

CuClad[®] 6700 Bonding Film

Suggested Applications

This high quality thermoplastic film has been developed specifically for use as a bonding agent to laminate stripline packages or other multilayer circuits made with CuClad[®] PTFE laminates.

Features

- Dielectric constant of 6700 Bonding Film is matched closely to that of CuClad[®] to insure uniform reproducibility of electrical characteristics of laminated package.
- A uniform, reliable bond can be easily obtained using techniques and equipment readily available to the industry.

Recommended Laminating Technique

Preparation

1. **Copper:** Following etching and stripping of the etch resist copper circuitry should be treated with a light microetch to insure complete removal of resist residues and to provide sufficient topography for sound mechanical adhesion. DO NOT mechanically clean.
2. **Substrate Surface:** All PTFE surfaces should be dry and clean: free of dust, dirt, grease, oils, soils, fingerprints, salts and residues of process chemistries, hard water salts, etc. Thorough rinsing with clean deionized water after the last chemical process followed by forced air drying may be sufficient. The use of compressed air should be avoided. A flush or dip of clean isopropyl alcohol may be used to aid drying. Swabbing the surface with a cloth wetted with a solvent should be avoided. Baking at 250°F (121°C) for 45 to 60 minutes is generally recommended. For CuClad® laminates from which ED copper has been etched the only requirements are that the surfaces be clean and dry.
PTFE surfaces which have been soiled by handling during other operations should be cleaned using any suitable chemical cleaning technique, although vapor degreasing is preferred over solvent wiping.
Priming of the PTFE surface is strongly recommended for maximizing adhesion of the bonding film to the following surfaces:
 - unclad CuClad®
 - surfaces from which foil has been etched
 - surfaces from which ED foil has been etched but which have been mechanically damaged, smoothed, or glossed by excessive or careless handlingThese surfaces may be primed with commercial preparations such as Tetra-Etch®. Consult your technical representative for further information.
3. **Staging:** Following surface preparation panels should be moved to clean, dry environment. Lay-up and lamination should be carried out soon after preparation and should generally not exceed 24 hours.
4. **6700 Bonding Film:** The 6700 Bonding Film arrives ready for use and requires no further preparation. Handling should be performed with gloves to prevent contamination with hand oils and acids in a clean, dust free environment.

Bonding Technique

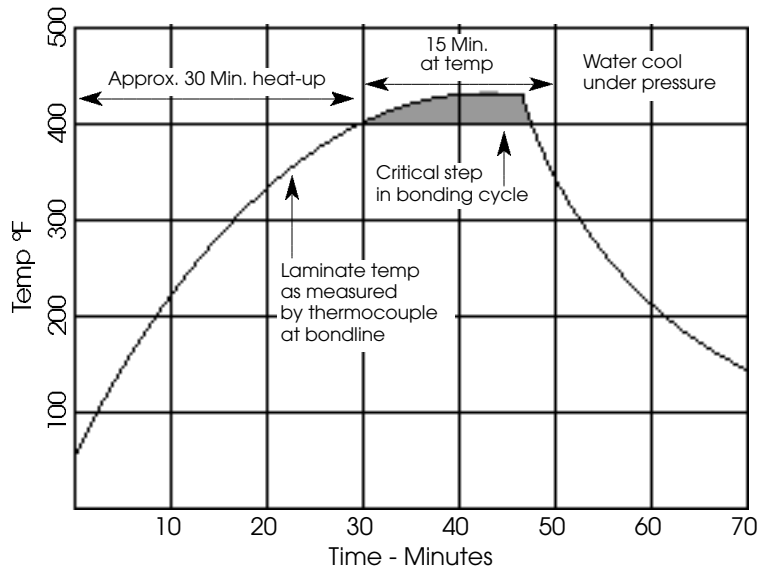
1. Lay the bonding film between boards to be laminated.
2. Insert thermocouple into laminate at the bondline. (The use of a thermocouple to characterize the time-temperature curve at the bondline is strongly recommended, due to the lag time between press platen temperature and laminate temperature.) In production, the use of a thermocouple inserted into the press padding to monitor temperatures is also recommended.
3. Load into press which has been preheated to 425°F. (see note a.)
4. Apply pressure – 100 to 200 psi.
5. Hold in press until temperature in the laminate reaches 400°F. This may require 20 to 30 minutes, depending upon heat capacity of press, padding, etc.
6. After laminate reaches 400°F, hold for an additional 15 minutes. (Final temperature at bondline will approach 425°F.)
7. Cool under pressure to less than 200°F before removing from press. (see note c.)

