

PRODUCT DATA SHEET

DESCRIPTION

Toray E745 is a 135°C (275°F) cure toughened epoxy component prepreg. E745 has been developed for impact structures and other mechanically demanding structural applications. E745 can be impregnated into a range of fiber and fabric types.

FEATURES

- ▶ High toughness and impact properties
- ▶ Excellent tack and drape
- ▶ 1 hour at 135°C (275°F) cure
- ▶ 60 days shelf life at ambient temperature
- ▶ Excellent surface finish
- ▶ Low volatile content—no solvents used during processing

PRODUCT TYPE

135°C (275°F) Cure Mid Temperature Curing Toughened Epoxy Component Prepreg

TYPICAL APPLICATIONS

- ▶ Side impact structures
- ▶ Formula 1 nose boxes
- ▶ Mechanically demanding structural applications

SHELF LIFE

| | |
|----------------------|--------------------------|
| Out Life: | 60 days at 20°C (68°F) |
| Storage Life: | 12 months at -18°C (0°F) |

Out life is the maximum time allowed at room temperature before cure.

To avoid moisture condensation

Following removal from cold storage, allow the prepreg to reach room temperature before opening the polythene bag. Typically, the thaw time for a full roll of material will be 4 to 6 hours.

TYPICAL NEAT RESIN PROPERTIES

| | |
|--|---|
| Density | 1.24 g/cm ³ (77.4 lbs/ft ³) at 23°C (73°F) |
| T _g (DMTA) after 1 hr at 135°C (275°F) | Onset: 118°C (244.4°F); Peak tan δ: 131°C (267.8°F) |

TYPICAL LAMINATE PROPERTIES

| | |
|--|-----------------------|
| Mode I Interlaminar Fracture Toughness (G _{IC} Strain Energy Release Rate) | 1137 J/m ² |
| SEA (Dynamic Crush Test) | 84.0 J/g |



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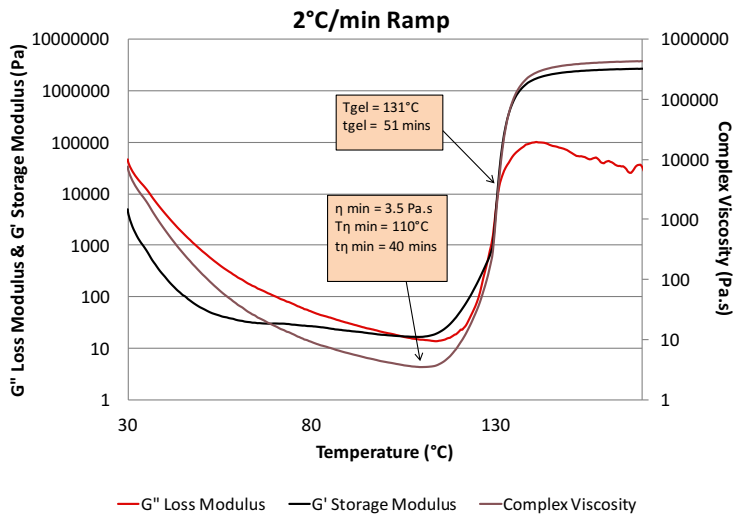
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TYPICAL LAMINATE PROPERTIES

