TECHNICAL DATA

TENCATE ADVANCED COMPOSITES

TenCate C640

High temperature resistant, flexible cure, cyanate ester component prepreg

PRODUCT TYPE

70°C (158°F) to 135°C (275°F) cure

Flexible cure high temperature resistant cyanate ester component prepreg

TYPICAL APPLICATIONS

- High temperature applications such as brake ducts.

SHELF LIFE

Out life
4 days at @ 20°C (68°F)

Storage life
6 months @ -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.

PRODUCT DESCRIPTION

TenCate C640 is a cyanate ester resin system suitable for curing between 70°C (158°F) and 135°C (275°F). The medium viscosity resin is pre-impregnated into high performance fibres such as carbon, glass and aramid. The system is capable of withstanding very high temperatures and is inherently flame-retardant. After a suitable postcure, the glass transition temperature can be increased to as high as 335°C (635°F).

TENCATE C640 PREPREG BENEFITS/FEATURES

- Flexible low to medium cure schedules 70°C (158°F) to 135°C (275°F)
- 4 days shelf life at ambient temperatures
- Inherently flame retardant with low toxic gas and smoke generation
- Excellent drapeability – complex shapes easily formed
- Maximum Tg (DMTA – onset) 335°C (635°F)
- Good dimensional stability and thermal durability up to 250°C (482°F) after post-cure
- Excellent surface finish
- Low volatile content - no solvents used during processing

TYPICAL NEAT RESIN PROPERTIES

Density ....1.28 g/cm^3

Tg (DMTA) after 2 hours at 250°C (482°F) postcure.....Onset: 285°C (545°F);
Peak tan δ: 334°C (633°F)

Tg (DMTA) after 2 hours at 300°C (572°F) postcure.....Onset: 335°C (635°F)
Peak tan δ: 409.5°C (769°F)

TYPICAL LAMINATE PROPERTIES

HS0804 - CARBON 205 GSM 2x2 TWILL, T300 (3K) 42% R.W., CURED FOR 10 HOURS AT 80°C (177°F) AND POST-CURED FOR 2 HOURS AT 300°C (572°F)

Property	Condition	Method	Results	
Tensile Strength*	RTD	ISO 527-4	509 MPa	156 ksi
Tensile Modulus*	RTD	ISO 527-4	58.4 GPa	8.5 Msi
Tensile Strength*	180 °C (356°F)	ISO 527-4	570 MPa	83 ksi
Tensile Modulus*	180 °C (356°F)	ISO 527-4	59.2 GPa	8.6 Msi
Poisson's Ratio	RTD	0.04		
Poisson's Ratio	180 °C (356°F)	0.05		
Compression Strength*	RTD	EN2580	652 MPa	95 ksi
Compression Modulus*	RTD	EN2580	57.3 GPa	8.3 Msi
Compression Strength*	180 °C (356°F)	EN2580	594 MPa	86 ksi
Compression Modulus*	180 °C (356°F)	EN2580	57.9 GPa	8.4 Msi
Compression Strength*	250 °C (482°F)	EN2580	594 MPa	86 ksi
In-Plane Shear Strength	RTD	ISO 14129	67 MPa	10 ksi
In-Plane Shear Modulus	RTD	ISO 14129	4.02 HPa	0.6 Msi
In-Plane Shear Strength	180 °C (356°F)	ISO 14129	69 MPa	10 ksi

* Results normalized to 55% Vf

TenCate C640

High temperature resistant, flexible cure, cyanate ester component prepreg

TYPICAL LAMINATE PROPERTIES CONTINUED

HS0804 - CARBON 205 GSM 2x2 TWILL, T300 (3K) 42% R.W., CURED FOR 10 HOURS AT 80°C (177°F) AND POST-CURED FOR 2 HOURS AT 300°C (572°F)

Property	Condition	Method	Results	
In-Plane Shear Modulus	180 °C (356°F)	ISO 14129	3.14 GPa	0.5 Msi
In-Plane Shear Strength	250 °C (482°F)	ISO 14129	61 MPa	9 ksi
ILSS	RTD	ISO 14130	32 MPa	5 ksi
ILSS	180 °C (356°F)	ISO 14130	40 MPa	6 ksi
ILSS	250 °C (482°F)	ISO 14130	37 MPa	5 ksi

