Toray Cetex® TC1130 PESU

Toray Advanced Composites

PRODUCT DATA SHEET

DESCRIPTION

Toray Cetex® TC1130 is a high-end thermoplastic composite, utilizing the amorphous PESU polymer for outstanding toughness and an inherently outstanding fire, smoke, and toxicity performance (< 15/15 OSU).

It is ideally suited as the skin component of sandwich panels, and can be combined with core materials of the same chemistry to create fully recyclable monomaterial sandwich structures. PESU can also be used in monolithic designs. Compared to its semi-crystalline counterparts, Toray Cetex® TC1130 can be used to achieve even shorter cycle times in part production. The material exhibits a superior bondability, which makes it very suitable for hybrid assemblies consisting of different materials.

Toray Cetex® TC1130 is available as a fabric prepreg with a woven glass reinforcement. It is typically supplied in pre-consolidated reinforced thermoplastic laminates (RTLs) of varying thicknesses.

FEATURES

- **Recyclable, also as a monomaterial sandwich structure**
- **Achieves high surface finish**
- **Rapid processing with cycle times < 3 minutes**
- **Excellent FST performance (OSU < 15/15)**
- **Low coefficient of thermal expansion (CTE) and coefficient of moisture expansion (CME)**
- **Very low moisture absorption**
- **Good chemical resistance**
- **Indefinite shelf life at ambient temperature storage**

TYPICAL APPLICATIONS

- Skins for monomaterial based thermoplastic sandwich panels
- Aircraft interiors (sandwich panels): side walls, ceiling panels, overhead stow bins, monuments
- Aircraft interiors (monolithic parts): seat shells, ducting channels
- Insert for large injection overmolded lightweight parts in aircraft interiors

PRODUCT TYPE

PESU (PolyEtherSulphone) Thermoplastic Resin System

TYPICAL NEAT RESIN PROPERTIES

Density (specific gravity)	1.37 g/cm³ (85.5 lb/ft³)
T_g (glass transition)	225°C (437°F)
T_m (melt)	N/A (amorphous)
T_p (processing)*	320–350°C (610–660°F)

* processing temperatures vary strongly with process design and product configuration

Contact us for more information:

North America/Asia/Pacific
e **explore@toraytac-usa.com**
t **+1 408 465 8500**

Europe/Middle East/Africa
e **explore@toraytac-europe.com**
t **+33 (0)548 633 933**

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PHYSICAL PROPERTIES

Property	8 Harness Satin (EC9 Glass Woven Prepreg)	2/2 Twill (EC9 Glass Woven Prepreg)
Fiber areal weight (FAW)	300 g/m² (8.9 oz/yd²)	200 g/m² (5.9 oz/yd²)
Weight per ply (PAW)	442 g/m² (13.04 oz/yd²)	299 g/m² (8.8 oz/yd²)
Resin content by weight (RC)	33%	33%
Volatile content	< 0.5 %	< 0.5 %
Glass transition temperature	220°C (428°F)*	220°C (428°F)*
Consolidated ply thickness (CPT)	0.22 mm (0.0087")	0.15 mm (0.0059")
Density	1.98 g/cm³ (123.6 lb/ft³)	1.98 g/cm³ (123.6 lb/ft³)
Width	1270 mm (50")**	1270 mm (50")**

*T_g midpoint ISO - see DSC in this document. T_g in first heating cycle ca. 190°C (374°F)
**1524mm (60") prepreg is possible
For the availability of other glass, or carbon reinforcements, please contact Toray Advanced Composites

