

PRODUCT DATA SHEET

DESCRIPTION

Toray E721-FR is a modified epoxy resin system of medium viscosity for cures at 120°C (248°F), pre-impregnated into high performance fibers such as carbon, glass, and aramid. Toray E721-FR offers excellent structural properties, flame retardancy, and exceptional toughness allowing direct lamination to honeycomb without the use of resin film. Toray E721-FR is designed for structural applications in the motor racing, marine industries, and for a wide range of engineering applications. If fire-retardant properties are not required, consult separate data sheet for Toray E720.

FEATURES

- ▶ **Excellent adhesive properties—ideal for honeycomb sandwich construction without the use of a resin film**
- ▶ **The resin system used in Toray E721-FR is fire resistant under FAR 25.853 Appendix F material test criteria (ii)**
- ▶ **Excellent drape—complex shapes easily formed**
- ▶ **60-day shelf life at ambient temperature**
- ▶ **Medium tack level—easily laminated onto mold surfaces**
- ▶ **Controlled flow—excellent surface finish**
- ▶ **Low volatile content—no solvents in manufacturing process**

PRODUCT TYPE

120°C (248°F) Cure

Mid Temperature, Fire-Retardant Modified Epoxy Resin System

TYPICAL APPLICATIONS

- ▶ Motor racing
- ▶ Marine industries
- ▶ Wide range of engineering 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 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.

TYPICAL NEAT RESIN PROPERTIES

Density	1.34 g/cm ³ at 23°C (74°F)
T _g (DMTA) after 1 hr at 120°C (248°F)	Onset: 120°C (248°F) Peak tan δ: 138°C (280°F)
Gelation time	10 minutes at 120°C (248°F)



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TYPICAL LAMINATE PROPERTIES

Standard Modulus T300 Type 3K Carbon 200gsm 2x2 Twill 46% RC				
Property	Condition	Method	Results	
Flexural Strength	RTD	CRAG 200	1041 MPa	151 ksi
Flexural Modulus	RTD	CRAG 200	60 GPa	8.7 Msi
Interlaminar Shear Strength	RTD	CRAG 100	56 MPa	8 ksi

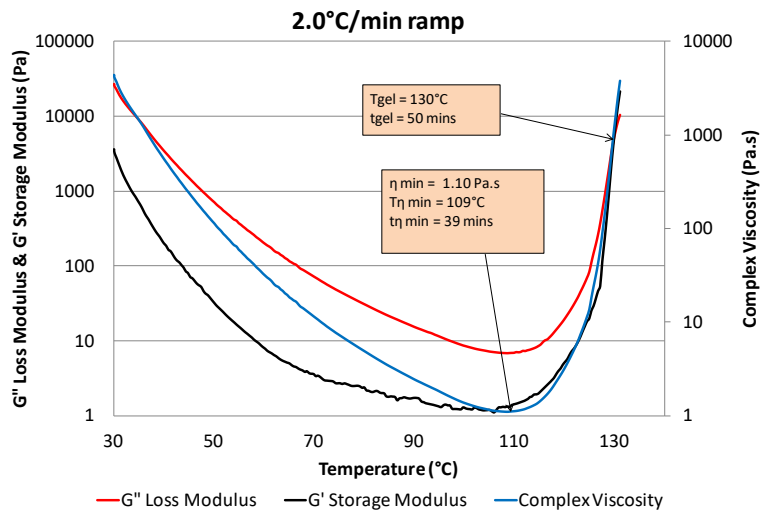
0/90° configuration woven laminates, results normalized to 55% Vf

TYPICAL ADHESIVE PROPERTIES

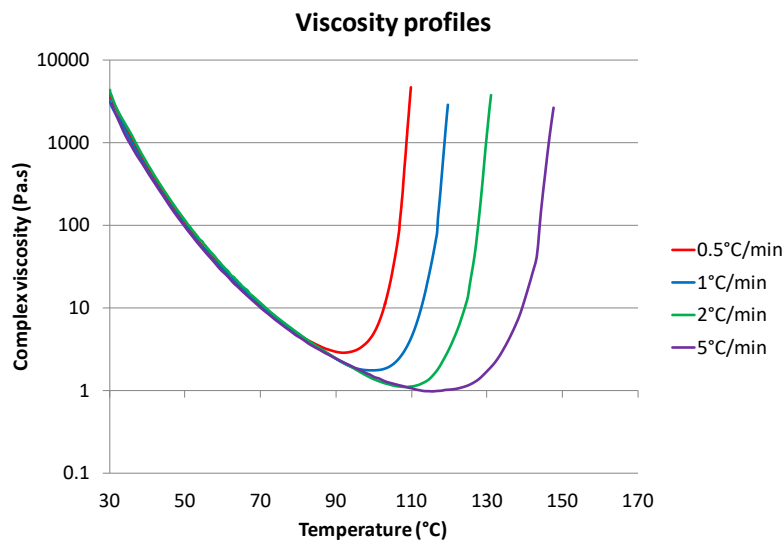
Climbing drum peel strength (N/76 mm)
250

