



# isola

B-DE 117/7

***DURAVER®-E-Cu***  
***quality 117***

High-T<sub>g</sub> base material

## High $T_g$ base material

# DURAVER®-E-Cu quality 117

DURAVER®-E-Cu quality 117 is a dicy-cured epoxy system of type FR-4. The glass transition temperature measured by DSC is 170 °C.

Due to the curing system this material can be pressed and processed in a similar way as DURAVER®-E-Cu quality 104 (standard FR-4).

The distinctly lower thermal expansion in z-direction resulting from the high  $T_g$  makes DURAVER®-E-Cu quality 117 a preferred material for multilayers with high layer count.

### Approval

Underwriters' Laboratories Inc. (UL)  
File-No. E41625

### Raw materials

The same types of E-glass-fabric and copper foils are used as for our standard base material DURAVER®-E-Cu quality 104 (FR-4).

For laminates with a thickness  $\leq 0.1$  mm VLP foils with HTE properties are used.

Laminates are only available with double-sided copper cladding

### Supply forms and storage

The laminates are produced in the standard sheet sizes

1225 mm x 1070 mm warp

1225 mm x 925 mm warp

Prepregs are supplied in the standard size approx. 1250 mm (location oriented).

Other sheet sizes and roll widths on request.

Laminate and prepreg panels are cut to specification.

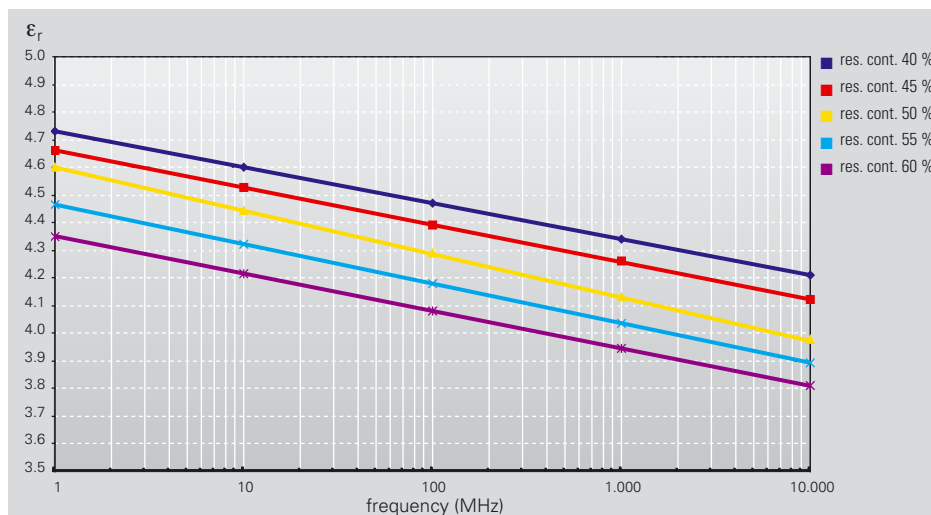
The tooling holes required in the prepreg panels for the pin-lam technique are also produced to specifications.

A variety of punch tools is available for this purpose.

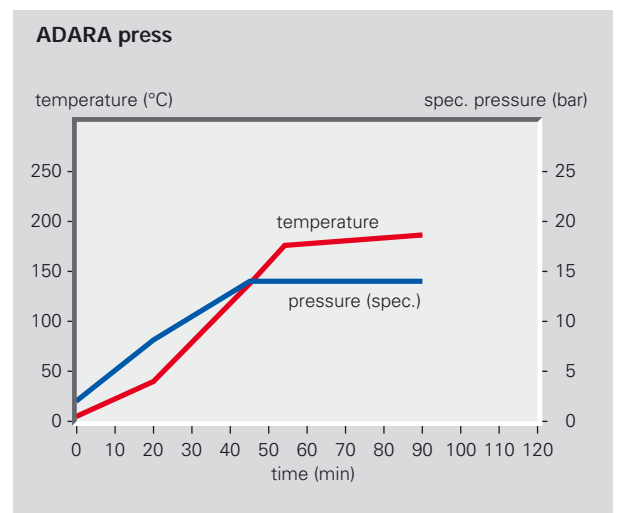
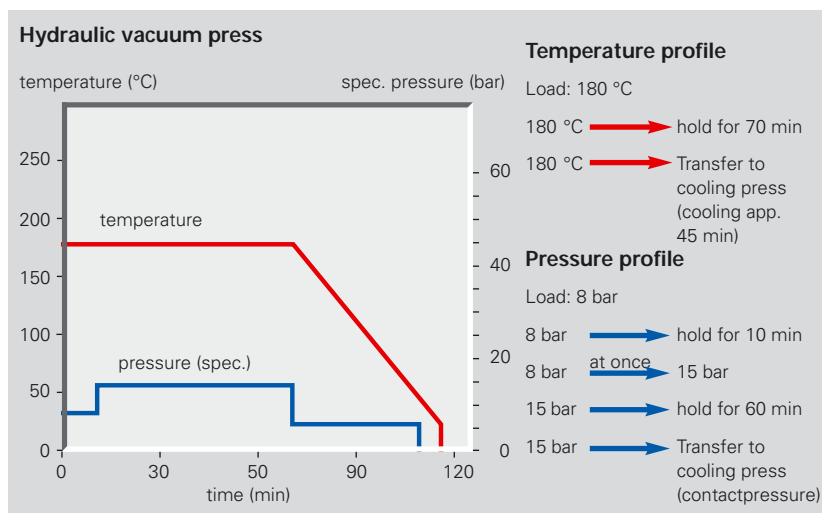
The prepregs' shelf life is six months at  $< 5$  °C or three months at  $< 23$  °C and a relative humidity of  $< 50\%$ . Care must be taken to avoid condensation when removing the prepregs from the cold store.