MECHANICAL PROPERTIES

EC9 Glass 300gsm FAW 8HS Woven Fabric Reinforced Laminate 33% RC				
Property	**Condition**	**Test Method**	**Results**	
Tensile Strength 0°	RTD	EN2747-3	442 MPa	61 ksi
Tensile Modulus 0°	RTD	EN2747-3	21.7 GPa	3.1 Msi
Tensile Strength 90°	RTD	EN2747-3	429 MPa	62 ksi
Tensile Modulus 90°	RTD	EN2747-3	20.5 GPa	3.0 Msi
Compression Strength 0°	RTD	ASTM D 6641	398 MPa	58 ksi
Compression Modulus 0°	RTD	ASTM D 6641	25.9 GPa	3.8 Msi
Compression Strength 90°	RTD	ASTM D 6641	324 MPa	47 ksi
Compression Modulus 90°	RTD	ASTM D 6641	25.2 GPa	3.7 Msi
Flexural Strength 0°	RTD	ISO 178	666 MPa	97 ksi
Flexural Modulus 0°	RTD	ISO 178	26 GPa	3.7 Msi
Flexural Strength 90°	RTD	ISO 178	559 MPa	81 ksi
Flexural Modulus 90°	RTD	ISO 178	23.2 GPa	3.4 Msi

Data generated from a limited dataset
Fabric style 7581, 50% fiber by volume (Vf), Room Temperature Dry (RTD) at 23°C (73°F)

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MECHANICAL PROPERTIES

EC9 Glass 200gsm FAW 2/2 Twill Woven Fabric Reinforced Laminate 33% RC				
Property	**Condition**	**Test Method**	**Results**	
Tensile Strength 0°	RTD	EN2747-3	471 MPa	68.3 ksi
Tensile Modulus 0°	RTD	EN2747-3	20.8 GPa	3.0 Msi
Tensile Strength 90°	RTD	EN2747-3	439 MPa	63.7 ksi
Tensile Modulus 90°	RTD	EN2747-3	19.8 GPa	2.9 Msi
Compression Strength 0°	RTD	ASTM D 6641	413 MPa	60 ksi
Compression Modulus 0°	RTD	ASTM D 6641	23.6 GPa	3.4 Msi
Compression Strength 90°	RTD	ASTM D 6641	335 MPa	49 ksi
Compression Modulus 90°	RTD	ASTM D 6641	23 GPa	3.3 Msi
Flexural Strength 0°	RTD	ISO 178	721 MPa	105 ksi
Flexural Modulus 0°	RTD	ISO 178	24.6 GPa	3.6 Msi
Flexural Strength 90°	RTD	ISO 178	589 MPa	85 ksi
Flexural Modulus 90°	RTD	ISO 178	24.5 GPa	3.6 Msi
Data generated from a limited dataset Fabric style 1035, 50% fiber by volume (Vf), Room Temperature Dry (RTD) at 23°C (73°F)				

FLAMMABILITY PROPERTIES

Test	Specification	Criteria	2 Plies of 7581 PESU Resin
Flammability	60-second vertical burn FAR 25.853 (a)	152 mm	PASS
Smoke Emission	ABD0031 (F)	150/200	PASS
Toxicity	ABD0031 (F)	Ds Max 4 min (Flaming/Non-Flaming) = 150	PASS
Heat Release	FAR 25.853 (d)	2-min Total HR ($kW\ min/m^2$) = 65	13.8
		Peak HR (kW/m^2) = 65	14.6
Data generated from a limited dataset			

PROCESSING

Monolithic parts and overmolded constructions can be made with well known processes in the thermoplastic composites industry. Sandwich constructions, especially monomaterial sandwich production demands a finely tuned process, due to the similarity in softening temperatures of the components. Toray Cetex® TC1130 PESU composites has a Tg of around ~190°C (~374°F) on the first heating cycle. The second heating cycle has a Tg of around 220°C (428°F). Monomaterial sandwiches can be built utilizing this lowered Tg or with a PESU adhesive with a lowered Tg. BASF markets a PESU polymer that can be used to produce this adhesive. A DSC of our material is added in this document.

