

Material Product Data Sheet

Amdry 400 Braze Filler Metal

Products: Amdry 400

1 Introduction

Amdry™ 400 is an inert, gas-atomized, cobalt-based braze filler metal. The material is formulated for joining superalloys, and in particular, cobalt-based alloy components. Boron and silicon are added as melt suppressants while chromium, nickel and tungsten additives provide corrosion resistance, oxidation resistance and improve strength at elevated service temperatures.

Brazing of cobalt-based superalloy components is facilitated by using Amdry 400 because it can diffuse through any surface film that may form from refractory elements in the base metal.

Gas atomization ensures homogeneity of the elements in Amdry 400 and delivers high purity powders for consistent processing results.

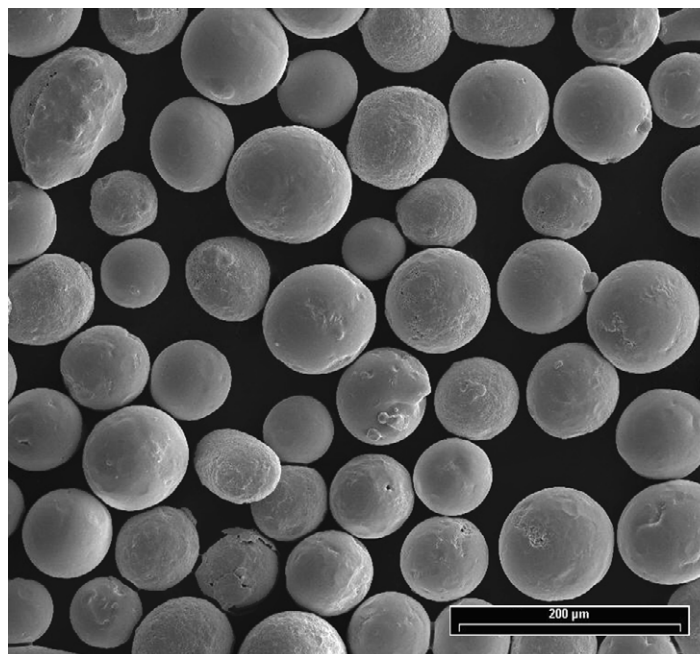
1.1 Typical Use and Applications

Usually used as a brazed filler metal for:

- Joining cobalt-based superalloy components where good strength, corrosion resistance and oxidation resistance are important
- Joining gas turbine vanes, fuel nozzles and combustors for jet engine applications
- Compatibility with MM509, MM302, X40, X45, L605 and other cobalt superalloy materials
- Brazing components that have high service temperatures

Quick Facts

Classification	Cobalt-based alloy
Chemical formula	Co 19Cr 17Ni 8Si 4W 0.8B 0.4C
Manufacture	Gas Atomization
Morphology	Spheroidal
Melting point	1149 °C (2100 °F)
Purpose	Joining
Process	Braze
Gap Size	0.012 – 0.1 mm (0.0005 – 0.004 in)
Viscosity	Free-flowing
Joint Strength	Excellent
Ductility	Excellent



SEM of typical gas atomized braze filler metal powder particles

2 Material Information

2.1 Chemical Composition

Product	Weight Percent						
	Co	Cr	Ni	Si	W	B	C
Amdry 400	Balance	18.0 – 20.0	16.0 – 18.0	7.5 – 8.5	3.5 – 4.5	0.7 – 0.9	0.35 – 0.45

2.2 Particle Size Distribution

Product	Nominal Range		
	Micrometers (µm)	Mesh (ASTM)	AWS Grade
Amdry 400	–106 +45	–140 +325	140F

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

2.3 Key Selection Criteria

- Amdry 400 is an excellent choice for use with cobalt-based superalloy components.
- Amdry 400 is available in powder form. Paste, tape or preforms can be provided on a special order basis. Please see the Commercial Section of this document and Materials Product Datasheets DSM-0290 (paste) or DSM-0290 (tape and preforms) for additional information.
- cobalt-based superalloy base materials as Amdry 400, but provides slightly higher service temperatures.
- For a low-cost alternative, Amdry 805 brazes in the same temperature range as Amdry 400 and also provides excellent joint strength, oxidation resistance and corrosion resistance.
- Amdry DF-4B is a nickel-based alternative for repair and restoration processes that brazes in the same temperature range as Amdry 400.
- Metco Joining & Cladding 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.

2.4 Related Products

- Before considering an alternative product, customers should also review product compliance with required specifications.
- Amdry 788 is another cobalt-based brazing filler metal also used to join or repair components of the same

2.5 Customer Specifications

Amdry 400	AWS A5.8 BCo-1, 140F Pratt & Whitney PWA 1186-1 Rolls-Royce Corporation EMS 56650 SAE International AMS 4783, 140F Tulsa Airfoil Repair MS 1112
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3 Braze Processing and Joint Information

3.1 Key Processing Information

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	
Recommended atmospheres		Vacuum	
Other atmospheres	Type	Ar, N ₂ or pure dry H ₂	
	Dew point	≤ -52 °C	≤ -60 °F
Melting range	Solidus	1121 °C	2050 °F
	Liquidus	1149 °C	2100 °F
Braze range		1149 °C – 1232 °C	2100 °F – 2250 °F
Viscosity		Free-flowing	
Recommended gap size		0.012 – 0.1 mm	0.0005 – 0.004 in

3.2 Key Braze Joint Information

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

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 400	Powder	1000781	5 lb (approx. 2.25 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 Metco Joining & Cladding 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 the appropriate Materials Data Sheet for additional information.
- Store tape in sealed bags to minimize drying of the tape. Refer to the appropriate Materials Data Sheet (tape and preforms) for additional information.

4.3 Safety Recommendations

See SDS 50-784 (Safety Data Sheet) in the version localized for the country where the material will be used. SDS are available from the Metco Joining & Cladding web site at www.metcojoiningcladding.com (Resources – Safety Data Sheets).