ET445
EPOXY MATRIX

GENERAL FEATURES

ET445 is a structural epoxy matrix system especially developed for obtaining surface finish of the cured part satisfactory for most aesthetic application.

ET445 has a T_g of 135°C.

It can be polymerized in autoclave, vacuum bag and hot mould processes.

MAIN CHARACTERISTICS

- Excellent surface finishing
- Ideal for aesthetic application
- T_g of 135 °C
- Suitable to impregnate a very wide range of supports (UD, fabric and multi-axial - carbon, glass, aramid and hybrids)
- Versatile in different manufacturing processes

QUICK REFERENCE TIPS

It is suggested to vent the vacuum in autoclave process according to the curing cycle shown in the following pages, in order to get the best aesthetic result and avoid both irregularities and crevices.

OPERATIONAL INSTRUCTIONS

CURE PROCESS RECOMMENDATIONS

ET445 epoxy matrix system can be processed starting from 80°C and up to 125°C; here follows the standard cure cycle suggestions:

Cure temperature °C	Cure time	Post-cure
125	30'	-
100	3h	may be necessary
90	6h	may be necessary
80	8h	may be necessary

Curing cycles are dependent on component thickness. Custom cycles could be developed with CIT Technical Department, to fulfil customer manufacturing process optimization.

AUTOCLAVE

Once determined the processing temperature and corresponding cure time, use these processing parameters in the following cure cycles:

Step	Temperature °C	Time min	Heating rate to isothermal °C/min	Pressure bar
1	25	–	–	Vacuum -0.8
2	125	–	1÷3	3/7
3	125	30	–	3/7
4	60	–	3÷5	3/7
5	25	–	–	–

RESIN MATRIX

GENERAL PROPERTIES

Property	Unit	Value	Standard
Storage life @ -18°C	months	12	-
Out life @ 23°C	months	1	-
Prepreg volatiles	%wt	<1	ASTM D3530-97R03
Cured resin density	g/cm^3	1.2	ASTM D792-00
T_g (DSC)*	°C	135	ASTM D3418-03
Max Dry T_g E' (DMA)**	°C	136	ASTM E1640-09
Tg Peak Tan δ (DMA)**	°C	155	ASTM E1640-09
Max Wet*** T_g E' (DMA)	°C	93	ASTM E1640-09
Tack	-	medium	-