OUTLIFE TRIAL - PREPREG LEFT FOR 5 DAYS AT 20°C (68°F) PRIOR TO MOULDING

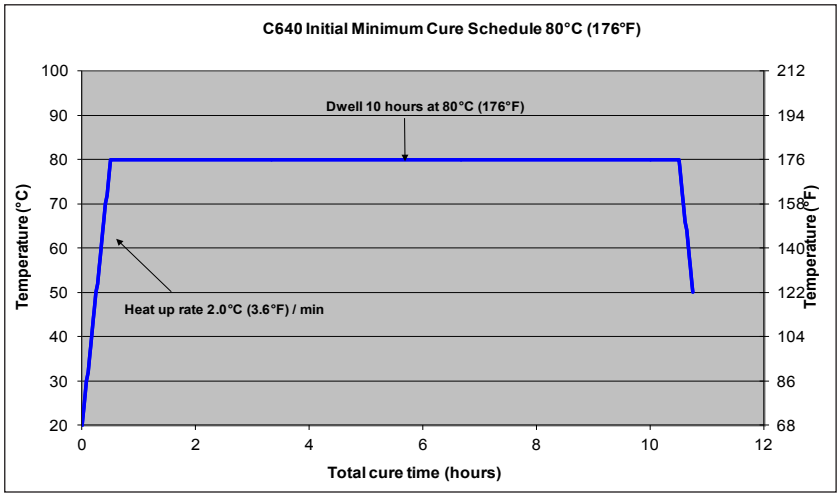
HS0804 - CARBON 205 GSM 2x2 TWILL, T300 (3K) 42% R.W., CURED FOR 10 HOURS AT 80°C (177°F) AND POST-CURED FOR 2 HOURS AT 300°C (572°F)

Property	Condition	Method	Results	
ILSS	RTD	ISO 14130	36 MPa	5 ksi
ILSS	180 °C (356°F)	ISO 14130	41 MPa	6 ksi
ILSS	250 °C (482°F)	ISO 14130 1	41 MPa	6 ksi

* Results normalized to 50.1% Vf

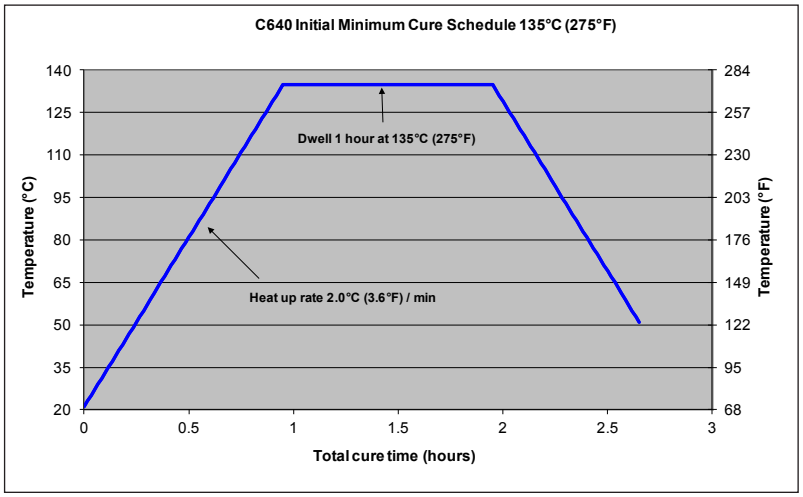
RECOMMENDED CURE TIMES

Cure temperature °C (°F)	Recommended dwell time (hours)
70 (158)	18
80 (176)	10
100 (212)	4
120 (248)	2
135 (275)	1



TenCate C640

High temperature resistant, flexible cure, cyanate ester component prepreg



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 6.2bar (90psi) (or maximum allowed by core material).
- Increase air temperature at 2°C (3.6°F) /min to the required dwell temperature (see table and graph on page 2).
- Dwell for the recommended time period and cool to 50°C (122°F) prior to removal of the pressure.
- To obtain the maximum Tg it is essential that a suitable postcure is carried out. e.g. ramp from the cure dwell temperature to 300°C (572°F) at 20°C (36°F) /hour and hold for 2 hours minimum. Cool to 60°C (140°F) at 3°C (5.4°F) per minute. This will produce a laminate with Tg 335°C (635°F) (DMTA Onset).

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 non-perforated release film on the prepreg surface trimmed to within 25-30mm of prepreg edge is recommended for the cure cycle, a vacuum bag should be installed using standard techniques.

TenCate C640

High temperature resistant, flexible cure, cyanate ester component prepreg

EXOTHERM

In certain circumstances, such as the production of thick section laminates rapid heat up rates or highly insulating masters, C640 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 minimise any condensation. All tooling and any moulded inserts should be dried prior to use to ensure any absorbed moisture is removed.

It is recommended that the postcure takes place immediately after the cure is completed.

HANDLING SAFETY

Observe established precautions for handling Cyanate Ester resins and fibrous materials.

For further information refer to Material Safety Data Sheet, which is available from Tencate Advanced Composites or at www.tencate.com.

Revised 08/2013

TENCATE ADVANCED COMPOSITES www.tencate.com

18410 Butterfield Blvd.
Morgan Hill, CA 95037 USA
Tel: +1 408 776 0700
Fax: +1 408 776 0107

2450 Cordelia Road
Fairfield, CA 94534 USA
Tel: +1 707 359 3400
Fax: +1 707 359 3495

Amber Drive, Langley Mill
Nottingham, NG16 4BE UK
Tel: +44 (0)1773 530899
Fax: +44 (0)1773 768687

G. van der Muelenweg 2
7443 PV Nijverdal NL
Tel: +31 548 633 933
Fax: +31 548 633 299

www.tencateadvancedcomposites.com
www.tencateindustrialcomposites.com
info@tcac-usa.com (USA)
advancedcomposites.europe@tencate.com (Europe)