter the braze alloy's chemical

composition, resulting in an increased remelt temperature. The new melting temperature cannot be accurately predicted; therefore, each particular application must be investigated for variation. If a rebraze operation is designed as part of the original manufacturing process, or as a repair operation, it is important to determine the rebraze temperature. To ensure minimal effects on the original braze joint, it is best to braze at the upper limit of the braze range for the maximum time the part can withstand. It is then recommended that subsequent cycles be performed below the original braze temperature.

4 Commercial Information

4.1 Ordering Information and Availability

Product	Form	Order No.	Package Size	Availability	Distribution
Amdry 9300	Powder	1001614	5 lb (approx. 2.25 kg)	Stock	Global
		1043149	25 lb (approx. 11.3 kg)	Stock	Global
Amdry 9301	Powder	1032589	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 9300B	Powder	1032588	5 lb (approx. 2.25 kg)	Stock	Global
Amdry 931A	Powder	2303658	10 lb (approx. 4.5 kg)	Stock	Global

Other product forms and packaging combinations are available on a special order basis. Customized braze tape and preforms are available to meet specific customer requirements. Please contact your local Oerlikon Metco sales office or account representative for additional information.

4.2 Handling Recommendations

- Store powder in the original, closed container in a dry location. Tumble contents prior to use to prevent segregation.
- Paste should be stored tip down in the original packing container. See paste datasheet for additional information.
- Store tape in sealed bags to minimize drying of the tape. Refer to our tape and preforms materials datasheet for more information.

4.3 Safety Recommendations

See the (Safety Data Sheet) in the version localized for the country where the material will be used. SDS are available from the Oerlikon Metco web site at www.oerlikon.com/metco (Resources – Safety Data Sheets).

Product	SDS Index No.
Amdry 9300	50-791
Amdry 9301	50-791
Amdry 9300B	50-791
Amdry 931A	50-2856