

METALLIC PREPREGS



MetPreg™ – What is it?

A prepreg is a combination of a matrix and fiber reinforcement. MetPreg is a metallic prepreg consisting of aluminum and continuous ceramic fiber reinforcement. MetPreg is analogous to prepreg units of construction commonly employed in polymer matrix composite fabrications. MetPreg can be processed in several different ways, with the most appropriate method chosen based on the particular application. Processing methods include:

- Filament winding
- Tape placement
- Hot pressing
- Hand lay-up
- Adhesive bonding
- Brazing

Metallic prepregs far exceed monolithic aluminum longitudinal tensile and compressive strengths, thereby providing an efficient option to structural engineers and designers interested in components that exhibit high specific (property value divided by material's density) strengths and elastic moduli.

MetPreg™ – Is it commercially available?

Yes, Touchstone Research Laboratory, Ltd. is now providing MetPreg in multiple sizes to composite part designers, fabricators, and system integrators.

MetPreg™ Sizes Available

MetPreg is available in nominal sizes as follows:

Width: 0.25 to 1.25 in. (6.4 to 32 mm)
Thickness: 0.008 to 0.030 in. (0.20 to 0.75 mm)
Length: Continuous strips to 1000 feet

MetPreg can also be produced in the form of tubes, angles, channels, etc.

MetPreg™ – Special Coatings

Metallic prepregs having a surface coating (typically 0.002 inch thick) of a lower melting alloy than the matrix alloy can be supplied upon special request. The surface coating aids brazing and welding to other tapes and to bulk aluminum.

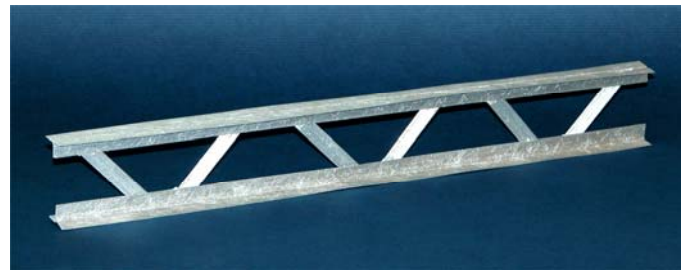
MetPreg™ Features

- Lightweight and strong: Twice the specific strength and stiffness of structural aluminum alloys (Example: AA7075-T6 has a UTS of 83 ksi and E of 10.4 Msi with a YS of 73 ksi. Please compare these values with those of MetPreg in the chart to the right).
- Can be welded, soldered, brazed and bonded with structural adhesives
- Maintains 85% of its room temperature longitudinal tensile strength to greater than 700°F.
- Field repairs are possible with soldering and brazing equipment
- Permeability of H₂ through the aluminum matrix is negligible
- Compatible with liquid O₂ and some propellant chemistries
- Does not microcrack at cryogenic temperatures
- Does not outgas under vacuum
- Properties are unaffected by high humidity
- UV exposure causes no degradation
- Electrically conductive – no static charging
- Can be handled in processing steps similar to polymer composites
- Coefficient of thermal expansion is approximately half that of aluminum
- MetPreg can be thermally formed and set to a desired geometry
- Integral flanges and end closures for vessels can be made of MetPreg to minimize thermal stresses during cycling
- Remains impermeable to He after 100 cycles between -450°F and 250°F

**Typical Properties of MetPreg™
(50% Fiber Volume)**

Bulk Density (lb/in ³)	0.12 (3.30 g/cm ³)
Elevated Use Temperature (°F)*	700 (370° C)
Tensile Strength (ksi)	210 (1450 MPa)
Tensile Modulus (Msi)	30 (207 GPa)
Tensile Strain to Failure (%)	0.7
Compressive Strength (ksi)	300 (2070 MPa)

*Temperature at which tensile strength is 85% of room temperature tensile strength



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