Toray C740

Toray Advanced Composites

PRODUCT DATA SHEET

DESCRIPTION

Toray C740 is a cyanate ester resin system for cures at 135°C (275°F), pre-impregnated into high performance fibers such as carbon, glass and aramid. The system is capable of withstanding very high temperatures and is inherently flame-retardant. After a suitable post cure the glass transition temperature can be increased to as high as 325°C (617°F).

FEATURES

- **Excellent drapeability—complex shapes easily formed**
- **Good electric properties**
- **30 days shelf life at ambient temperature**
- **Inherently flame retardant with low toxic gas and smoke generation**
- **Good dimensional stability and thermal durability up to 250°C (482°F) after post cure**
- **Excellent surface finish**
- **Maximum T_g of 325°C (617°F)**
- **Low volatile content—no solvents used during processing**

PRODUCT TYPE

135°C (275°F) Cure
High Temperature Cyanate Ester Component Prepreg

TYPICAL APPLICATIONS

- Automotive, aerospace and industrial applications where high temperature performance is paramount

SHELF LIFE

Out Life:	30 days at 18°C (64°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	1.27 g/cm^3 (79.3lbs/ft^3) at 23°C (73°F)
T_g (DMTA) 2 hours at 280°C (536°F)	Onset: 325°C (617°F); Peak tan δ: 415°C (779°F)

Note: Components will be able to withstand short duration thermal spikes up to 330°C (626°F).

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PRODUCT DATA SHEET

TYPICAL LAMINATE PROPERTIES

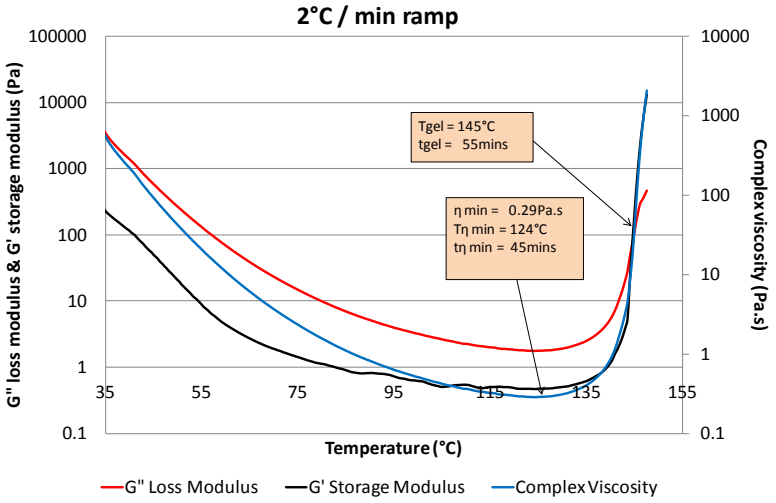
HS0804 – Carbon 205 gsm 2x2 Twill T300 (3K) 42% RC				
Property	**Condition**	**Method**	**Results**	
Tensile Strength*	RTD	ISO 527-4	541 MPa	79 ksi
Tensile Modulus*	RTD	ISO 527-4	57.4 GPa	8.3 Msi
Tensile Strength*	180°C (356°F)	ISO 527-4	573 MPa	83 ksi
Tensile Modulus *	180°C (356°F)	ISO 527-4	63.7 GPa	9.2 Msi
Tensile Strength*	250°C (482°F)	ISO 527-4	566 MPa	82 ksi
Poisson's Ratio	RTD		0.03	
Poisson's Ratio	180°C (356°F)		0.05	
Compression Strength *	RTD	EN 2580	606 MPa	88 ksi
Compression Modulus *	RTD	EN 2580	55.1 GPa	8.0 Msi
Compression Strength *	180°C (356°F)	EN 2580	595 MPa	86 ksi
Compression Modulus *	180°C (356°F)	EN 2580	60.8 GPa	8.8 Msi
In-Plane Shear Strength	RTD	ISO 14129	65 MPa	9 ksi
In-Plane Shear Modulus	RTD	ISO 14129	4.18 GPa	0.6 Msi

Cured for 2 hrs at 135°C (275°F), and post cured for 2 hrs at 300°C (572°F)
* Results normalized to 51.3% Vf

HS0804 – Carbon 205 gsm 2x2 Twill T300 (3K) 42% RC				
Property	**Condition**	**Method**	**Results**	
In-Plane Shear Strength	180°C (356°F)	ISO 14129	64 MPa	9 ksi
In-Plane Shear Modulus	180°C (356°F)	ISO 14129	3.16 GPa	0.5 Msi
In-Plane Shear Strength	250°C (482°F)	ISO 14129	65 MPa	9 ksi
Interlaminar Shear Strength	RTD	ISO 14130	28 MPa	4 ksi
Interlaminar Shear Strength	180°C (356°F)	ISO 14130	40 MPa	6 ksi
Interlaminar Shear Strength	250°C (482°F)	ISO 14130	34 MPa	5 ksi

Cured for 2 hrs at 135°C (275°F), and post cured for 2 hrs at 300°C (572°F)
* Cured 10 hrs at 80°C; results normalized to 55% Vf

