


Filled Epoxy Prepreg



Arlon's 44N is a high resin content multifunctional (170°C) epoxy prepreg system with a proprietary microdisperse ceramic filler system. 44N is engineered for the filling of clearance holes in thin metal cores such as 0.006" Copper-invar-Copper or via holes in sequentially laminated MLB designs. Based on Arlon's 45N, the 44N system is compatible with conventional epoxy lamination and fabrication.

Features:

- Meets IPC4101/98 description and specification
- UL recognized as UL94 V-0
- Micro-disperse ceramic filled to minimize resin shrinkage and cracking in filled clearance holes
- Prepreg format eliminates the need for messy paste fill material in high volume applications
- High Tg compatible with conventional multifunctional epoxy processing
- Filled system has reduced Z-direction expansion and improved thermal conductivity for improved plated through hole reliability
- Suitable for most Lead-Free applications
- RoHS/WEEE compliant

Typical Applications:

- Automotive Under-hood applications
 - Backplanes and Mother Boards
 - Ball Grid Array Packaging
 - High layer count MLB's
 - Filling thick metal copper ground planes
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Typical Properties:

Property	Units	Value	Test Method
Electrical Properties			
Dielectric Constant @ 1 MHz	-	4.2 to 4.6	IPC TM-650 2.5.5.3
@ 1 GHz	-		IPC TM-650 2.5.5.9
Dissipation Factor @ 1 MHz		0.025	IPC TM-650 2.5.5.3
@ 1 GHz			IPC TM-650 2.5.5.9
Volume Resistivity			
C96/35/90	MΩ-cm	2.6×10^7	IPC TM-650 2.5.17.1
E24/125	MΩ-cm	3.3×10^7	IPC TM-650 2.5.17.1
Surface Resistivity			
C96/35/90	MΩ	4.0×10^4	IPC TM-650 2.5.17.1
E24/125	MΩ	2.9×10^7	IPC TM-650 2.5.17.1
Electrical Strength	Volts/mil (kV/mm)	1500	IPC TM-650 2.5.6.2
Dielectric Breakdown	kV		IPC TM-650 2.5.6
Arc Resistance	sec	65	IPC TM-650 2.5.1
Thermal Properties			
Glass Transition Temperature (Tg)			
TMA	°C		IPC TM-650 2.4.24C
DSC	°C	175	IPC TM-650 2.4.25D
Decomposition Temperature			
Initial	°C		IPC TM-650 2.4.24.6
5% weight loss	°C		IPC TM-650 2.4.24.6
T260	min		IPC TM-650 2.4.24.1
T288	min		IPC TM-650 2.4.24.1
T300	min		IPC TM-650 2.4.24.1
CTE (X,Y)	ppm/°C	14 - 16	IPC TM-650 2.4.41
CTE (Z)			
< Tg	ppm/°C	55	IPC TM-650 2.4.24
> Tg	ppm/°C	200	IPC TM-650 2.4.24
z-axis Expansion (50-260°C)	%	2.4	IPC TM-650 2.4.24
Mechanical Properties			
Peel Strength to Copper (1 oz/35 micron)			
After Thermal Stress	lb./in (N/mm)	8	IPC TM-650 2.4.8C
At Elevated Temperatures	lb./in (N/mm)	8	IPC TM-650 2.4.8.2A
After Process Solutions	lb./in (N/mm)	8	IPC TM-650 2.4.8C
Young's Modulus CD/MD	Mpsi (GPa)	2.8	ASTM E111
Tensile Strength CD/MD	kpsi (MPa)		ASTM D3039
Poisson's Ratio	-		ASTM E13204
Physical Properties			
Water Absorption (0.062")	%	0.1	IPC TM-650 2.6.2.1A
Density	g/cm ³	1.85	ASTM D792 Method A
Thermal Conductivity	W/mK	0.3	ASTM E1461
Flammability	class	V0	UL-94

Results listed above are typical properties, provided without warranty, expressed or implied, and without liability. Properties may vary, depending on design and application. Arlon reserves the right to change or update these values.

Availability:

Arlon Part Number	Glass Style	Resin (%)	Resin Flow	Ceramic Load	Yield per Ply
44N0680	106	80	50 ± 5%	14 ± 2	0.0015"

Recommended Process Conditions:

We suggest the use of vacuum or vacuum assist lamination. Pressure, temperature and time may vary depending on the available equipment, panel size and complexity and other factors.

Controlling the heat-up rate, of the multilayer package, to 8-12°F/4-7°C per minute between 150°F and 300°F/65-150°C is recommended.

See start point recommendations for pressure in table below:

Panel Size		Pressure	
in.	mm	psi	kg/cm2
12 x 18	305 x 457	275	19
16 x 18	406 x 457	350	25
18 x 24	457 x 610	400	28

A 90 minute cure at a temperature of 365°F/185°C should achieve a Tg of >170°C. When the lamination package contains layers of metal core, the cure time may need to be extended to offset the heat lagging effects of the metal.

NOTE: for sequential lamination use 60 minutes for the first lamination and 90 minutes for the final.

Cool down under pressure at < 10°F/min (5.5°C/min). Cool down at < 5°F/min (3°C/min) can enhance reliability and resistance to cracking.

Drill at 350 SFM. Undercut bits are recommended for vias 0.018" (0.45cm) and smaller De-smear using alkaline permanganate or plasma with settings appropriate for FR-4. slightly longer dwell times may be needed for multifunctional compared with difunctional FR-4.

Bake for 1 – 2 hours at 250°F (121°C) prior to solder reflow or HASL.



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