AGC
Your Dreams, Our Challenge

N8000

General Processing Guidelines

Cyanate Ester Laminate and Prepreg

N8000 is a high-performance advanced material with a high Tg and extremely low Z-Axis expansion, creating a material with signal speed capabilities not achievable through standard epoxy or polyimide.

Material Handling & Storage

Store laminates flat in a dry environment. Do not bend, scratch or dent laminate.
Store prepreg flat, with a storage temperature of <72° F (<23°C) and ≤50% RH.
For extended prepreg storage, reduce storage temperature to <41° F (<5°C).
Place prepreg under vacuum or in a desiccant chamber 12 - 24 hours prior to lay-up for best results.
Reseal opened bags of unused prepreg.

Copper & Surface Preparation

Prepare copper surface for photo resist application according to the following options:
The type of copper surface preparation employed should relate to the foil type as specified below:

- **Reverse Treat Foil (RTFoil®)**: Chemical clean followed by a light tack clean.
- **Shiny Copper Foil**: Chemical and / or Mechanical clean followed by a light tack clean.
- **Double Treat Foil**: Chemical clean followed by a light tack clean.

Note: Chemical clean consists of a mild cleaner to remove soils followed by a mild acid to remove the passivation.

Bond Enhancing Treatments

One of the following options can be used successfully:

- Option 1: Oxide alternative based on sulfuric-peroxide etch

- Option 2: Brown oxide with controlled dissolution post-treatment.

- Option 3: Modified brown oxide with DMAB (dimethylamino borane) reduction. Oxide weight gain should be .12 ± .03 mg / cm^2

Note: The brown oxide deposit should be tested using a weight loss test. Thick oxide deposits tend to yield poor thermal resistance. The oxide deposit should not exceed 0.4 mg/cm2.

Inner Layer Drying

Inner layers should be oven dried to remove absorbed moisture. Absorbed moisture in the inner layer can affect the curing properties of the prepreg. Conveyorized warm air drying is usually not effective in removing absorbed moisture from the etched layer.

	Recommendations
Signal layers	225°F (107°C) in vertical racks with minimum 0.5" (12 mm) separations for 60 minutes

Note: 1)Check with oxide supplier if using DMAB oxide reducer. Excessive exposure to heat may re-oxidize the reduced treatment.
2) If inner layers are baked horizontally in stacks of 1 - 2" (25-50mm) extend time to 90 minutes.
3) Drying temperatures below 212°F (100°C) are not effective in removing absorbed moisture from the layer.
4) If slip sheets are used to protect layers it is important that they not contain wax or silicon based materials which can transfer between cores and affect adhesion after lamination.

Prepreg Drying

The cure rate of N8000 prepreg can be affected by absorbed moisture. For best results, the prepreg should be vacuum desiccated at ambient temperature for 12-24 hours at a minimum vacuum of 28.5" Hg prior to usage. If prepreg is stored for 3 days after the drying process, the vacuum desiccation procedure should be repeated..

Lay-up

For best results, use inner layers within 2 hours after drying. Rebake inner layers if not used within 24 hours.

Lamination

For best results, fully cure in vacuum assisted hydraulic press

	Recommendations
Vacuum Gauge Pressure	A minimum of 28.5" Hg (965 mbars) for 15 minutes before applying heat & pressure.
Heat Up Rate*	8 - 12°F (4 – 7 °C) per minute
Critical Range	180 – 280°F (80 – 140°C)
Pressure	200 - 300 psi (14 – 21 bar)
Cure Time, Temp	240 minutes @ 425 °F (240 minutes @ 218 °C)
Cool Down Rate	7°F (4°C) per minute or less until stack reaches 260°F (127°C)
Breakdown	After panels have cooled below 150°F (65 °C)

Notes: Heat rise is usually controlled by using an acceptable thermal lagging such as kraft paper or press pads. Alternately the heat rise can be controlled by ramping the platen temperature about 5 – 10 °F (5 °C) higher than book temperatures and controlling the heat up rate through the critical temperature range.

For partial cure in press and full cure in oven, laminate product 60 minutes at 360°F (182°C) followed by a 240 minute postbake in the oven at 425°F (218°C).

Drilling

Typical Drill Parameters	Recommendations	
Drill Sizes	0.010" – 0.013" (0.25 – 0.33 mm)	0.020" - 0.040" (0.50 – 1.0 mm)
Surface Speed	250 – 350 SFM (76– 107 m/min.)	350-450 SFM (107 – 138 m/min.)
Chip Load	0.5 – 1.5 mils/rev (13 – 38 µm/rev)	0.75 – 1.5 mils/rev (19 – 38 µm/rev)
Maximum Hit Count	500 - 1000	750 – 1500
Typical Stack Height	0.045" – 0.100" (1.1 – 2.5 mm)	0.060" – 0.100" (1.5 - 2.5 mm)

Note: As with all high modulus resin systems, N8000 may exhibit resin cracks of separation of glass and resin adjacent to the hole wall if exposed to excessively aggressive drill parameters. Care should be taken in following the drill parameters specified in the N8000 Routing and Drilling table.

Drilling parameters should be adjusted depending on hole size, layer count, panel thickness, copper content and stack height. For specific feed and speed parameters, contact your drill supplier or AGC'S technical representative. Detailed typical drilling parameters are available for many products. Please contact agc-ml.info-maltimaterial@agc.com.

Hole Cleaning (Resin Smear Removal)

Most solvent swell and permanganate etch processes are suitable. Aggressive solvent swell processes and double pass chemical desmear processes should be avoided.

Plasma: Typical desmear conditions

Temperature	Gas mixture	Power	Time
80± 2°C	10%CF_4 , 80% O_2, 10% N_2	4000 W	25-30 min

Note: Depending on the amount of resin removal required, a preheat cycle and an oxygen burn cycle for ash removal may be necessary. Longer dwell times will be required if full etch-back is required. See your technical representative for additional information.

Chemical Desmear:

Type	Temp (°F /°C)	Time
Cyclic Amine 100%	130 ± 5 / 54 ± 2	2 - 4 min.
Cyclic Amine 50% v/v	170 ± 5 / 77 ± 2	3 - 5 min.
Butyl / hydroxide solvent	173 ± 5 / 78 ± 2	3 - 5 min.
Alkaline Permanganate oxidizer	175 ± 5 / 79 ± 2	8 - 10 min.

Routing

Typical Drill Parameters	Recommendations
Stack Height	0.250" (≤6.25 mm)
Tool Size	0.093" (2.4 mm)
Feed Rate	36 IPM (0.9 m/min.)
Speed	24K RPM

General Processing Notes

1. Cyanate ester resin is susceptible to attack from strong alkaline process solutions. Contact of the cured resin with strong alkalis such as alkaline cleaners and solder mask strippers should be avoided. Exposure with solutions containing strong bases such as solvent swellers for resin desmearing and permanganate desmear chemistries should be limited to the recommended levels.

2. The cured cyanate ester resin can absorb moisture more quickly than other materials commonly used to fabricate PCB's. Ensure that moisture is thoroughly removed from PCB's before subjecting them to solder assembly temperatures (solder reflow or solder assembly).

These guidelines can provide only basic and reference information for PCB fabricators. Because of different environment, equipment, tooling and so on, in all instances, the user shall determine suitability in any given conditions or applications. For more detailed processing information, please contact with the AGC engineer or sales representative.