

ER453

EPOXY MATRIX

GENERAL FEATURES

ER453 is a toughened structural epoxy system developed specifically for obtaining surface finish of the cured part satisfactory for most aesthetic application.

It features a flexible processing cycle with a range of cure temperatures from 90°C to 180°C (from 194°F to 356°F) and lamination by autoclave, hot press moulding or vacuum bag processes.

MAIN CHARACTERISTICS

- Flexible cure: 90÷180°C.
- Maximum service temperature of 165°C (329°F).
- Toughened epoxy matrix.
- Good surface finishing.
- Low tack/ low flow.
- Autoclave, press or vacuum bag processing.
- Solvent free.
- Up to 30 days shop life at room temperature.

QUICK REFERENCE TIPS

The standard cure cycle of 170°C (338°F) for 2 hours achieves high conversion and optimal mechanical performance; however, good conversion can be obtained in as little as 2 hours @ 135°C (275°F).

OPERATIONAL INSTRUCTIONS

CURE PROCESS RECOMMENDATIONS

This epoxy matrix system can be processed under the temperatures as described below:

Temperature °C (°F)	Time	Tg °C (°F) DSC	Tg °C (°F) E' DMA
135 (275)	2h	162 (322)	-
170 (338)	2h	177 (351)	166 (331)

Custom cure cycles can be developed in conjunction with the CIT Technical Department.

AUTOCLAVE

The standard cure cycle is shown below:

Step	Temperature °C (°F)	Time (min)	Heating rate to isothermal °C/min (°F/min)	Pressure bar (psi)
1	25 (77)	-	-	Vacuum -0.8 (-11.6)
2	170 (338)	-	1÷3 (1.8-5.4)	3÷7 (43-102)*
3	170 (338)	120	-	3÷7 (43-102)
4	65 (149)**	-	3÷5 (5.4-9.0)	3÷7 (43-102)
5	25 (77)	-	-	-

* Vent the vacuum when the pressure reaches 1 bar.

** The part can be removed when the part temperature is less than 65°C (150F)

RESIN MATRIX

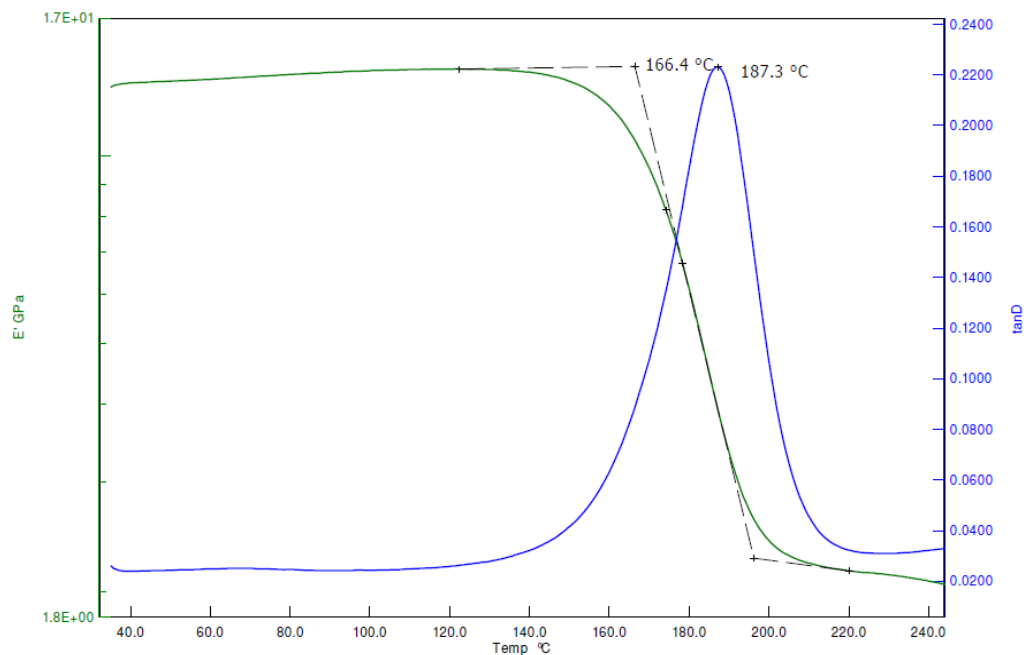
GENERAL PROPERTIES

Property	Unit	Value	Standard
Storage life @ -18°C (0°F)	months	12	
Out life @ 23°C (73°F)	days	30	
Prepreg volatiles	%wt	< 1	ASTM D3530-97R03
Cured resin density	g/cm ³	1.2	ASTM D792-00
Tg (DSC)	°C (°F)	177 (351)	ASTM D3418-03
Tg E' (DMA)*	°C (°F)	166 (331)	ASTM E1640-09
Tg Peak Tan δ (DMA)*	°C (°F)	187 (363)	ASTM E1640-09
Tack		low	

* Laminate after cure at 170°C for 2 hours.