Notes

- a. Recent Microwave Materials Division Laboratories studies suggest that maximum bond strength may be achieved using a press temperature of 450°F (232°C) for most standard CuClad® laminates.
- b. The bonding parameters of temperature pressure and time are interrelated and may be adjusted somewhat to suit individual requirements. The minimum possible bonding temperature is 390°F, while temperatures over 475°F should be avoided to prevent excess flow. Excessive temperatures may result in material decomposition and excessive fuming.
- c. Productivity may be increased by removing the hot laminate from the press and transferring to a cold press for cooling under pressure. Delays in heating and cooling the press are thus eliminated.
- d. Laminating presses should be well maintained and in good working order. Features such as platen flatness, degree of parallel, temperature uniformity at heating and cooling, etc. as well as routine lamination practices should agree with generally accepted industry guidelines as well as those of the manufacturer.
- e. Packages properly bonded will yield a bond strength (peel) in excess of 20 lb. per inch width. The bondline will actually be stronger than the interlaminar strength of the base material.

The logo for Arlon, featuring the word "ARLON" in a bold, red, sans-serif font.

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A time-temperature curve as shown on the accompanying chart illustrates a typical press temperature cycle which has produced satisfactory bonding results.

Safety Notes: As with all halocarbon polymers when subjected to temperatures at or above their melting point, adequate ventilation should be provided.

Physical Properties: CuClad® 6700 Bonding Film

| | Units | Value | Test Method |
|---------------------------------|---------------|----------------------|----------------|
| Thickness | inches | 0.0015 | Micrometer |
| Tensile Strength MD* TD** | psi psi | 5000 3000 | D-882 D-882 |
| Elongation MD* TD** | % % | 90 90 | D-882 D-882 |
| Water Absorption | % | 0.005 max | D-570 |
| Thermal Conductivity | Cal. sec-cm°C | 5.3×10^{-4} | — |
| Flammability | | Non-flammable | — |
| Continuous Use Temp | °F (°C) | 350 (176) | — |
| Crystalline Meltpoint | °F (°C) | 361-367 | Hot Stage |

* Machine Direction ** Transverse Direction

Electrical Properties: CuClad® 6700 Bonding Film

| | Units | Value | Test Method |
|---------------------|--------|---------------|-------------|
| Dissipation Factor | — | 0.0025 | IPC-TM-650 |
| Dielectric Constant | — | 2.35 ± 10 | IPC-TM-650 |
| Dielectric Strength | VPM | 2500 | D-149 |
| Volume Resistivity | Ohm-cm | 10^{18} | D-257 |
| Surface Resistivity | Ohms | 10^{16} | D-257 |
| Arc Resistance | sec | 130-140 | D-495 |

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| Chemical | % Increase in weight | Visible effect on sample |
|-----------------------|-----------------------------|---------------------------------|
| Acetone | 5.17 | Cloudy Softened |
| Ammonium Hydroxide | None | None |
| Benzene | 2.4 | Clouded Flexible |
| Carbon Tetrachloride | 4.1 | Flexible |
| Heptane | None | Slightly Clouded |
| 10% Hydrochloric Acid | None | None |
| Isopropyl Alcohol | None | None |
| Methyl Ethyl Ketone | 5.9 | Extremely Flexible |
| Nitric Acid Conc. 70% | None | None |
| Sodium Hydroxide 50% | None | None |
| Sulfuric Acid 30% | None | None |
| Trichloroethylene | 10.9 | Clouded, extremely flexible |

Troubleshooting

No Bond

1. Surface of board to be bonded was mechanically cleaned (pumice scrubbed, brushed, etc.) Do not mechanically clean. Use chemical cleaning procedure.
2. Inadequate temperature-time above minimum bond temperature. Solution: double check temperature at bondline with thermocouple.
3. Contamination with release agents, moisture, dirt, etc. Solution: Review cleaning and priming procedures and conditions.

Spotty Bonding or Blistering

1. Non-uniform pressure. Solution: Use fresh padding or additional padding. Check flatness of press.
2. Inadequate temperature. (See #2 above.)

Distortion

1. Excessive temperature.
2. Non-uniform pressure.

Shelf Life & Storage

The shelf life of 6250 and 6700 bonding film is two years. Storage conditions include remaining in the sealed original packaging, maintaining environmental conditions of less than 25°C and less than 70% relative humidity, and storage away from direct sunlight. The film should be stored on edge or suspended by the roll core to prevent creating flat (thin) areas due to supporting the roll weight.

We believe this product is relatively inert. There are no aging effects during the two year period. For film storage significantly longer than two years, we would recommend making a trial run and evaluating the results, or simply discarding and replacing with fresh product.

The information and data contained herein are believed reliable, but all recommendations or suggestions are made without guarantee. You should thoroughly and independently test materials for any planned applications and determine satisfactory performance before commercialization. Furthermore, no suggestion for use, or material supplied shall be construed as a recommendation or inducement to violate any law or infringe any patent.



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