

N4000-13

Application Bulletin- Processing

N4000-13

Processing Best Practices

Rev August 1, 2005

Scope

This bulletin describes the best practices we recommend for use when processing the N4000-13 substrate materials.

Best Practices

1. Prepreg Storage:
 - Store Prepreg in a temperature and humidity controlled environment (<21°C [70°F] and <50% RH)
 - Keep prepreg in bags until needed
 - Tape shut any opened bags
2. Bake inner layer details after oxide
 - Bake signal layers at 110°C (230°F) for 30 minutes minimum
 - Bake power / ground layers at 110°C (230°F) for 60 minutes
3. Lamination Cycle:
 - Vacuum: apply vacuum of 1 torr (28.5" Hg) maximum for 15 minutes
 - Heat rise measured from 83° -139°C (180°-280°F)
 - Ideal heat rise is 2.3° - 3.4°C (4°-6°F)
 - A heat rise of 2.3° - 4.4°C (4°-8°F) is acceptable.
 - Pressure: KISS pressure cycle (optional)
 - Initial pressure of 3.5 bar (50psi). Ramp to full pressure when product is between 90°C and 100°C (194°-212°F) at the rate of 5 bar /min (72psi.min)
 - Full pressure of 19 to 24 Bar (275-350psi)
 - Cure Cycle
 - 90 minutes at 193°C (380°F)
 - Do not allow product temperature to exceed 201°C (395°F)
 - Cool to < 127°C (260°F) at a rate < 4°C/min (7°F/min)

4. Drilling

- Drilling parameters per chart on Nelco website. Small hole drill speeds based on 430 sfpm cutting speed
- Use new drills
- Limit hit count to 1000 hits
- Use undercut drills for the smaller holes down to 0.25 mm (.010")
- Recommend using lubricated entry or backup materials (Mitsubishi LE Sheet or LCOA Slick Back)
- Recommend peck drilling for boards >2.5 mm (>0.100") in thickness

5. Post Drill Conditioning

- Use 1" (2.5 cm) horizontal stacks at 356°F (180°C) for 2-4 hours
- Place weighted steel plates on stacks
- Cool below 275°F (135°C) at under 8°F/min (4.5°C/min)

6. Resin smear removal

- Plasma desmear followed by a mild permanganate desmear is preferred process.
- ***Crazing can be minimized by optimizing the exposure times in each of these processes.***
- Plasma process
 - Dry boards at 110°C (220°F) for 60 minutes before plasma processing. (***Moisture in the holes can contribute to crazing***)
 - Preheat boards to 71°C (160°F) to improve the uniformity of plasma attack.
 - Typical plasma desmear conditions are as follows:
 - ◆ Temperature: 80±2°C
 - ◆ Gas mixture: 10% CF₄, 80% O₂, 10% N₂
 - ◆ Power: 4000W
 - ◆ Time: 25-30 minutes
- Permanganate process
 - Minimal solvent swell and permanganate etch should be utilized per the following table

	Type	Temp(°F)	Temp (°C)	Time
Option 1	Butyl carbitol / hydroxide	173±5	78±2	4-6 min
<i>Note: NMP solvent swell is not recommended for N4000-13</i>				
	Alkaline permanganate	175±5	79±2	8-12 min
<i>Note: Hydroxyl content should be controlled below 1.05 N (40g/l for NaOH)</i>				