| Intermediate Modulus 6K Carbon 200gsm 2x2 Twill 42% RC | | | | |
|--|-----------|-----------|----------|----------|
| Property | Condition | Method | Results | |
| Tensile Strength 0° | RTD | ISO 527-4 | 1072 MPa | 156 ksi |
| Tensile Modulus 0° | RTD | ISO 527-4 | 75.9 GPa | 11.0 Msi |
| Poisson's Ratio | RTD | ISO 527-4 | 0.04 | |
| Tensile Strength 90° | RTD | ISO 527-4 | 1130 MPa | 164 ksi |
| Tensile Modulus 90° | RTD | ISO 527-4 | 78.9 GPa | 11.4 Msi |
| Poisson's Ratio | RTD | ISO 527-4 | 0.81 | |
| Compression Strength 0° | RTD | EN 2580 | 717 MPa | 104 ksi |
| Compression Modulus 0° | RTD | EN 2580 | 70.6 GPa | 10.2 Msi |
| Compression Strength 90° | RTD | EN 2580 | 707 MPa | 103 ksi |
| Compression Modulus 90° | RTD | EN 2580 | 71.4 GPa | 10.4 Msi |
| In-Plane Shear Strength | RTD | ISO 14129 | 124 MPa | 18 ksi |
| In-Plane Shear Modulus | RTD | ISO 14129 | 3.9 GPa | 0.6 Msi |
| Interlaminar Shear Strength 0° | RTD | ISO 14130 | 70 MPa | 10 ksi |
| Interlaminar Shear Strength 90° | RTD | ISO 14130 | 69 MPa | 10 ksi |

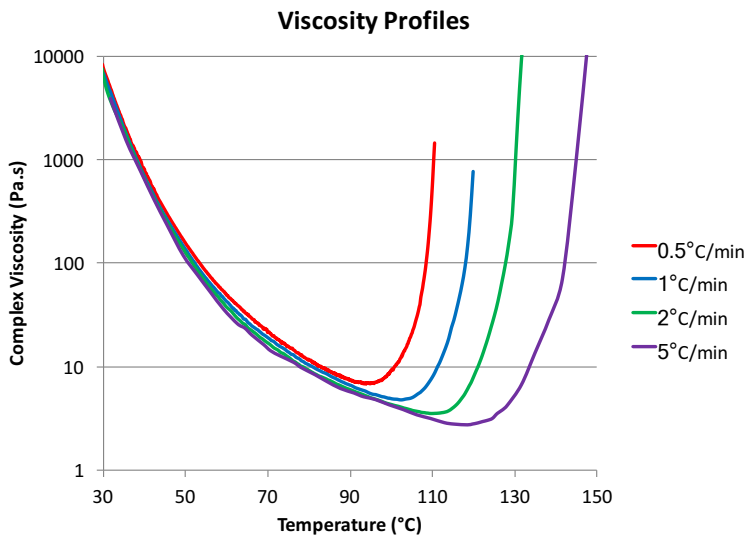
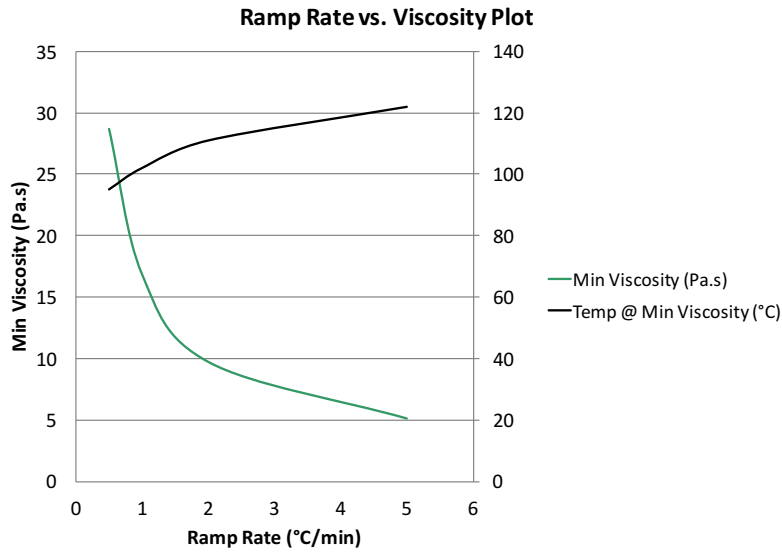
Cured 1 hr at 135°C (275°F)
Results normalized to 55% Vf, otherwise results are at actual 49.3% Vf

RHEOLOGY



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VISCOSITY



CURE PROPERTIES: VISCOSITY PROFILE (30°C TO 170°C OR 86°F TO 338°F)