### Dielectric constant depending on frequency and resin content

Loss factor from 1 MHz to 10 GHz =  $0.0195 \pm 0.005$



### Recommended press parameters



## Processing

DURAVER®-E-Cu quality 117 can be fully cured with a similar press cycle as

DURAVER®-E-Cu quality 104 (standard FR-4). Post-baking is not required.

Current product information can also be obtained from our website [www.isola-group.com](http://www.isola-group.com)

### DURAVER®-E quality 117 ML Standard Prepregs

Prepreg type	Nominal thickness		Resin content %	Res. gel-time s	Viscosity Pa · s	Scaled flow	
	mm	inch				mil/Prepreg	mm/Prepreg
106 HT01	0.061	0.0024	74 ± 4	115 ± 20	64 ± 15	1.6 ± 0.2	0.041 ± 0.005
1080 HT01	0.079	0.0031	64 ± 4	115 ± 20	64 ± 15	2.3 ± 0.2	0.058 ± 0.005
2116 HT01	0.132	0.0052	54 ± 4	115 ± 20	64 ± 15	4.5 ± 0.3	0.114 ± 0.008
7628 HT01	0.190	0.0075	43 ± 3	115 ± 20	64 ± 15	6.5 ± 0.3	0.165 ± 0.008

Other prepreg types on request.

### DURAVER®-E-Cu quality 117 ML Standard Laminate Constructions

Nominal thickness		Thickness tolerances		Construction	Mean resin content* %
mm	inch	IPC-4101B cl. B mm	IPC-4101B cl. C mm		
0.075	0.003	± 0.018	± 0.013	1 x 1080	63
0.100	0.004	± 0.018	± 0.013	1 x 2116	45
0.125	0.005	± 0.025	± 0.018	1 x 2165	47
0.150	0.006	± 0.025	± 0.018	1 x 2157	47
0.200	0.008	± 0.038	± 0.025	1 x 7628M	44
0.250	0.010	± 0.038	± 0.025	2 x 2165	47
0.300	0.012	± 0.050	± 0.038	2 x 2157	47
0.360	0.014	± 0.050	± 0.038	2 x 7628M	39
0.410	0.016	± 0.050	± 0.038	2 x 7628M	44
0.510	0.020	± 0.064	± 0.050	3 x 7628	39
0.540	0.022	± 0.064	± 0.050	3 x 7628M	39
0.610	0.024	± 0.064	± 0.050	3 x 7628M	44
0.710	0.028	± 0.064	± 0.050	4 x 7628M	39
0.760	0.030	± 0.064	± 0.050	4 x 7628M	42
0.900	0.035	± 0.100	± 0.075	5 x 7628M	39
1.000	0.039	± 0.100	± 0.075	5 x 7628M	44
1.080	0.042	± 0.130	± 0.075	6 x 7628M	39
1.200	0.047	± 0.130	± 0.075	6 x 7628M	44

Other thicknesses on request.

### DURAVER®-E-Cu quality 117 Standard Laminate Constructions

Nominal thickness		Thickness tolerances		Construction	Mean resin content* %
mm	inch	IPC-4101B cl. L mm	IPC-4101B cl. M mm		
1.55	0.060	± 0.130	± 0.075	8 x 7628M	42
2.0	0.080	± 0.180	± 0.100	11 x 7628M	39
2.4	0.096	± 0.180	± 0.100	12 x 7628M	43
3.2	0.128	± 0.230	± 0.130	17 x 7628M	41

Other thicknesses on request.

