

Processing Guide

The processing guidelines contained in this document were developed through in-house testing and field experience. However, they should be considered to be starting points that will require further adjustment. Read the following review of processes for applicability to your particular Printed Wiring Board (PWB) fabrication environment. Remember that the suggestions contained herein can not account for all possible board designs or processing environments. Additional adjustments by the fabricator will be necessary. Isola can and will assist with this process, but the fabricator, not Isola, is ultimately responsible for their process and the end results.

Fabricators should verify that PWBs made using these suggestions meet all applicable quality and performance requirements.

Part 1: Prepreg Storage and Handling

Isola Group's prepreg bonding sheets for use in multilayer printed circuit board applications are manufactured to specifications that include physical and electrical properties and processing characteristics relative to the laminating application. Handling and storage factors have an important influence on the desired performance of the prepreg. Some parameters are affected by the environment in which prepreps are stored. They can also deteriorate over extended periods of storage. The prepreg received by the customer is a glass fabric that has been impregnated with a stated quantity of low volatile, partially polymerized resin. The resin is tack-free but somewhat brittle. Many lamination problems arise from resin loss off the fabric due to improper handling. The fabric used is based on the order and supplies the required thickness. In most cases the amount of resin carried by the fabric increases as the fabric thickness decreases.

Isola Group's 370HRN is a proprietary multifunctional epoxy no-flow prepreg. It has been specifically formulated for optimal performance in bonding applications that require minimal resin flow and consistency in lamination. The material brings the fabricator specific characteristics appropriate for use in heat sink bonding, die cavity board (direct chip attachment) and multilayer rigid-flex applications.

Handling Suggestions

Handle all prepreg using clean gloves. Use sharp, precision equipment when cutting or paneling prepreg. Treat all prepreg as being very fragile. Use extreme care when handling very high resin content prepreg (glass fabrics 1080 and finer).

Storage Suggestions

Upon receipt, all prepreg should be immediately moved from the receiving area to a controlled environment. All prepreg should be used as soon as possible using a First-In-First-Out (FIFO) inventory management system. No-flow prepreps should remain in their original bagging during storage and bags should be resealed if opened.

Prepreg should be stored at $\leq 23^{\circ}\text{C}$ and below 50% humidity. Prepreg packages should be allowed to equilibrate to layup room conditions before opening to prevent moisture condensation on the prepreg.

If stored @ 5°C (41°F), the unopened bag should be equilibrated for 8 hours in the layup area prior to opening and use.

Attention must be given to environmental conditions in the storage/layup areas to insure that the prepreg is not allowed to absorb moisture. 370HRN prepreps are hygroscopic. Moisture absorption can lower minimum melt viscosity, resulting in a lengthening of the flow window. Further, excessive moisture absorption can also depress Tg and impact degree of cure. ***If excessive moisture is absorbed, desiccation procedures may NOT return prepreg performance to original specifications.***

Part 2: Prepreg Selection

Isola Laminate Systems offers no-flow prepreps in various glass styles. The resin content and flow characteristics of these items are tightly controlled to optimize consistency of flow and filling capability, plus provide precise thickness contribution. Actual thickness will be dependent on the prepreps selected as well as on the specific lamination set-up, including temperature, pressure, area under lamination and configuration of facing surfaces.

370HRN no-flow prepreg should be considered for use where UL94 V-0 flammability rating, high temperature reliability and chemical resistance are required.

Generally, two-plys of no-flow prepreg provide the best results. One ply of no-flow prepreg, style 1080 or thinner, is not generally

suggested. This is due to the lack of sufficient cushioning during lamination and may result in an increased potential for lamination voids and other defects. 370HRN no-flow prepregs are typically available in 106 and 1080 glass styles in most regions (Asia, Europe and North America). Some regions may offer more than one combination of resin content and/or flow performance per glass style.

Prepreg selection should be based on the glass style and overall thickness requirement needed as well as the resin content and the flow characteristics of the specific prepreg product. The PWB fabrication process requirements as well as the end product's design and performance requirements should also be taken into account when choosing no-flow prepregs.

Consult your Technical Service representative for assistance with product selection as well as with general processing and press cycle adjustments. The processing suggestions contained in this document are generic or general in nature. Each fabricator should characterize 370HRN No-flow prepregs in their specific applications.

Bond Enhancement

Bond strength and assembly reliability will be improved if the organic and metal surfaces to be bonded with no-flow prepregs are properly prepared prior to lamination using suitable procedures. Laminate surfaces (flex film or unclad laminate) should be clean and roughened (pumice scrubbed, plasma etched or similarly prepared). Metal or metallized surfaces should have the shininess broken and oxidation removed by pumice scrubbing, brushing, vapor honing or similar means. Copper surfaces are best prepared with oxide or oxide replacements for maximum adhesion. Shiny nickel is a particularly challenging surface to be bonded. Surface(s) must be dry, as moisture will affect adhesion, prepreg flow characteristics and disrupt the curing mechanism.

Each fabricator should conduct in-house testing to verify that their coating produces acceptable results with FR406N.

If reduced oxides are used, consult the chemical supplier for post oxide baking considerations as excessive baking may degrade the coating characteristics. It is generally suggested that post-oxide baking be performed vertically, in racks. Suggest mild bake of oxidized surfaces (15-30 minutes @ 80-100°C). For conveyORIZED oxide replacements, an efficient dryer at the end of a conveyORIZED oxide replacement line should remove all moisture from the innerlayer surface.

However, drying of layers for 30 minutes minimum @ 100°C or higher is considered a "best practice". Drying in racks is preferred.

If immersion tin adhesion treatments are used, the fabricator should test the coating to verify adequate bond strength develops with 370HRN prepregs.

Part 3: Lamination

Standard Lamination

The amount of time at cure temperature, and to some extent the actual cure temperature of 370HRN material, will be determined by the thickness of the multilayer package being produced. Very thick boards will require a longer cure time to assure optimum material performance.

On rare occasions a customer will encounter a board design with highly unusual fill characteristics. In those cases, it is sometimes necessary to use very high pressures (400-500 PSI) to achieve complete resin fill with the prepreg in question.

It is important to understand when higher pressure is the appropriate solution to the problem and when a different prepreg (thicker glass style, higher resin content or higher Circle Flow performance) is a more appropriate solution.

Table 1 outlines general suggestions for lamination pressure based on press type used.

Removal of FR406N flash should be performed by routing rather than shearing to minimize crazing along the panel edges.

Some designs and applications may require deviation from these guidelines. Consult with Isola Technical Service for assistance.

Part 5: Ordering Information

Contact your local sales representative or visit: www.isola-group.com for further information.

Or contact us at: info@isola-group.com

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NOTES

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