

ET440

EPOXY MATRIX

GENERAL FEATURES

ET440 is an epoxy matrix system developed for high quality carbon look parts.

The system gives excellence results in press moulding technology, in autoclave process and also in Out-of-Autoclave process. The chemistry of the formulation grants a white-spot free surface, crystal clear finished components and good stability to UV.

A snap cure cycle of 5 minutes in hot-press makes it ideal for high volume productions for high-end automotive application.

ET440 has a maximum service temperature of 145°C and can withstand peaks over 155°C.

MAIN CHARACTERISTICS

- Ideal for high-rate production volumes
- Allows rapid processing of composite parts through snap cures cycle from 130°C to 150°C
- Crystal clear epoxy for carbon look application. Excellent surface finishing and good mechanical properties
- Available on wide range of support (high quality fabrics, Unidirectional tapes, and multi-axials)
- Excellent drape-ability and tackiness

OPERATIONAL INSTRUCTIONS

CURE PROCESS RECOMMENDATIONS

1. SNAP-CURE PROCESS

For hot-press application, the ideal cure cycle is 7 min at 140°C. Additional cure conditions are described below:

| Temperature (°C) | Time (min) | Tg E' (DMA) (°C) |
|------------------|------------|------------------|
| 130 | 15 | 136 |
| 140 | 7 | 135 |
| 150 | 5 | 129 |

Custom cure cycles can be suggested by CIT Technical Department

Parts can be easily removed from a hot compression mould tool without cooling.

2. AUTOCLAVE PROCESS

ET440 can also be cured with a standard autoclave process:

| Temperature (°C) | Time (min) | Pressure (bar) | Tg E' (DMA) (°C) |
|------------------|------------|----------------|------------------|
| 100 | 120 | 6 | 131 |
| 135 | 120 | 6 | 145 |

3. OUT-OF-AUTOCLAVE PROCESS

ET440 can also be cured by oven + vacuum process:

| Temperature (°C) | Time (hours) | Tg E' (DMA) (°C) |
|------------------|--------------|------------------|
| 80 | 8 | 114 |

RESIN MATRIX

GENERAL PROPERTIES

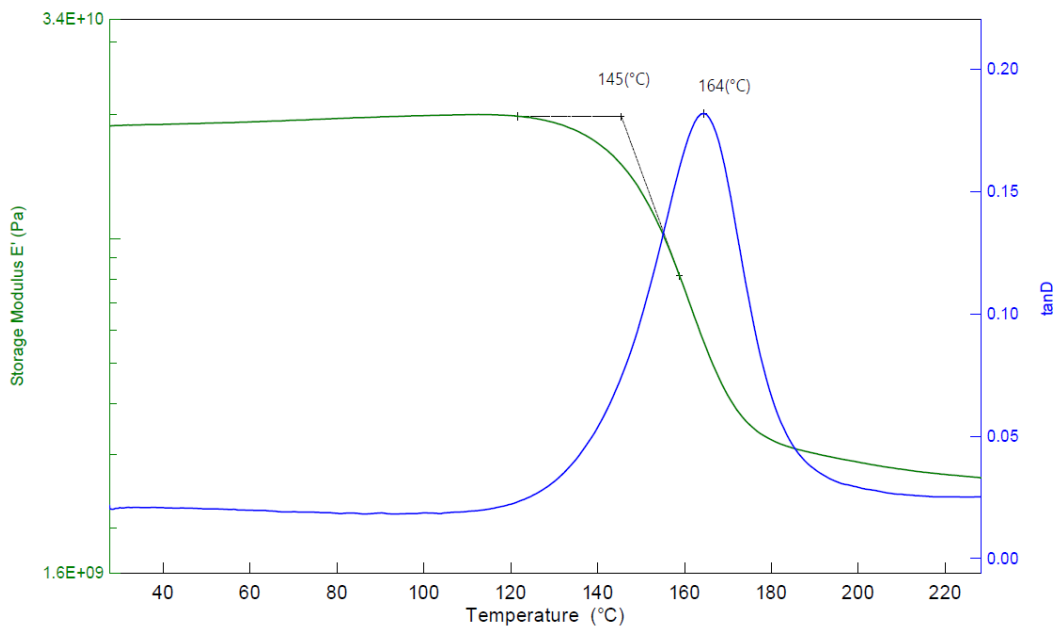
| Property | Unit | Value | Standard |
|----------------------|-------------------|--------|---------------|
| Storage life @ -18°C | months | 12 | |
| Out life @ 23°C | days | 30 | |
| Prepreg volatiles | %wt | <1 | ASTM D3530 |
| Cured resin density | g/cm ³ | 1.22 | ASTM D792-00 |
| Dry Tg E' (DMA)* | °C | 145 | ASTM E1640-09 |
| Wet Tg E' (DMA)** | °C | 105 | ASTM E1640-09 |
| Tack | | Medium | |