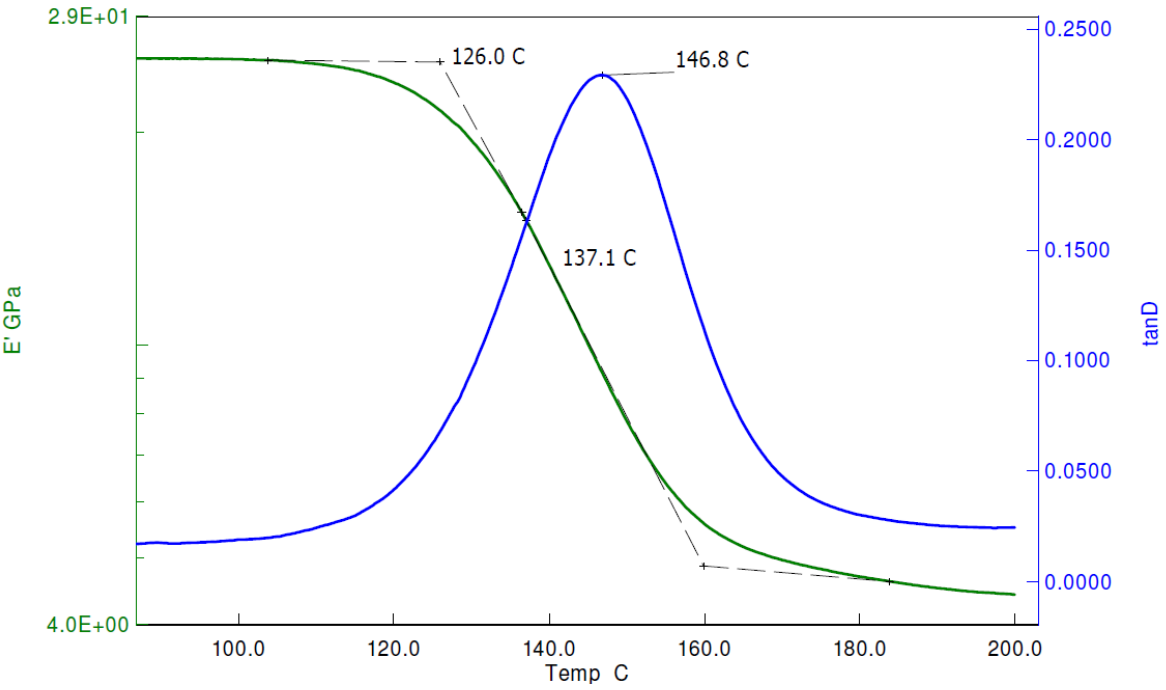
** Dynamic analysis*

*** Laminate Fully Cured 2 hours @135°C*

**** Wet Conditioning: 14 days immersion at 70°C*

THERMO-MECHANICAL DMA ANALYSIS

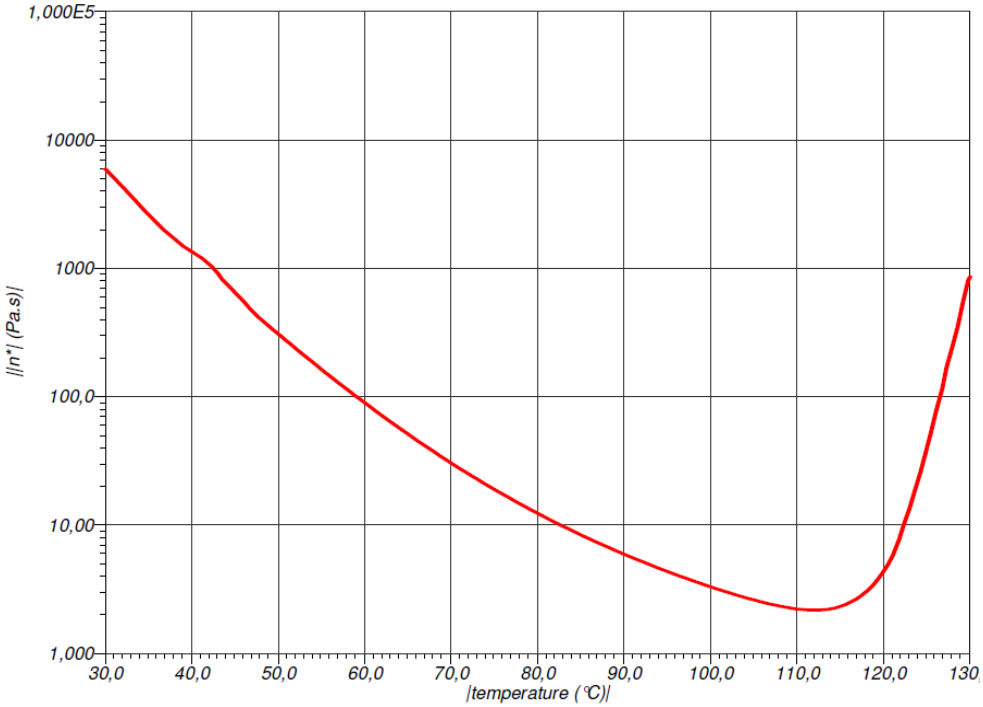
DMA trace of ET445 laminate cured for 30' @ 125°C.



DMA Analysis: modulus E' vs Temperature

Modulus E' evaluated under 2°C/min heating rate, 1Hz oscillating frequency.

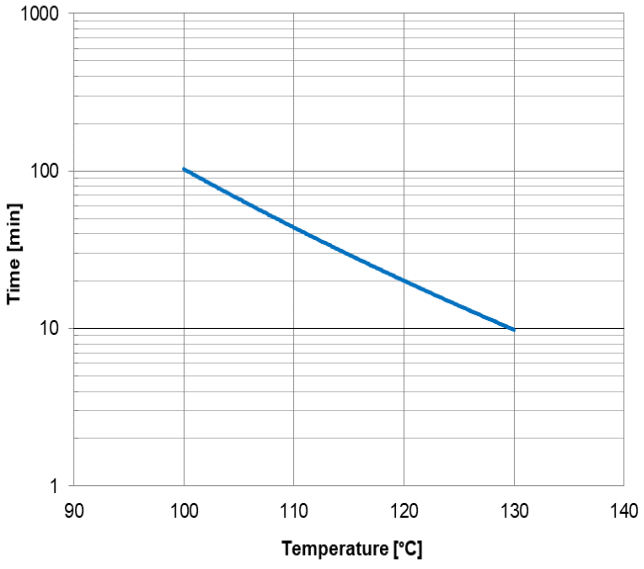
VISCOSITY PROFILE



Viscosity profile: temperature vs complex viscosity

Resin complex viscosity is measured under 3°C/min heating rate, 1Hz oscillating frequency.