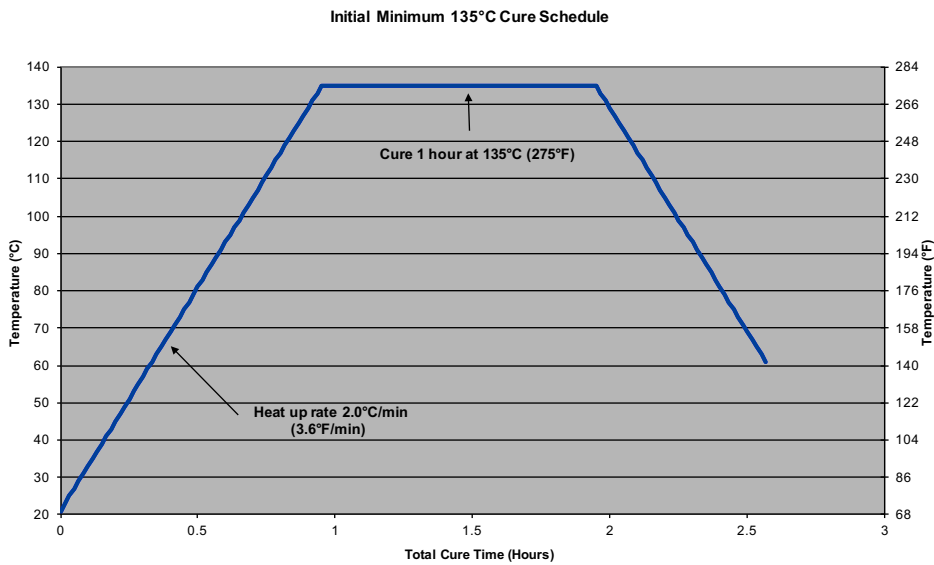
| Ramp rate [°C(°F)/min] | Minimum Viscosity (Pa.s) | Temperature at Minimum Viscosity |
|------------------------|--------------------------|----------------------------------|
| 0.5 (1.0) | 6.8 | 94°C (201°F) |
| 1.0 (1.8) | 4.74 | 102°C (216°F) |
| 2.0 (3.6) | 3.5 | 110°C (230°F) |
| 5.0 (9.0) | 2.73 | 118°C (244°F) |

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RECOMMENDED CURE CYCLE

- ▶ Toray E745 can be successfully molded by vacuum bag, autoclave, or matched die molding techniques.
- ▶ Increase autoclave pressure to 1.4 bar (20 psi) with vacuum applied.
- ▶ Vent to atmosphere and raise pressure to 6.2 bar (90 psi) (or max allowed by the core material).
- ▶ Increase air temperature at 2°C (3.6°F)/min and hold for 1 hour at 135°C (275°F).
- ▶ Allow to cool to 60°C (140°F) before removal of pressure.

CURE SCHEDULE



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EXOTHERM

In certain circumstances, such as the production of thick section laminates rapid heat-up rates or highly insulating masters, Toray E745 can undergo exothermic heating leading to rapid temperature rise and component degradation in extreme cases. Where this is likely, a cure incorporating an intermediate dwell is recommended in order to minimize the risk.

HANDLING SAFETY

Observe established precautions for handling epoxy resins and fibrous materials—wear gloves. For further information, refer to Safety Data Sheet.

PROCESSING

Following removal from refrigerated storage, allow the prepreg to reach room temperature before opening the polythene bag, to avoid moisture condensation. Typically, the thaw time for a full roll of material will be 4 to 6 hours. Cut patterns to size and lay-up the laminate in line with design instructions taking care not to distort the prepreg. If necessary, the tack of the prepreg may be increased by gentle warming with hot air. The lay-up should be vacuum debulked at regular intervals using a P3 (pin pricked) release film on the prepreg surface; a vacuum of 980 mbar (29 in Hg) is applied for 20 minutes.

For autoclave cures, use of a nonperforated release film on the prepreg surface trimmed to within 25–30 mm of the prepreg edge is recommended for the cure cycle and a vacuum bag should be installed using standard techniques.