THERMO-MECHANICAL DMA ANALYSIS

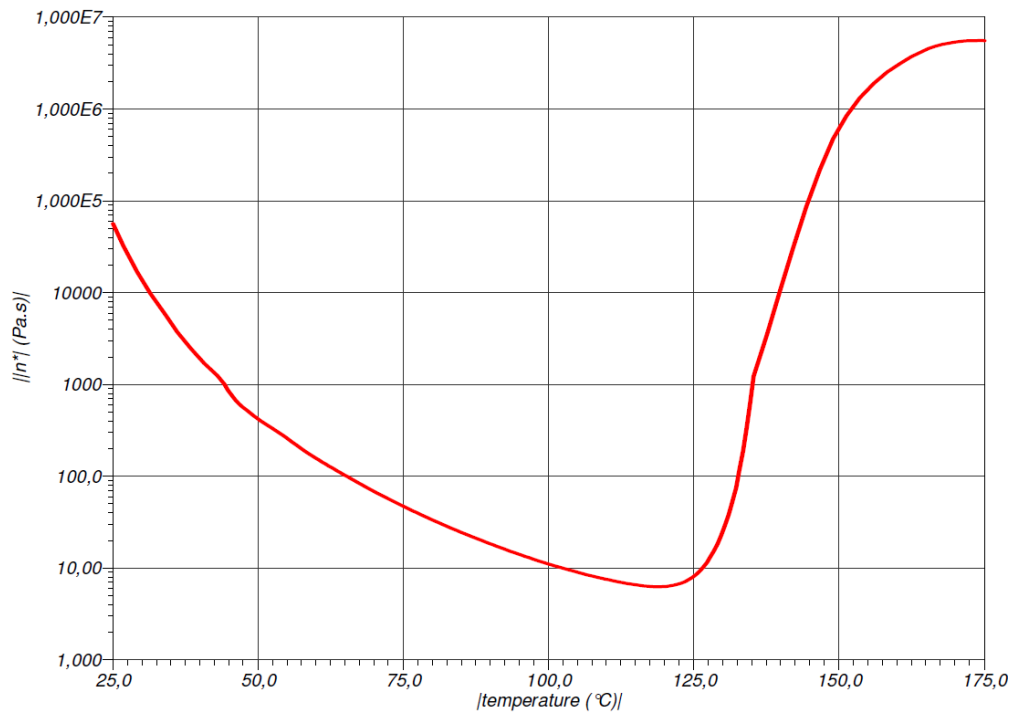
DMA trace of ER453 laminate cured in autoclave 2h@170°C.



DMA Analysis: modulus E' vs Temperature

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

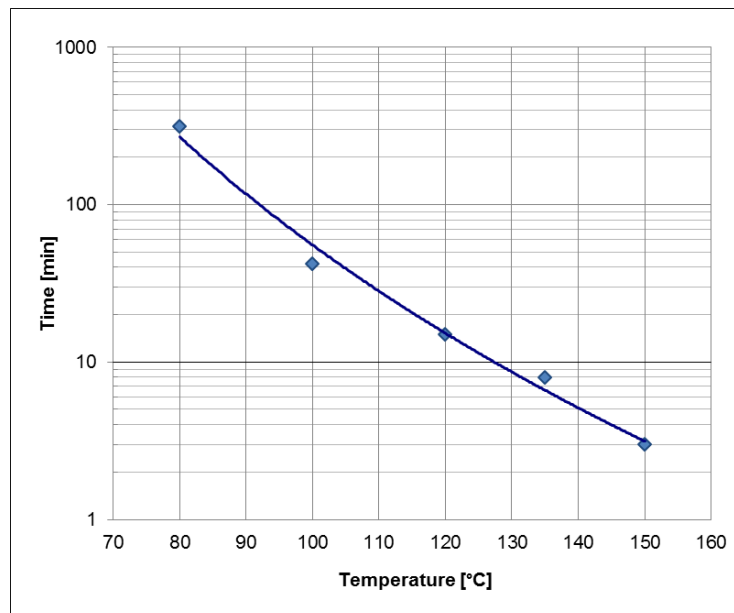
VISCOSITY PROFILE



Viscosity profile: temperature vs complex viscosity

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

GEL TIME



Temperature °C (°F)	Gel Time (min)
80 (176)	315
100 (212)	42
120 (248)	15
135 (275)	8
150 (302)	3

CURED PREPREG

MECHANICAL PROPERTIES OF PREPREG LAMINATES

Test carried out at room temperature

Cure condition: 120 min @170°C

Values normalized to 48% Vf (except for ILSS and Glc)

Cured Material Property	Test method	Units	CC201 ER453 42%
Tensile Strength 0°	ASTM D3039	MPa	789
Tensile Modulus 0°	ASTM D3039	GPa	57.1
Tensile Strength 90°	ASTM D3039	MPa	700
Tensile Modulus 90°	ASTM D3039	GPa	53.1
Flexural Strength 0°	ASTM D790-03	MPa	895
Flexural Modulus 0°	ASTM D790-03	GPa	50.5
Interlaminar Shear Strength	ASTM D2344	MPa	61.1
Interlaminar Fracture Toughness Glc	ASTM D5528	J/m ²	556

CC 201: 194gsm Plain 3K TR30S fiber

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 (3") 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 (39.4") or 127 cm (50").

Standard length: 50 m (54.7 In yds).

Unidirectional Prepreg: Supplied on 300 mm (12") 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 (23.6"), range from 30cm (11.8") up to 105cm (41.3")

Standard length: 100 m (109 In yds).

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:

The data and statements supplied in this datasheet are met to provide an overview of this product and its properties. Users should perform their own verification and testing to determine suitability of this material for their specific end use applications. NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSED OR IMPLIED. Nothing herein is to be taken as permission to practice any patented invention without a licence.

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