Climbing drum peel strength at 20°C (68°F) according to DTD 5577 using 2 plies of T300 carbon 200gsm 2x2 twill 46% resin content E721-FR on aluminum honeycomb 5.2-¼-25-3003

RHEOLOGY

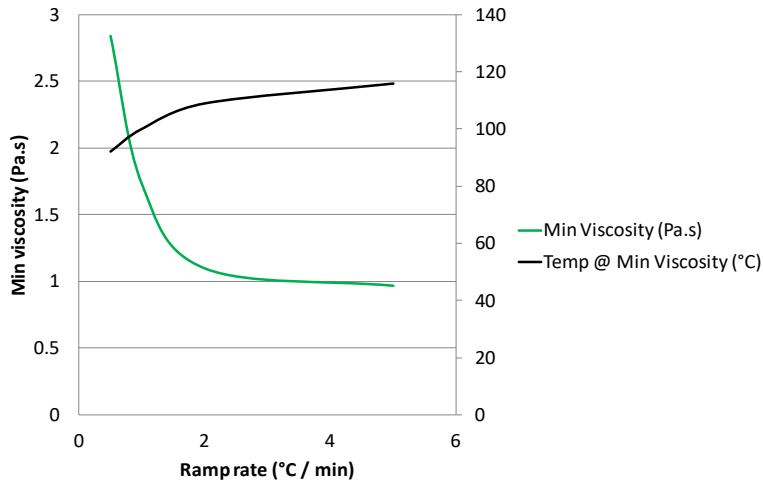


VISCOSITY



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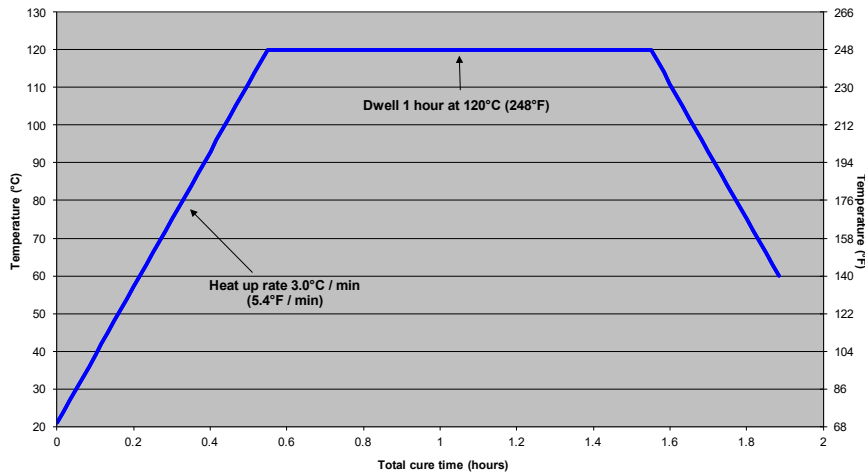
Ramp rate vs viscosity plot



CURE PROPERTIES: VISCOSITY PROFILE (30°C TO 130°C OR 86°F TO 266°F)

Ramp rate [°C(°F)/min]	Minimum Viscosity (Pa.s)	Temperature at Minimum Viscosity
0.5 (1.0)	2.84	92°C (198°F)
1.0 (1.8)	1.73	100°C (212°F)
2.0 (3.6)	1.1	109°C (228°F)
5.0 (9.0)	0.97	116°C (241°F)

INITIAL MINIMUM CURE SCHEDULE



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CURING CYCLES

- ▶ Cure for 60 minutes at 120°C (248°F). It is recommended that heat-up rates of 2–5°C/min (3.6–9°F/min) are employed
- ▶ Allow to cool to 60°C (140°F) prior to releasing vacuum and removal from mold

EXOTHERM

In certain circumstances, such as the production of thick section laminates, rapid heat-up rates, or highly insulating masters, Toray E721-FR 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 the Safety Data Sheet.

PROCESSING

Toray E721-FR can be successfully molded by vacuum bag, autoclave, or matched die molding techniques. In autoclave molding, pressures up to 6.2 bar (90 psi) may be applied.