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Material Product Data Sheet
Amdry 105 High Temperature Braze Filler Metal

Products: Amdry 105

1 Introduction

Amdry™ 105 is a gas-atomized, nickel-based braze filler metal developed for those applications where the characteristics of a high-temperature, nickel-chromium-based braze material are desired, but it is necessary to braze at a lower temperature.

Boron free: Amdry 105 can be used for longer braze cycles with no risk of erosion.

High chromium content: The high chromium content (29 % by weight) in Amdry 105 makes it an excellent choice for applications where corrosion resistance is required, and it will provide significant oxidation resistance at temperatures up to 980 °C (1800 °F).

Lower braze temperature: Amdry 105 brazes at temperatures lower than NiCrSi braze filler metals, reducing the chance of grain growth during the braze cycle.

High strength: Amdry 105 is suitable for use on components where a high burst pressure is specified.

Low viscosity: The silicon in Amdry 105 (6 wt.%) makes it free-flowing and suitable for use in very narrow gaps, and for long and/or wide joints such as plates.

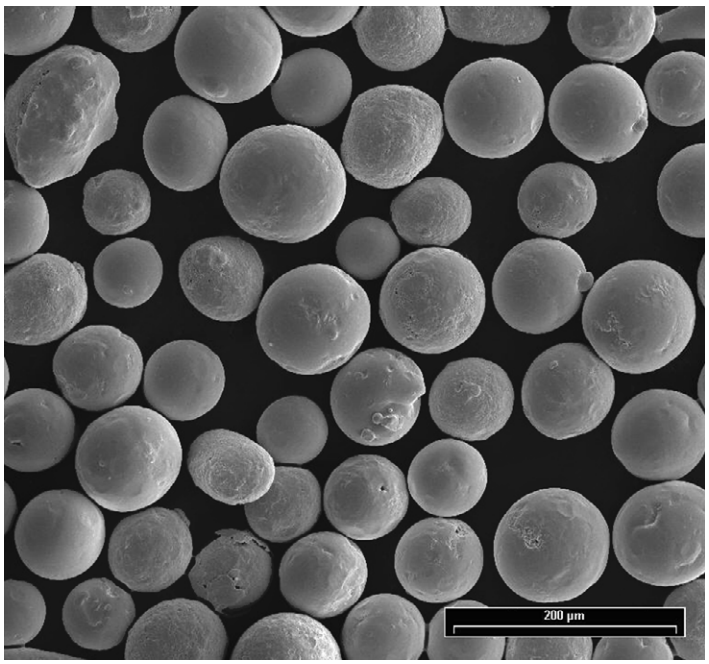
Gas-atomized: Amdry 105 is produced as a clean, dry powder with a precise and consistent particle size for repeatable processing results.

1.1 Typical Use and Applications

Amdry 105 is excellent for applications where a high-strength and corrosion-resistant braze joint must be balanced with a reduced braze temperature:

- Plate and fin type heat exchangers used in corrosive environments such as chemical plants, marine environments, plastics processing and air conditioning.
- Automotive exhaust system components such as EGR coolers, radiators and catalytic converters.
- Components with large surfaces or several braze joints.

Quick Facts	
Classification	Nickel-based alloy
Chemical formula	Ni 23Cr 6Si 5P
Manufacture	Gas Atomization
Morphology	Spheroidal
Apparent density	7.65 g/cm^3
Melting point	1010 °C (1820 °F)
Purpose	Joining
Process	Braze
Gap Size	12.5 – 101.5 µm (0.0005 – 0.004 in)
Viscosity	Free-flowing
Joint Strength	Excellent
Ductility	Good



SEM of typical gas atomized braze filler metal powder particles

2 Material Information

2.1 Chemical Composition

Product	Weight Percent			
	Ni	Cr	Si	P
Amdry 105	Balance	22 – 24	6 – 7	4 – 5

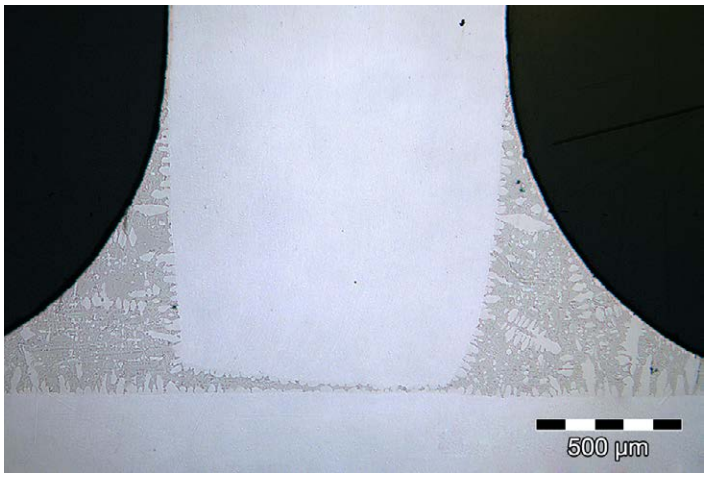
2.2 Particle Size Distribution

Product	Nominal Range		
	micrometers (µm)	Mesh (ASTM)	AWS Grade
Amdry 105	–106 +45 µm	–140 +325 mesh	140F

