

N5000

General Processing Guidelines

BT Epoxy PCB Material

N5000 is a BT (bismaleimide triazine) based resin system which provides good electrical properties and ease of processing.

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).

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.

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. To use DMAB successfully, oxide weight gain should be $.12 \pm .03$ mg / cm².

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 effective in removing absorbed moisture from the etched layer.

	Recommendations
Innerlayer Bake Cycle	225°F (110°C) in vertical racks with minimum 0.5" (12 mm) separations for 60 minutes
Plane layers and plated sub-lam layers	230°F (110°C) in vertical racks with minimum 0.5" (12 mm) separation for 60 minutes

- Note: 1) If inner layers are baked horizontally in stacks of 1 - 2 "(25-50mm) extend time to at least 90 minutes.
 2) Check with oxide supplier if using DMAB oxide reducer. Excessive exposure to heat may re-oxidize the reduced treatment
 3) Prepared inner layers should be staged in a clean, low moisture environment to prevent moisture reabsorption.

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 - 350 psi (14 - 24 bar)
Cure Time, Temp	90 minutes @ 375 °F (90 minutes @ 190 °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)

*Note: 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.

Drilling

Typical Drill Parameters	Recommendations	
Drill Sizes	0.010" – 0.020" (0.30 – 0.50 mm)	0.020" - 0.040" (0.50 – 1.0 mm)
Surface Speed	375 – 450 SFM (115– 137 m/min.)	400-500 SFM (122 – 152 m/min.)
Chip Load	0.5 – 1.5 mils/rev (12 – 38 µm/rev)	1.0 – 2.0 mils/rev (25 – 51 µm/rev)
Maximum Hit Count	800 - 1200	1200 – 1500
Typical Stack Height	0.120" – 0.180" (3.0 – 4.5 mm)	0.120" – 0.180" (3.0 – 4.5 mm)

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 commonly used desmear methods are compatible. Plasma desmear, followed by a short immersion in a permanganate oxidizer is the preferred method for resin smear removal and etch back of hole walls..

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. See your technical representative for additional information.

Chemical Desmear:

A solvent swell and permanganate oxidizer can also be used for removal of drill smear. This method is not recommended for etch-back as aggressive attack of the resin can result in damage to the hole wall.

Type	Temp (°F /°C)	Time
Cyclic Amine 100%	130 ± 5 / 54 ± 2	5 - 7 min.
Cyclic Amine 50% v/v	170 ± 5 / 77 ± 2	5 - 7 min.
Butyl / hydroxide solvent	173 ± 5 / 78 ± 2	5 - 7 min.
Alkaline Permanganate oxidizer	175 ± 5 / 79 ± 2	12 - 15 min.

Routing

Typical Drill Parameters	Recommendations
Stack Height	0.250" (≤6.25 mm)
Tool Size	0.093" (2.4 mm)
Feed Rate	48 IPM (1.2 m/min.)
Speed	24K RPM

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.