



### Metglas® Brazing Foil & Preforms

Components with rigid dimensional tolerances and high strength/stiffness-to-weight ratios are needed to handle the stresses and heat inherent in aerospace, heat exchanger, and automotive exhaust applications. **Metglas®** Brazing Foils (MBFs) from **Metglas, Inc.** are produced as thin as 25 µm (1 mil) to satisfy these requirements. It gives consistently reliable and strong joints.

*MBFs Provide extensive manufacturing and performance advantages over conventional metal joining methods.*



### Metglas® Brazing Foil Benefits

**Unique foil form combined with outstanding ductility** – MBF bends 180° without fracturing to comply with complex joint geometries to ease fixturing; ductile enough to be mechanically stamped and shaped to 3-D configurations.

**Ease of automation** – for enhanced manufacturing efficiency.

**Consistent Performance** – eliminates waste and creates high quality joints.

**Unlimited shelf life**

**Contaminant free** – for prolonged brazing furnace life.

**Fast melting and outstanding wetting and flow** – for void free, optimum strength joints.

**Wide range of products** – covering brazing temperatures from 950°C (1742°F) to 1195°C (2183°F).

**Wide range of widths** – for easy brazing of small and large areas.

**Range of thicknesses available** – for optimized joint gaps, including very thin foil, 25µm (1 mil) for decreased erosion of base metal.

### Advantages of Brazing with Metglas® Brazing Foils

#### **Vs. Mechanically-fastened joints**

MBF provides higher strength, leak tightness and superior resistance to shock and vibration. Lighter gauge base metals may be used for substantial weight savings since MBF provides continuous, uniform joints.

#### **Vs. Adhesive bonding and soldering**

MBF offers superior strength, flexibility and temperature resistance.

#### **Vs. Welding**

MBF provides much higher processing efficiency. The lower melting temperature of MBF eliminates erosion of base metals. No cleaning or finishing is required.

#### **Vs. Powder, paste and tape forms of brazing**

MBF contains no organic binders, thus eliminating contaminating residues and reducing furnace cycle times. Completely homogeneous, 100% metal MBF alloy optimizes brazed joint formation and performance. Reliable melting and flow reduces rework and reject rate as well.

MBF Alloy	AWS & ASM Classifications	Nominal Composition, wt %								Melting Temp. C° (F°)		Braze Temp. (Approx.) C° (F°)	Density g/cm <sup>3</sup> (lbm/in <sup>3</sup> )
		Cr	Fe	Si	C*	B	P	Mo	Ni	Solidus	Liquidus		
15		13.0	4.2	4.5	0.03	2.8	-	-	Bal	965 (1769)	1103 (2017)	1135 (2075)	7.82 (0.283)
20	AWS BNi2 /AMS	7.0	3.0	4.5	0.06	3.2	-	-	Bal	969 (1776)	1024 (1875)	1055 (1931)	7.88 (0.285)
30	AWS BNi3/AMS	-	-	4.5	0.06	3.2	-	-	Bal	984 (1803)	1054 (1929)	1085 (1985)	8.07 (0.291)
50	AWS BNi-5a	19.0	-	7.3	0.08	1.5	-	-	Bal	1052 (1924)	1144 (2091)	1170 (2138)	7.70 (0.278)
51	AWS BNi-5b	15.0	-	7.25	0.06	1.4	-	-	Bal	1030 (1886)	1126 (2058)	1195 (2183)	7.73 (0.278)
53		15.0	-	7.25	0.06	1.4	-	5.0	Bal	1045 (1900)	1127 (2060)	1195 (2183)	7.75 (0.280)
60		-	-	-	0.10	-	11.0	-	Bal	883 (1621)	921 (1688)	950 (1742)	8.14 (0.294)
62		21.0	<1	0.5	-	0.5	8.0	1.0	Bal	878 (1612)	990 (1814)	1020 (1868)	7.74 (0.280)
64		17.5	4.0	6.0	-	0.75	5.0	1.0	Bal	913 (1675)	978 (1792)	1010 (1850)	7.68 (0.277)
80		15.2	-	-	0.06	4.0	-	-	Bal	1048 (1918)	1091 (1996)	1120 (2045)	7.94 (0.278)

\* Maximum concentration

## Main Applications

## AEROSPACE

### 1) Compressor Vane and Shroud Assemblies (Stators)

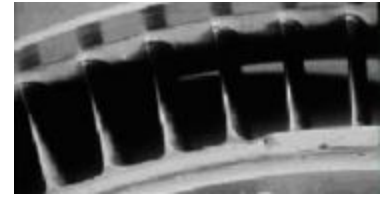
These stationary components are set between rotating blade assemblies in the compressor section of jet turbine engines. They guide airflow between blade stages, critical to increased engine efficiency.