* Laminate cured 120 min @ 135°C, autoclave process

**Laminate conditioned at 70°C at 100% R.H. until equilibrium (ASTM D570).

THERMO-MECHANICAL DMA ANALYS

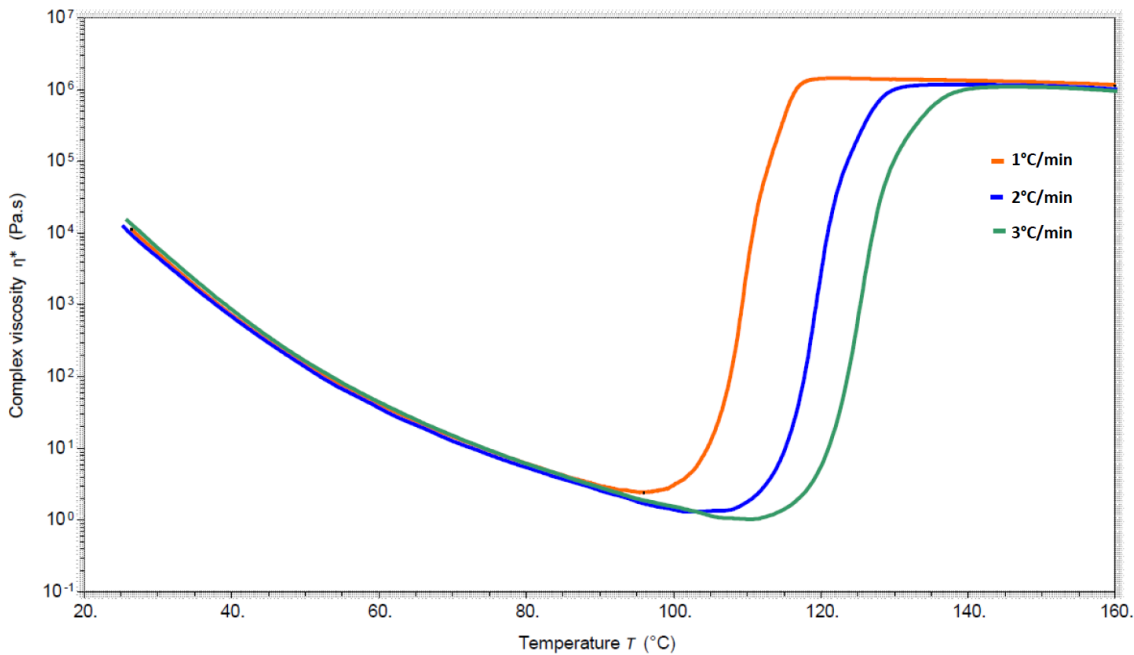
DMA trace of ET440 laminate cured for 120 min @ 135°C.



DMA Analysis: modulus E' vs Temperature

Modulus E' evaluated under 5°C/min heating rate, 1Hz oscillating frequency.

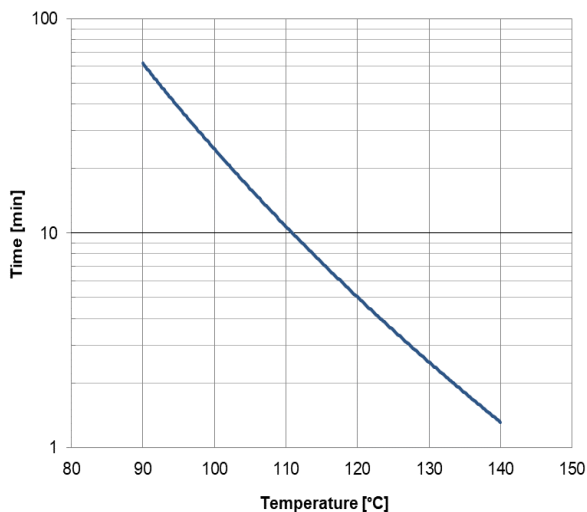
VISCOSITY PROFILE



Viscosity profile: temperature vs complex viscosity

Resin complex viscosity is measured under 1,2 and 3°C/min heating rate, 1Hz oscillating frequency.

GEL TIME



| Temperature (°C) | Gel Time (min) |
|------------------|----------------|
| 90 | 56 |
| 100 | 25 |
| 120 | 6 |
| 130 | 3 |
| 140 | 1 |

LAMINATE

MECHANICAL PROPERTIES OF FABRIC PREPREG LAMINATES

Test carried out at room temperature
 Cure condition: 120 minutes @135°C, 6 bar
 Actual values (Vf =48.9%)

| Cured Material Property | Test method | Units | CC206 T300 ET440 42% |
|-----------------------------------|-----------------|-------|-------------------------|
| 0° Tensile Modulus | | GPa | 55.1 |
| 0° Tensile Strength | ASTM D3039 | MPa | 632 |
| 0° Poisson's ratio | | - | 0.06 |
| 0° Elongation @ failure | | % | 1.02 |
| 90° Tensile Modulus | | GPa | 56.9 |
| 90° Tensile Strength | ASTM D3039 | MPa | 643 |
| 90° Poisson's ratio | | - | 0.06 |
| 90° Elongation @ failure | | % | 0.99 |
| 0° Compressive Strength | SACMA SRM 1R-94 | MPa | 617 |
| 90° Compressive Strength | SACMA SRM 1R-94 | MPa | 654 |
| In-plane Shear Modulus | | GPa | 3.04 |
| In-plane Shear Strength @ failure | ASTM D3518 | MPa | 112 |
| In-plane Shear Strength @ 5% | | MPa | 69.3 |
| 0° Inter-laminar Shear Strength | ASTM D2344 | MPa | 75.9 |
| Cured ply thickness | - | mm | 0.237 |

CC 206: 204gsm 2x2 Twill weave T300 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 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:

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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