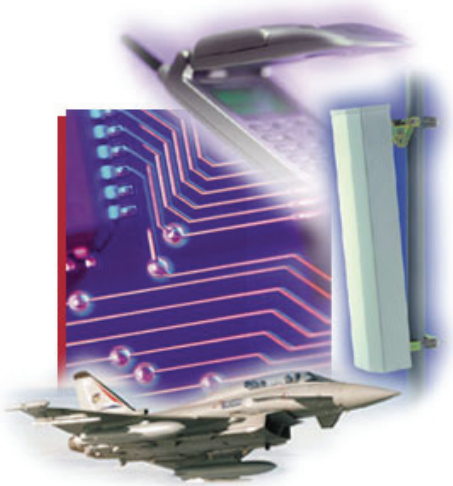
CuClad 6250 and 6700 Bonding Films



CuClad 6250 and 6700 are low melting point bonding films that have been developed for lamination of stripline or other multilayer circuits fabricated from CuClad or other Arlon PTFE-based laminates. Dielectric constants of 6250 and 6700 Bonding Films fall in the midrange of CuClad and DiClad Microwave Printed Circuit Board Substrates product lines and ensure uniform reproducibility of electrical performance.

Shelf Life and Storage: Maximum recommended shelf life for CuClad 6250 or 6700 is two years when material is stored away from direct sunlight and in the original sealed package at no greater than 25°C (77°F) and 70% relative humidity. The film rolls should be stored on edge (standing upright) or suspended by the roll cores to avoid creating creased areas or flat spots due to roll weight.

Typical Properties: CuClad 6250 and 6700				
Property	**Units**	**Test Method**	**6250**	**6700**
Dielectric Constant @ 10 GHz		IPC TM-650	2.32	2.35
Dissipation Factor @ 10 GHz		IPC TM-650	0.0013	0.0025
Dielectric Strength	V/mil	ASTM D-149	1000 min	2500
Volume Resistivity	Ohm-cm	ASTM D-257	10^{16}	10^{18}
Surface Resistivity	Ohms	ASTM D-257		10^{16}
Arc Resistance	sec	ASTM D-495		130-140
Water Absorption	%	ASTM D-570		0.005
Thermal Conductivity	W/m-k		0.17	0.17
Brittle Temperature	°C		-60	
Crystalline Melt Point	°F (°C)	Hot Stage		364 (184)
Continuous Use Temperature	°F (°C)		165 (75)/10	350 (176)
Density	(g/cm^3)	ASTM D-1505	0.93	2.1

Material Availability:

	CuClad 6250	CuClad 6700
Available Width	24" only	24" only
Available Roll Lengths	30 ft or 150 ft	30 ft or 150 ft
Available Thicknesses	0.0015"	0.0015" or 0.003"

Results listed above are typical properties; they are not to be used as specification limits. The above information creates no expressed or implied warranties. The properties of laminates may vary, depending on the design and application.

Processing Recommendations

Preparation of Surfaces to be Bonded

1. Etched copper circuitry or copper ground/power planes should be treated with a light microetch prior to lamination. Copper surfaces should not be mechanically scrubbed (rotating or oscillating brush) or pumice scrubbed.
2. Etched-off PTFE surfaces should be dry and clean, free of all process chemical residues as well as dust, dirt, grease, oils, fingerprints, etc. Thorough rinsing with clean, deionized water followed by forced air drying may be sufficient. A flush or dip in clean (isopropyl alcohol) IPA will aid in drying. Do not swab or wipe surfaces.
3. As-etched copper clad surfaces may not require treatment to promote bonding immediately after etching the copper; however, for unclad PTFE laminates or PTFE surfaces that have been wiped, rubbed or handled carelessly prior to lamination, it is strongly recommended:
- Sodium metal based chemical surface preparation, using Tetra-Etch® Fluoropolymer Etchant (W.L. Gore) or Fluoroetch® Fluoropolymer Etchant (Acton Technologies), is recommended to maximize adhesion of bonding film to the PTFE surfaces.
- Gas plasma cycles have also been shown as effective to promote adhesion to PTFE surfaces; this applies not only to plated through hole preparation, but also to multilayer lamination.

4. Panels should be stored in a clean, dry environment. Layup and lamination should be done as soon as possible, preferably within 24 hours of etching/surface preparation.
5. CuClad 6250 and 6700 bonding films come ready to use and require no preparation. Handling/ cutting of material should take place in a clean, dust-free environment. The operator should use gloves to prevent transfer of oils and acids from hands or fingers.

Bonding Process

1. Lay the bonding film between the layers to be laminated. Be sure to use enough film to encapsulate the thickness of copper traces and patterns and to provide additional thickness as dielectric if required.
2. It is recommended that a thermocouple be placed into the laminate at the edge of the bond line (outside the working area of the MLB) to measure actual working temperature at the bonding interface.
3. Preheat the press to the approximate bonding temperature required:
- For CuClad 6250 Bonding Film, a set temperature of 275°F is suggested (bonding will occur at temperatures between 250°F and 300°F).
- For CuClad 6700 Bonding Film, a set temperature of 450°F is suggested (bonding will occur at temperatures between 390°F and 440°F).

4. Apply pressure of approximately 100 psi. Pressure as high as 200 psi may be used if lower pressure does not result in sufficient flow for more complex circuit fill. Sufficient padding should be used to develop uniform pressure, or spotty bonds/blisters may occur.
5. Hold in the press until the temperature at the bond interface reaches the critical point:
- For CuClad 6250, this should be a minimum of 250°F (max, 300°F).
- For CuClad 6700, this should be a minimum of 400°F (max, 475°F).

6. Hold at temperature for an additional 10 minutes (for 6250) or 15 minutes (for 6700). This step is critical. Insufficient time at temperature will result in a failed or spotty bond.
7. Cool under pressure at a maximum cool-down rate of 10°F/min.
- For CuClad 6250, cool to under 125°F before removing from the press.
- For CuClad 6700, cool to under 200°F before removing from the press.

Note: Transfer to a cooling press for cool down under pressure to maximize available hot-press availability is acceptable. Transfer should be made, while still hot, and material should not be allowed to sit on cold surfaces during transfer. Cool down pressure should equal the hot pressure. Forced cooling greater than 10◦F/min or without adequate pressure may result in partial debonding or board warpage.

8. Lamination Temperature Profiles:

Curves as shown on the accompanying charts illustrate typical cycles that can produce satisfactory bonding results.