#### Brazing Application

12 to 15 stators may be used in an engine, with each stator requiring attachment of 100+ airfoil vanes to a shroud ring. High strength, corrosion resistant, economical joints with uniform gap are required.

#### Solution

Brazing powder and powder-binder composites may be used, but these leave contaminating residues and promote joint shrinkage and brazing rejects. MBF is simply tack welded into place on the shroud ring and the vanes are assembled and fixtured with an expansion ring for brazing. Clean, nonporous joints are formed upon brazing.



The resulting stator exhibits precise, uniform joints on each vane.

### 2) Rotating Blade Porous Metal (Feltmetal) Seals

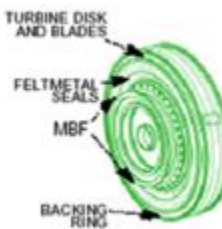
These seals are used in the rotating blade assemblies of jet turbine engines. They are designed to wear down from the blade rotation and then be periodically replaced.

#### Brazing Application

20 or more of these seals may be used in an engine. Each seal is brazed to a backing ring and requires uniform joint gap and minimal wicking. If excessive wicking occurs, the feltmetal will damage the more complex and costly blade assembly.

#### Solution

MBF is sandwiched between the backing ring and feltmetal, fixtured with an expansion ring, and brazed. Ultra-thin custom-designed MBF meets the specified dimensional tolerance to avoid excessive wicking, simplifies the process, and eliminates rejects.



### 3) Brazing Honeycomb To Perforated Face Sheets (Sandwich)

Honeycomb structural panels are widely used in aerospace applications since they offer exceptional strength/stiffness-to-weight ratio. Acoustic turbine tailpipes, exhaust plugs, cones, nozzles and fan ducts are often brazed as honeycombs.

#### Brazing Application

For acoustic or sound attenuation structures, the brazing filler alloy must flow off the honeycomb surfaces to form fillets at all the junctions without clogging the perforations, which are needed for sound absorption. Residues left by other brazing fillers clog the perforations, leading to joint rejects.

#### Solution

By tack welding the MBF to the face sheets, capillary action draws the melted brazing foil to the thin edges of the honeycomb structure, while keeping it out of the perforations. Joint strength is improved because the foil acts as a spacer to maintain an optimum joint gap. Filler metal flows only in necessary contact area.

\*\*\*Note Metglas, Inc./Hitachi Metals America policy prohibits the utilization of our products in weapons of mass destruction and missiles.

## CONTACT INFORMATION

### AMERICAS / USA

Metglas, Inc.

440 Allied Drive  
Conway, SC 29526  
Tel: (800) 581-7654  
Tel: (843) 349-7319  
Fax: (843) 349-6815  
Email:  
[metglas@metglas.com](mailto:metglas@metglas.com)

### EUROPE Hitachi Metals Europe

14-16 Immermann Strasse,  
Dusseldorf, Germany  
Tel: 49(0) 211-16009-11  
Fax: 49(0) 211-16009-30  
Email:  
[metglas-europe@metglas.com](mailto:metglas-europe@metglas.com)

### ASIA Hitachi Metals Hong Kong (Taiwan Office)

4F-1, No. 3, Section 1,  
Tun Hwa South Road,  
Taipei 105, Taiwan Region  
Tel: 886-2-2570-3325  
Fax: 886-2-2579-5652  
Email:  
[metglas-asia@metglas.com](mailto:metglas-asia@metglas.com)

### India Hitachi Metals India

Plot No. 94 & 95, Sector 8,  
IMT Manesar, Gurgaon,  
Haryana 122050, India  
Tel: +91 (124) 412-4812  
Email:  
[metglas-india@metglas.com](mailto:metglas-india@metglas.com)

[www.metglas.com](http://www.metglas.com)