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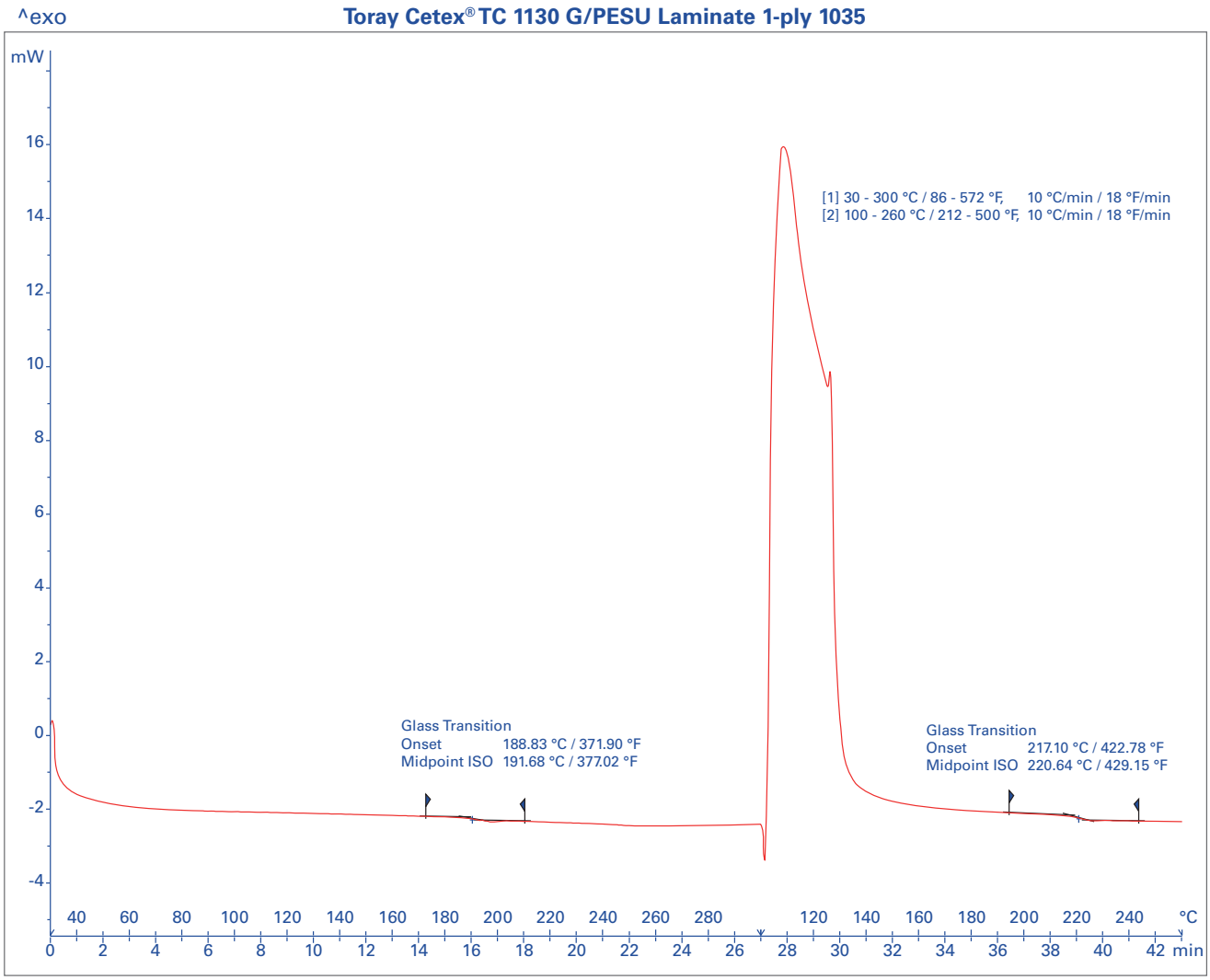
DSC GRAPH



HANDLING SAFETY

Health and safety information on handling and processing Toray composite materials is described in the Safety Data Sheet available from Toray Advanced Composites. To obtain this or any other information about Toray Cetex® PESU thermoplastic composite materials, contact Toray Advanced Composites.

Toray Advanced Composites

Cetex®

18255 Sutter Blvd.
Morgan Hill, CA 95037, USA
t +1 408 465 8500

2450 Cordelia Road
Fairfield, CA 94534, USA
t +1 707 359 3400

G. van der Muelenweg 2
7443 RE Nijverdal, NL
t +33 (0)548 633 933

www.toraytac.com
explore@toraytac-usa.com (North America/Asia/Pacific)
explore@toraytac-europe.com (Europe/Middle East/Africa)