



### 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 20 µm (0.78 mil) to satisfy these requirements. It gives consistently reliable and strong joints.

### 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, 20µm (0.78 mil) for decreased erosion of base metal.

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



### 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.

Available Alloys

MBF Alloy	AWS & ASM Classifications	Alloy Description	Braze Temp. (Approx.)
			C° (F°)
15		Ni-Cr-Fe-Si-B	1135 (2075)
20	AWS BNi-2 / AMS 4777	Ni-Cr-Fe-Si-B	1055 (1931)
30	AWS BNi-3 / AMS 4778	Ni-Si-B Eutectic	1085 (1985)
50	AWS BNi-5a	High Cr, Low B	1170 (2138)
51	AWS BNi-5b	High Cr, Low B	1195 (2183)
60	AWS BNi-6	Ni-P Eutectic	950 (1742)
62		High Cr, Ni-P	1020 (1868)
67		High Cr, Ni-P	1020 (1868)

MBF Alloy	AWS & ASM Classifications	Alloy Description	Braze Temp. (Approx.)
			C° (F°)
601		Fe-Ni Braze Foil	1060 (1940)
80	AWS BNi-9	Ni-Cr-B	1120 (2045)
90		Ni-Co-Si-B	1090 (1994)
91		Ni-Cr-Co-Nb-B	1140 (2084)
92		Ni-Cr-Co-B	1110 (2030)
1005		Ni-Pd-Si	880 (1616)
1011		Ni-Pd-Co-Si-Mo	925 (1697)
1012		Ni-Pd-Cr-B	990 (1814)

### 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.

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

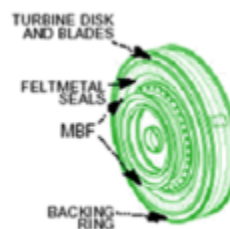
These seals are used in the rotating blade assemblies of jet turbine engines. They are designed to wear down from the blade rotation and then be periodically replaced.

#### **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.



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