GEL TIME



Temperature °C	Gel Time (min)
100	87
110	56
120	21
130	8'45''

CURED PREPREG

MECHANICAL PROPERTIES OF UNIDIRECTIONAL PREPREG LAMINATES

Test carried out at room temperature
Cure condition: 30 minutes @125°C
Values normalized to 60%Vf (except for PR, ILSS, IPSS and IPSM)

Cured Material Property	Test method	Units	Material
			HS 300 T700S 38%
0° Tensile Modulus	ASTM D3039	GPa	131
0° Tensile Strength		MPa	2489
0° Poisson's ratio		–	0.35
0° Compressive Modulus	ASTM D6641	GPa	116
0° Compressive Strength	SACMA SRM 1R-94	MPa	1254
In-Plane Shear Modulus	ASTM D3518	GPa	3.93
In-Plane Shear Strength @ 5%*		MPa	63.3
Interlaminar Shear Strength	ASTM D2344	MPa	83.5
Interlaminar Fracture Toughness G_{IC}	ASTM D5528	J/m^2	400 ÷ 600

(*) at 5% calculated shear strain

HS 300 ET445 38%: 300gsm unidirectional 24K T700 fibre

MECHANICAL PROPERTIES OF FABRIC PREPREG LAMINATES

Test carried out at room temperature
Cure condition: 30 minutes @125°C
Values normalized to 55%Vf (except for PR, ILSS, IPSS and IPSM)

Cured Material Property	Test method	Units	Material	
			CC245 T300 43%	CC384 T700S 40%
0° Tensile Modulus	ASTM D3039	GPa	60.4	65.8
0° Tensile Strength		MPa	734	1107
0° Strain @ break		%	1.13	1.62
0° Poisson's ratio		–	0.06	0.06
0° Compressive Modulus	ASTM D6641	GPa	57.0	56.8
0° Compressive Strength	SACMA SRM 1R-94	MPa	707	661
In-Plane Shear Modulus	ASTM D3518	GPa	3.24	3.55
In-Plane Shear Strength @ failure		MPa	113	106
In-Plane Shear Strength @ 5%*		MPa	67.1	63.7

(*) at 5% calculated shear strain

CC245 ET445 43%: 245 gsm, Twill 2/2, 3K T300 fibre

CC384 ET445 38%: 380 gsm, Twill 2/2, 12K T700S fibre

SAFETY CONSIDERATIONS

- Please consult the Material Safety Data Sheet.
- This product contains epoxy resin, and may cause allergic reaction.
- The use of latex gloves for handling is recommended.
- Waste material should be discarded following national law.

DELIVERY FORM AND PACKAGING

Custom widths, roll size, and packaging are available on request.

Prepreg fabrics: Supplied on 75 mm diameter cardboard cores with release paper on one side and polyethylene film separator on the other side.
Rolls are sealed plastic bags and packed in cardboard boxes.

Standard width: 100 cm or 127 cm.

Standard length: 50 m.

Unidirectional Prepreg: Supplied on 300 mm diameter cardboard cores with release paper on one side and smooth polyethylene film separator on the other side. Rolls are sealed in plastic bags and packed in cardboard boxes.

Standard width: 60cm, range from 30cm up to 105cm
Standard length: 100 m.

HANDLING AND CONDITIONING

- Store rolls at -18 °C, sealed in original packages.
- Shop life at 23°C refers to rolls sealed in original packages.
- Before using the prepreg, remove the roll from the freezer and let it warm up to room temperature for 6 hours sealed in its original package.

IMPORTANT NOTICE:

Details provided in this document have been obtained from carefully controlled samples; data are an overview of this product and should not be intended as technical specification.
Because the properties of this product can be significantly affected by the fabrication and testing techniques employed and since CIT does not control the conditions under which its products are tested and used, CIT cannot guarantee that the properties provided will be obtained with other processes and equipment.
CIT has the right to change any data or information when deemed appropriate.

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