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

2.3 Key Selection Criteria

- Amdry 105 is designed for use on most steels, including most types of stainless steel. It will work equally well on nickel or cobalt superalloy components because of its high chromium and nickel content.
- 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 105 is available in powder form. Paste, tape or preforms can be supplied on a special order basis. Please see the Commercial Section of this document and Materials Product Datasheets DSMB-0001 (paste) or DSMB-0002 (tape and preforms) for additional information.



A T-joint brazed with AMDRY 105 demonstrates its ability to fill small gaps while maintaining good fillet characteristics.

2.4 Related Products

- Before considering an alternative product, customers should also review product compliance with required specifications.
- Amdry 805 can be used for applications where a higher service temperature is required or where a nickel-based braze alloy would be cost prohibitive.
- Amdry 770, which has a similar melting temperature range and is a good alternative when boron in the braze joint is desirable.
- 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.

3 Braze Processing and Joint Information

3.1 Key Processing Information

Amdry 105 contains silicon and phosphorus as temperature suppressants, which enhances wetting during brazing. Its reduced melting range permits the alloy to melt and flow more easily than braze filler metals with wider melting ranges and reduces the possibility of liquation.

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 Dew Point	Pure, dry H_2 < –52 °C	 < –60 °F
Melting range	Solidus Liquidus	993 °C 1010 °C	1820 °F 1850 °F
Braze range	Nominal Optimum	1066 °C – 1121 °C 1080 °C – 1107 °C	1950 °F – 2050 °F 1975 °F – 2025 °F
Viscosity		Free flowing	
Recommended gap size		12.5 – 101.5 µm	0.0005 – 0.004 in

3.2 Key Braze Joint Information

Joint strength: Amdry 105 can be expected to significantly exceed the burst strengths of BNi-2 and BNi-5 filler metals in heat exchangers. Routine burst strengths in excess of 13.8 MPa (2000 psi) can be achieved in plate-type heat exchangers.

Joint ductility: Good.

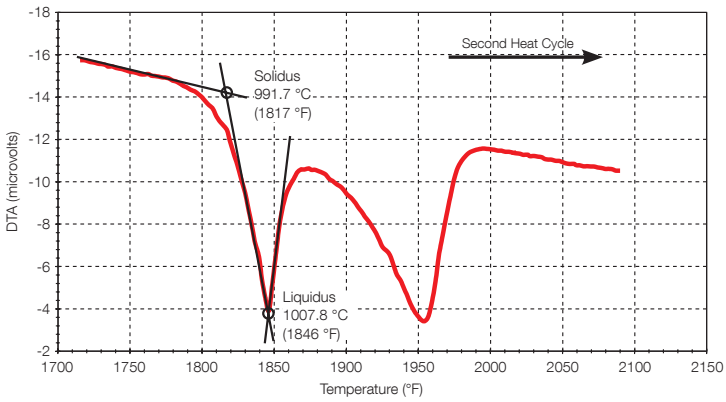
Corrosion resistance: Brazed coupons of Amdry 105 tested for 150 h in 10% solutions of HCL, NaCl and H_2SO_4 indicated no corrosion damage whatsoever. The coupons were reviewed for stability, etching and strength of the braze joint before and after immersion.

High temperature oxidation resistance: Melted button specimens of Amdry 105 were exposed to an air atmosphere for 24 h at 815 °C (1500 °F). Specimen weight changed insignificantly, demonstrating that Amdry 105 can withstand oxidation at higher service conditions.

3.3 Differential Thermal Analysis

Two-cycle DTA in Argon

830 – 1330 °C @ 10 °C/min
(1526 – 2426 °F @ 18 °F/min).



3.4 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 105	Powder	1059461	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 Materials Data Sheet DSMB-0001 (paste) for additional information.
- Store tape in sealed bags to minimize drying of the tape. Refer to Materials Data Sheet DSMB-0002 (tape and preforms) for additional information.

4.3 Safety Recommendations

See SDS 50-1062 (Safety Data Sheet) for the product form and 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).

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