

## LOW-LOSS PREPREG FOR PTFE MULTI-LAYER PCB's

### GenClad® 280 PRELIMINARY Process Overview

GenClad 280 is a novel bond-ply system comprised of a high performance thermoplastic with a thermosetting resin system that offers electrical performance that rivals current PTFE composites used by designers of RF, microwave, and high-speed digital devices, but with the process cost advantages of traditional printed wiring board manufacturing methods. GenClad is a true enabling technology, which allows the cost effective design, implementation, and complete integration of complex circuitry for RF multilayer designs. The following are recommendations developed by our Technical Service Staff that highlight important considerations when processing this material at a typical PWB facility. These are only starting points and will require optimization specific to the design and to the fabrication process and equipment used.

#### Prepreg Storage & Handling:

GenClad prepreg is significantly different from earlier generations of low-loss thermoset materials in that they are not tacky, brittle or dusty. Prepreg should be stored in a controlled environment and protected from exposure to radiation or ultraviolet light. It is recommended to store the prepreg in its heat-sealed packaging and to reseal the package with tape after opening. Prepreg properties will be maintained for twelve months after receipt if stored below 68°F (<20°F) and < 50% relative humidity. Prepreg should be allowed to equilibrate at processing room conditions before use and care should be used to prevent moisture condensation.

#### Lamination

Inner cores should be baked at 225-250°F for 30 minutes to remove moisture prior to lamination to insure good bond. A pre-vacuum in the press for 30 minutes prior to application of heat or pressure is recommended for removal of air from the package. 350 psi is recommended for lamination of a typical 18"x24" panel. Full pressure should be maintained throughout the cycle. A heat rise of 8-12°F/minute from 200°F to 350°F is recommended to maximize resin flow for circuit filling. A dwell of 90 minutes at 360°F is necessary to fully cure the resin system to insure electrical and mechanical properties. Depending on the complexity and thickness of the final circuit board, a higher lamination temperature of 375-390°F may be necessary to insure full resin cure. Temperatures below 345°F or cure times below 90 minutes will result in under-cured resin and possible board delamination. A cool-down rate of 10°F/minute or less is recommended to minimize warping. Be sure to use enough plies of prepreg to encapsulate the thickness of copper traces and patterns. Direct foil lamination for outer layers are possible, but results will vary depending on the specific copper foil used. Contact your Arlon Technical Service representative for specific recommendations.

#### Drilling

Drilling parameters used with typical PTFE laminate composites have been shown to work well with GenClad 280. Conventional rigid entry and exit materials should be used to minimize copper

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burrs and optimize hole quality. High quality carbide tipped drill bits are recommended for mechanical hole formation.

### **Hole Preparation**

Hole cleaning is strongly recommended with all resin systems used on multilayer printed wiring boards to assure reliable interconnection. Hole preparation common for use of PTFE-based circuit board materials is acceptable for use with the GenClad system.

### **Copper Plating**

GenClad contains no PTFE and, therefore, requires no special hole treatment to improve wetting of the drilled hole walls. Standard plating processes and several direct metallization systems have been used. To assure the highest standards of plated through reliability, copper plating thickness should be 0.0015” at the center of the plated through hole, for high layer count PWBs.

### **Metal Finishing**

Traditional metal finishes have been used without issue including reflowed tin-lead, hot air leveled solder, electroless and electrolytic nickel, tin-palladium, tin-silver, immersion tin, and various types of gold plating. A bake at 225-250°F for 1 hour prior to thermal excursions, such as those encountered during hot air solder leveling, is considered prudent. Bake times and temperatures may require adjustment depending on local conditions.

### **Printed Wiring Assembly**

Standard through hole and surface mount assembly processes are compatible with GenClad. Pre-baking of boards for 1-2 hour bake at 225-250°F is recommended to reduce the potential of moisture related failures. Fixturing may be required for thin boards or in-panel soldering, due to the lower modulus of GenClad. Assembly methodologies compatible with PTFE boards are appropriate. Special techniques may be required if extensive hand rework and repair is required to avoid pad lifting.

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