RHEOLOGY



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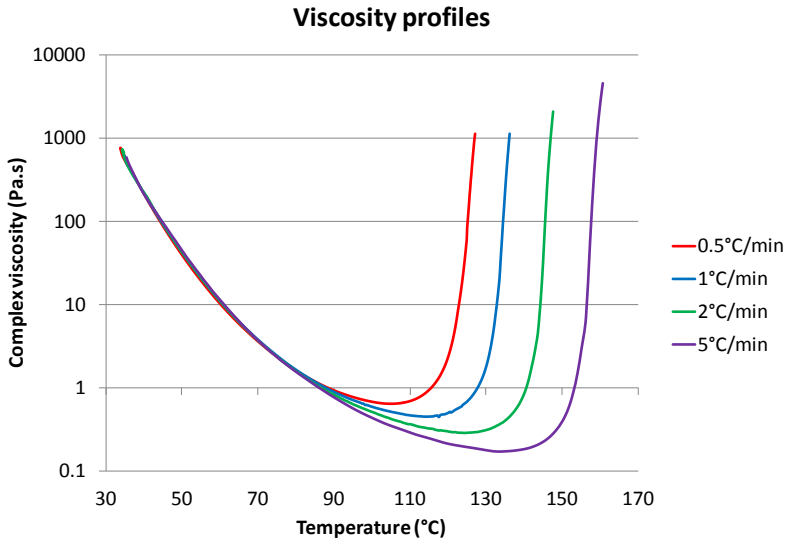
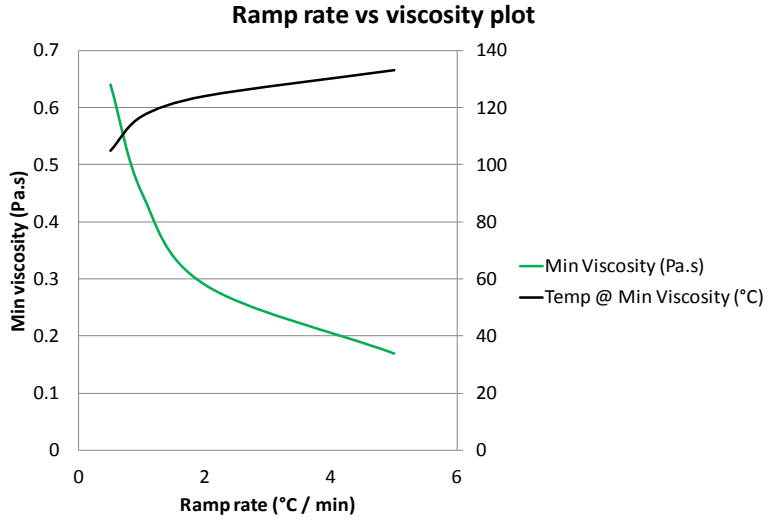
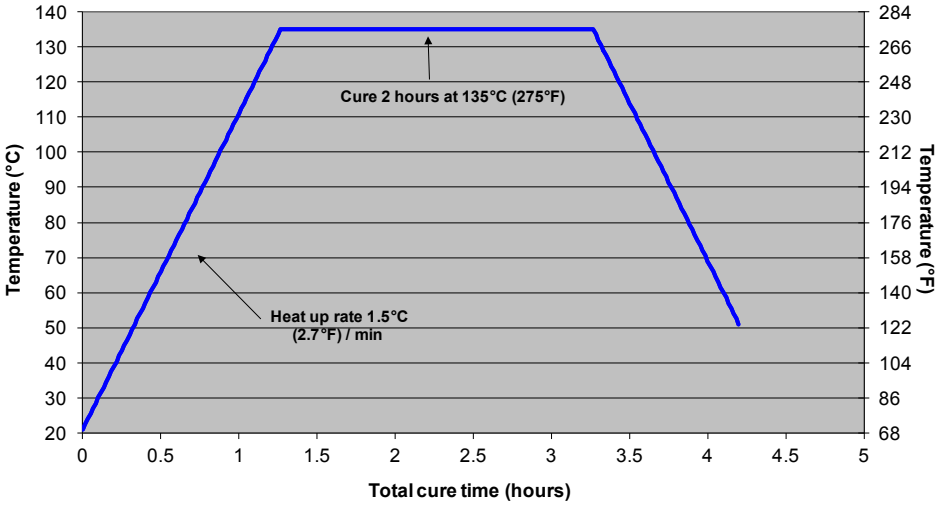




CURE PROPERTIES: VISCOSITY PROFILE (30°C TO 160°C OR 86°F TO 320°F)

Ramp rate [°C(°F)/min]	Minimum Viscosity (Pa.s)	Temperature at Minimum Viscosity
0.5 (1.0)	0.64	105°C (221°F)
1.0 (1.8)	0.45	117°C (243°F)
2.0 (3.6)	0.29	124°C (255°F)
5.0 (9.0)	0.17	133°C (232°F)

INITIAL MINIMUM CURE SCHEDULE



RECOMMENDED CURE CYCLE

- Increase autoclave pressure to 1.4 bar (20 psi) with vacuum applied (29 in Hg)
- Vent to atmosphere and raise pressure to 6.2 bar (90 psi) (or max allowed by the core material)
- Increase air temperature at 1.5°C (2.7°F)/min and hold for 2 hours at 135°C (275°F.
- Allow to cool to 60°C (140°F) before removal of pressure
- To obtain the maximum T_g, it is essential that a suitable post cure is carried out
- E.g. for T_g 325°C (617°F), ramp from initial cure temperature to 280°C (536°F) at 0.5°C (0.8°F)/min and hold for 2 hours minimum. Cool to 60°C at 3.0°C (4.8°F)/min.

EXOTHERM

In certain circumstances, such as the production of thick section laminates rapid heat-up rates or highly insulating masters, Toray C740 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.

MOISTURE EFFECTS

Under certain conditions moisture will react with cyanate ester functional groups to produce carbon dioxide gas, and at elevated temperatures trapped gas will expand and may cause the laminate to blister.

Care must be taken when defrosting the prepreg to minimize any condensation. All tooling and any molded inserts should be dried prior to use to ensure any absorbed moisture is removed. It is recommended that the post cure takes place immediately after the cure is completed.

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; 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.

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