

Material Product Data Sheet

Amdry D-15 Diffusion Braze Alloy

Products:

Amdry D-15 (Powder, Paste and Tape)

1 Introduction

Amdry™ D-15 is a spheroidal, inert gas-atomized nickel braze alloy containing boron as melt suppressant. This braze alloy will readily diffuse into the parent material during brazing or during a diffusion thermal cycle.

As an activated diffusion braze alloy, Amdry D-15 can be used for restoration or repair work when blended with a filler powder. Alternatively, it can be used as a high temperature braze alloy for applications where service conditions are at quite high temperature.

A diffusion cycle of 2 to 4 hours is typical for Amdry D-15. This is usually done at the end of the braze cycle or as a separate heat treatment. The additional time at this temperature promotes formation of a diffusion zone where the braze alloy and the base metal interface.

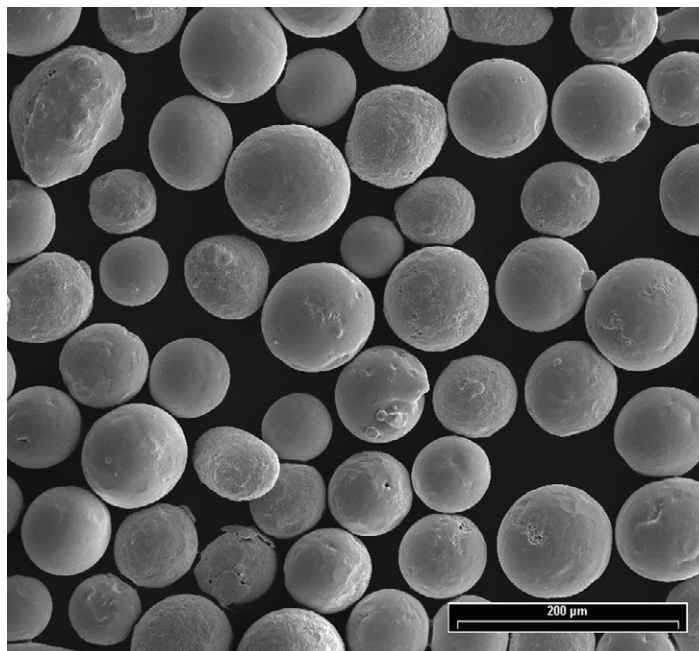
1.1 Typical Use and Applications

Usually used as a brazing filler metal for:

- Joining or repair of superalloy components such as Rene 80, IN 738, MM247 or Rene N4.
- Repair of cracks or damaged parts when Amdry D-15 mixed with a compatible superalloy or filler powder.
- Applications with service temperatures up to 1040 °C (1900 °F).

Quick Facts

| | |
|------------------|------------------------------------|
| Classification | Nickel-based diffusion braze alloy |
| Chemical formula | Ni 15Cr 10.25Co 3.5Ta 3.5Al 2.3B |
| Manufacture | Gas Atomization |
| Morphology | Spheroidal |
| Apparent density | 7.65 g/cm ³ |
| Melting point | 1163 °C (2125 °F) |
| Purpose | Joining, repair and restoration |
| Process | Brazing, diffusion brazing |
| Gap size | 0.05 – 0.25 mm (0.002 – 0.010 in) |
| Viscosity | Medium flow |
| 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 | Co | Al | Ta | B |
| Amdry D-15 | Bal. | 14.8–15.8 | 9.5–11.0 | 3.2–3.7 | 3.0–3.8 | 2.1–2.5 |

2.2 Particle Size Distribution

| Product | Nominal Range | |
|------------|------------------|-------------|
| | Micrometers (µm) | Mesh (ASTM) |
| Amdry D-15 | -125 +45 | -120 +325 |

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

2.3 Key Selection Criteria

- Choose Amdry D-15 when it meets the required customer material specification, and/or the particle size distribution suitable to the application method to be used.
- Amdry D-15 is available as a powder. Paste and tape are available on a special order basis.
- Amdry D-15 can also be special ordered pre-blended in pre-defined ratios with a specified filler powder.

2.4 Related Products

- Before considering an alternative product, customers should also review product compliance with required specifications.
- Amdry DF-4B is another diffusion braze alloy with a chemistry similar to Amdry D-15. Amdry DF-4B contains

a small amount of yttrium that helps resolve wetting issues during brazing as a result of braze alloy or base metal oxide formation.

- Amdry DF-3, which has a higher chrome content, is a viable alternative to D-15 when corrosion resistance is a critical factor for the brazed component.
- A lower temperature alternative for braze repair is Amdry BRB. The chemistry of this diffusion braze alloy is quite similar to D-15, but can be successfully brazed at 1150 °C (2100 °F).
- 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 D-15 | GE B50A942, Class A GE B50TF173 Class A Tulsa Airfoil Repair MS 1085 |
|------------|--|

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 | | None | |
| Melting range | Solidus | 1093 °C | 2000 °F |
| | Liquidus | 1163 °C | 2125 °F |
| Braze range | | 1175 °C – 1220 °C | 2150 °F – 2230 °F |
| Recommended diffusion cycle | 2 – 4 h @ | 1080 °C | 1975 °F |
| Viscosity | | Medium flow | |
| Recommended gap size | | 0.05 – 0.25 mm | 0.002 – 0.010 in |

3.2 Key Braze Joint Information

| | |
|----------------------|-----------|
| Joint strength | Excellent |
| Joint ductility | Very 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 D-15 | Powder | 1001791 | 5 lb (approx. 2.25 kg) | Stock | Global |

Other product forms and packaging combinations are available on a special order basis. Braze paste, 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 in the original, closed container in a dry location.
- Tumble contents prior to use to prevent segregation.

4.3 Safety Recommendations

See SDS 50-800 (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).

Information is subject to change without prior notice.