\*double sided 35 µm

# Technical Values

## DURAVER®-E-Cu quality 117

Specification Sheet #:	IPC-4101C/24
Reinforcement:	woven E-glass
Resin system:	primary: difunctional epoxy • secondary: multifunctional epoxy
Flame Retardant Mechanism:	brominated epoxy resin • minimum UL requirement: V-0
Fillers:	none
ID Reference:	UL/ANSI: FR-4 • ANSI: FR-4/24 • RoHS-compliant
Glass Transition Temperature (T <sub>g</sub> ):	150 °C - 200 °C

### Explanations:

C = preconditioning in humidity chamber

E = preconditioning at temperature

The figures following the letter symbols indicate with the first digit the duration of the preconditioning in hours, with the second digit the preconditioning temperature in °C and with the third digit the relative humidity.

Properties	Units	Laminate thickness < 0.50 mm		Laminate thickness ≥ 0.50 mm	
		Specification	Isola-Value	Specification	Isola-Value
<b>1. Peel Strength</b> , minimum					
A. Low profile copper foil and very low profile copper foil – all copper weights >17 µm	N/mm	0.70	1.40	0.70	n/a*
B. Standard profile copper foil (35 µm)					
1. After thermal stress	N/mm	0.80	1.50	1.05	1.80
2. At 125 °C	N/mm	0.70	1.20	0.70	1.40
3. After process solutions	N/mm	0.55	1.50	0.80	1.70
C. All other foil composite	N/mm	n/a*	n/a*	n/a*	n/a*
<b>2. Volume Resistivity</b> , minimum					
A. C-96/35/90	MΩ · cm	1.0 · 10 <sup>6</sup>	4.6 · 10 <sup>7</sup>	n/a*	n/a*
B. After moisture resistance	MΩ · cm	n/a*	n/a*	1.0 · 10 <sup>4</sup>	4.0 · 10 <sup>8</sup>
C. At elevated temperature E-24/125	MΩ · cm	1.0 · 10 <sup>3</sup>	1.4 · 10 <sup>7</sup>	1.0 · 10 <sup>3</sup>	5.0 · 10 <sup>6</sup>
<b>3. Surface Resistivity</b> , minimum					
A. C-96/35/90	MΩ	1.0 · 10 <sup>4</sup>	3.8 · 10 <sup>7</sup>	n/a*	n/a*
B. After moisture resistance	MΩ	n/a*	n/a*	1.0 · 10 <sup>4</sup>	3.3 · 10 <sup>7</sup>
C. At elevated temperature E-24/125	MΩ	1.0 · 10 <sup>3</sup>	2.9 · 10 <sup>7</sup>	1.0 · 10 <sup>3</sup>	1.7 · 10 <sup>7</sup>
<b>4. Moisture Absorption</b> , maximum	%	n/a*	n/a*	0.80	0.15**
<b>5. Dielectric Breakdown</b> , minimum	kV	n/a*	n/a*	40	48
<b>6. Permittivity @ 1 MHz</b> , maximum (Laminate or prepreg as laminated)		5.4	4.5 - 4.9	5.4	4.6 - 4.9
<b>7. Loss Tangent @ 1MHz</b> , maximum (Laminate or prepreg as laminated)		0.035	0.013	0.035	0.016
<b>8. Flexural Strength</b> , minimum					
A. Length direction	N/mm <sup>2</sup>	n/a*	n/a*	415	600
B. Cross direction	N/mm <sup>2</sup>	n/a*	n/a*	345	490
<b>9. Flexural Strength @ Elevated Temperature</b> , length direction, minimum	N/mm <sup>2</sup>	n/a*	n/a*	n/a*	n/a*
<b>10. Thermal Stress at 288 °C</b> , minimum					
A. Unetched	s	≥ 10	≥ 10	≥ 10	≥ 10
B. Etched	s	≥ 10	≥ 10	≥ 10	≥ 10
<b>11. Electric Strength</b> , minimum (Laminate or prepreg as laminated)	kV/mm	30	45	n/a*	n/a*
<b>12. Flammability</b>	class	V-0	V-0	V-0	V-0
<b>13. Glass Transition Temperature (T<sub>g</sub>) DSC</b>	°C	150 - 200		150 - 200	170
<b>14. Coefficient of Thermal Expansion (CTE) TMA</b>					
Fill direction (below T <sub>g</sub> / above T <sub>g</sub> )	ppm/K	–	–	–	17/12
Warp direction (below T <sub>g</sub> / above T <sub>g</sub> )	ppm/K	–	–	–	12/7
Vertical (below T <sub>g</sub> / above T <sub>g</sub> )	ppm/K	–	–	–	60/260

Tests are carried out in accordance with IPC-650 test methods.

\*not applicable \*\*measured at 1.55 mm laminate

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