

# Material Product Data Sheet

## Amdry MM509 Series of Braze Alloys

### Products:

**Amdry MM509, Amdry MM509-C, Amdry MM509B-C**

### 1 Introduction

The Amdry™ MM509 series of alloy powders are spherical, inert gas atomized, cobalt-based powders.

Amdry MM509 and Amdry MM509-C are the chemically equivalent powdered form of superalloy MarM-509. These materials are used as superalloy matrix materials when blended with boron-containing braze filler metals for activated diffusion brazing applications.

Amdry MM509B-C is chemically similar to MarM-509, but contain boron as a melt-depressant. This material is commonly used as activated diffusion braze alloys for the repair of cobalt-based components.

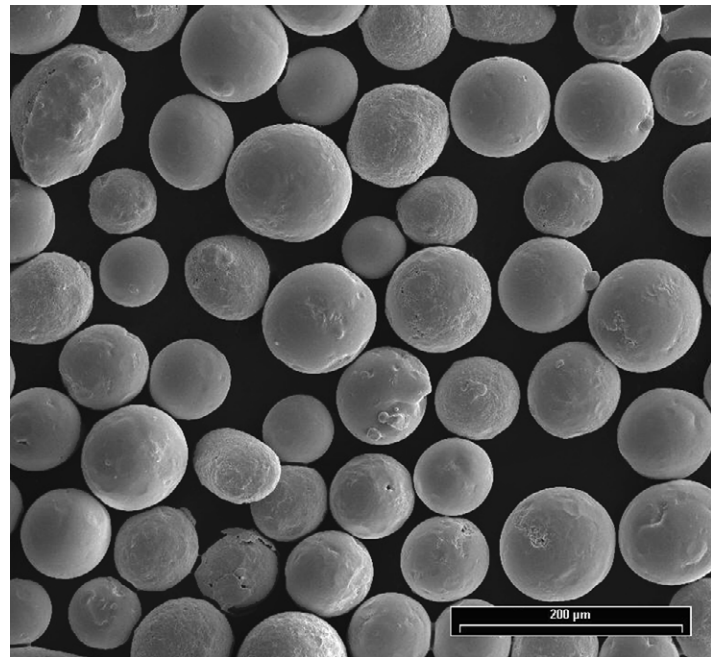
All of these materials can also be used in thermal spray coating applications. Gas atomization ensures excellent chemical homogeneity and high purity for consistent processing results.

#### 1.1 Typical Use and Applications

- Blend material for braze repairs, such as restoration of worn or damaged areas, crack repair or repair of surface defects.
- Joining of cobalt-based superalloy components for use in high temperature service conditions.
- Applications where excellent joint strength is required.
- Wide-gap braze applications by blending Amdry MM509 with Amdry or MM509B-C.
- Thermal spray coating for superalloy components.
- Used on aerospace and industrial gas turbine components.

### Quick Facts

Classification	Cobalt-based alloy
Chemical formula	Co 24Cr 10Ni 7W 3.5Ta 0.6C (2.5B)
Manufacture	Gas Atomization
Morphology	Spheroidal
Purpose	Repair and restoration
Process	Diffusion brazing
Viscosity	Sluggish



SEM of typical gas atomized braze filler metal powder particles

## 2 Material Information

### 2.1 Chemical Composition by Weight Percent

	<b>Amdry MM509</b>	<b>Amdry MM509-C</b>	<b>Amdry MM509B-C</b>
<b>Co</b>	Balance	Balance	Balance
<b>Cr</b>	22.5 – 24.25	22.5 – 24.25	22.5 – 24.25
<b>Ni</b>	9.0 – 11.0	9.0 – 11.0	9.0 – 11.0
<b>W</b>	6.5 – 7.5	6.5 – 7.5	6.5 – 7.5
<b>Ta</b>	3.0 – 4.0	3.0 – 4.0	3.0 – 4.0
<b>B</b>	–	–	2.0 – 3.0
<b>Ti</b>	0.15 – 0.30	0.15 – 0.30	0.15 – 0.30
<b>Zr</b>	0.30 – 0.60	0.30 – 0.60	0.30 – 0.60
<b>C</b>	0.55 – 0.65	0.55 – 0.65	0.55 – 0.65

### 2.2 Particle Size Distribution

<b>Product</b>	<b>Nominal Range</b>	
	<b>Micrometers (µm)</b>	<b>Mesh (ASTM)</b>
Amdry MM509	–45 +5	–325 +5 µm
Amdry MM509-C	–106 +45	–140 +325
Amdry MM509B-C	–106 +45	–140 +325

### 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.
- These filler metal materials are available in powder, paste, tape or preforms. Please see the Commercial Section of this document, the datasheet for paste or the datasheet for tape and preforms for additional information.
- Amdry MM509 or Amdry MM509-C can be used as a superalloy matrix material when blended with activated diffusion braze alloys. Please refer to customer specification requirements or contact Oerlikon Metco for specific blend ratios.
- Amdry MM509B-C can be used as activated diffusion braze alloys. They can be blended with Amdry MM509, Amdry MM509-C or other Amdry superalloy matrix materials. Please refer to customer specification requirements or contact Oerlikon Metco for specific blend ratios.

### 2.4 Related Products

- Before considering an alternative product, review product compliance with any required specifications.
- Amdry 485/509 is a pre-blended product of Amdry 485 and Amdry MM509 that meets the Pratt Whitney PWA 1185 specification.
- Amdry 788 is a cobalt-based diffusion braze alloy for joining, restoration or repair of cobalt-based superalloy components with a somewhat lower viscosity.
- Amdry 400 (AMS 4783) is an alternative for joining, restoration or crack repair of cobalt-based components with a very low viscosity.
- Oerlikon Metco has a broad portfolio of filler metals to suit many applications and service conditions. Please consult with us about your specific requirements.

### 2.5 Customer Specifications

Amdry MM509	Canada Pratt Whitney CPW 549-2 GE B50A988, Class B Pratt Whitney PWA 1185-2 Tulsa Airfoil Repair MS 1068
Amdry MM509-C	GE B50A988, Class A
Amdry MM509B-C	GE B50A989, Class A

## 3 Braze Processing and Joint Information (Amdry MM509B-C)

### 3.1 Key Processing Information

Substrate preparation		Clean and dry, free of oxides and organic contaminants.	
Flux requirements		None	
Recommended atmosphere	Type	Vacuum	
Other atmospheres	Type	Pure dry H <sub>2</sub>	
	Dew point	≤ -52 °C	≤ -60 °F
Melting range	Solidus	1130 °C	2065 °F
	Liquidus	1165 °C	2130 °F
Braze range		1175 °C – 1260 °C	2150 °F – 2300 °F
Viscosity		Sluggish	
Recommended gap size	Joining	0.05 – 0.1 mm	0.002 – 0.004 in
	Restoration / crack repair	≥ 0.25 mm	≥ 0.01 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 MM509	Powder	1002099	5 lb (approx. 2.25 kg)	Stock	Global
Amdry MM509-C	Powder	1059330	10 lb (approx. 4.5 kg)	Stock	Global
Amdry MM509B-C	Powder	1030113	10 lb (approx. 4.5 kg)	Stock	Global
Amdry MM509 / MM509B (Blend) <sup>a</sup>	Paste	1033720	Various <sup>b</sup>	Special Order	Global

<sup>a</sup> Blend ratio must be supplied for a quotation

<sup>b</sup> Please refer to Materials Product Datasheet for paste for package types and sizes.

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

<b>Product</b>	<b>SDS No.</b>
Amdry MM509	50-1023
Amdry MM509-C	50-1023
Amdry MM509B-C	50-953