

# Material Product Data Sheet

## Amdry B-93 Diffusion Braze Alloy

### Products:

#### Amdry B-93 (Powder, Paste and Tape)

### 1 Introduction

Amdry™ B-93 is a spheroidal, inert gas-atomized nickel braze alloy containing silicon and a small amount of boron as melt suppressants and flow enhancers.

As an activated diffusion alloy, Amdry B-93 can be used for restoration or repair work; but, it is also well-suited as a braze alloy for applications where service conditions are at quite high temperatures.

A diffusion cycle of 2 to 4 hours is typical for Amdry B-93 after the braze cycle. This additional heat treatment generates formation of a homogeneous diffusion zone at the braze deposit and base metal interface.

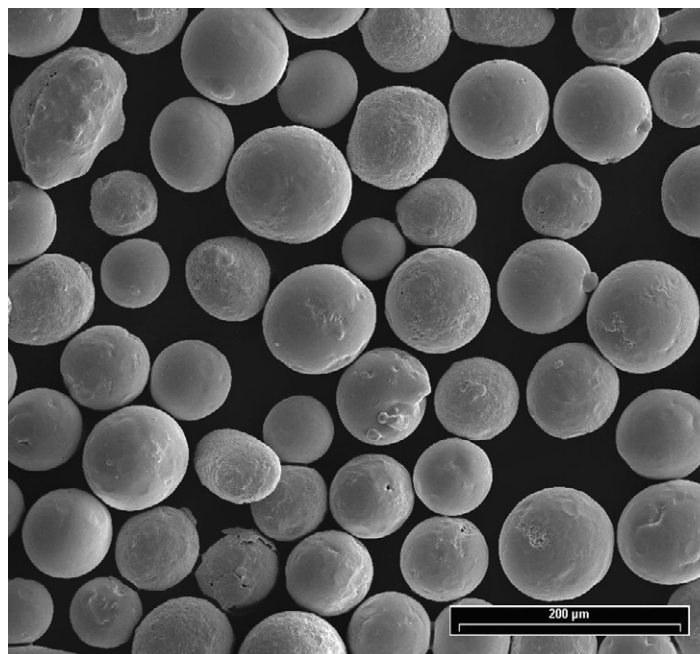
#### 1.1 Typical Use and Applications

Usually used as a brazing filler metal for:

- Joining or repair of superalloy components such as Rene 80, Haynes 282, GTD-111 or Rene N4.
- Crack repair when mixed with a compatible superalloy or filler powder.
- Use in applications with service temperatures up to 1040 °C (1900 °F).

### Quick Facts

Classification	Nickel-based diffusion braze alloy
Chemical formula	Ni 14Cr 9.5Co 4.5Si 4.0Ti 4.0W 4.0Mo 3.0Al 0.7B
Manufacture	Gas Atomization
Morphology	Spheroidal
Melting point	1154 °C (2110 °F)
Purpose	Joining, repair and restoration
Process	Brazing, diffusion brazing
Gap Size	0.05 – 0.1 mm (0.002 – 0.004 in)
Viscosity	Medium flow
Joint strength	Good
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	Ti	Si	Mo	W	Al	B	C
Amdry B-93	Bal.	13.7 – 14.3	9.0 – 10.0	4.6 – 5.0	4.2 – 4.8	3.7 – 4.3	3.7 – 4.0	2.8 – 3.2	0.50 – 0.80	0.13 – 0.19

### 2.1 Particle Size Distribution

Product	Nominal Range	
	Micrometers (µm)	Mesh (ASTM)
Amdry B-93	-125 +45	-120 +325

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

### 2.3 Key Selection Criteria

- Choose Amdry B-93 when it meets the required customer material specification, and/or the particle size distribution suitable to the application method to be used.
- Amdry B-93 is available as a powder. Paste is available on a special order basis.
- Amdry B-93 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 B-93. 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 has a higher chrome content, making it an excellent choice when corrosion resistance is a critical factor.
- Amdry 775 is a diffusion braze alloy that brazes at a lower temperature than Amdry B-93. It works well on nickel-based components and most stainless steels. With only chrome and boron added to the nickel, there are no oxide issues during brazing.
- Metco Joining & Cladding offers 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 B-93	GE B50TF108
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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		None	
Melting range	Solidus	1093 °C	2000 °F
	Liquidus	1154 °C	2110 °F
Braze range		1191 – 1224 °C	2175 – 2235 °F
Recommended diffusion cycle		2 – 4 h @ 1080 °C	1975 °F
Viscosity		Medium flow	
Recommended gap size		0.05 – 0.1 mm	0.002 – 0.004 in

## 3.2 Key Braze Joint Information

Joint strength	Good
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 B-93	Powder	1021561	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 Metco Joining & Cladding 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 the SDS (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 Metco Joining & Cladding web site at [www.metcojoiningcladding.com](http://www.metcojoiningcladding.com) (Resources – Safety Data Sheets).

Product	Product Form
Amdry B-93 Powder	50-817
Amdry B-93 CNT Paste	50-1331