



METAL COMPOSITE, COPPER CLAD INVAR

ESF-M6A101-A

1. SCOPE

The material defined by this specification is an Invar substrate clad on both sides with copper. It is approximately 20% Cu - 60% Invar - 20% Cu.

2. APPLICATION

This specification was released originally for material used in the ignition control module.

3. REQUIREMENTS

3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.1 CHEMICAL COMPOSITION (INVAR)

Phosphorus	0.025 max
Sulfur	0.025 max
Carbon	0.12 max
Manganese	0.50 max
Silicon	0.25 max
Nickel	35.50 - 36.50
Iron	Balance

3.2 CHEMICAL COMPOSITION (SAE C10300 COPPER)

Copper (Inc. Silver)	99.95 min
Phosphorus	0.001 - 0.005

3.3 MECHANICAL PROPERTIES (ASTM E8)

Tensile Strength, min	310 MPa
Yield Strength, min (0.2% offset)	173 MPa
Elongation, min (50.8 mm length)	25%

3.4 TEMPER

The material shall be furnished in the annealed condition unless specifically ordered to a different temper.

Date	Action	Revisions
2003 10 09	Revised	Para 3.0 inserted; para 3.9, 3.10 and 4 deleted
1987 02 09	888002-512	Revised & retyped
1983 04 12		Released (Was XF-M6AX40) CF4N-RD557294-25





3.5 SURFACE FINISH

The surfaces shall be free of heavy oxidation or surface imperfections such as pits, nicks, dents, gouges, scratches, delaminations, or inclusions greater than 0.02 mm in depth. A light oxidation is acceptable, provided it can be cleaned/removed by standard cleaning methods.

The surface finish, as measured by a profilometer against the rolling direction, shall be 1.0 micrometres, max.

3.6 THERMAL COEFFICIENT OF EXPANSION

The material shall expand at a rate of 5.2 +/- 1.0 ppm/°C over the temperature range of - 55 °C to +/- 125 °C. Test technique to be agreed upon by supplier and customer.

3.7 BOND INTEGRITY

The material shall not delaminate after bending the material 180° around an arbor of diameter equal to the material thickness.

3.8 DENSITY

8440 kg/m³ +/- 10%