

PRODUCT DATA SHEET

DESCRIPTION

Toray Cetex® TC1225 is a high-end thermoplastic composite material, utilizing a semi-crystalline low-melt PAEK resin for excellent mechanical performance. The distinctive value of Toray Cetex® TC1225 over other composites with a PAEK family matrix is its superior processability due to a low-melt viscosity and reduction in processing temperature of up to 60°C (140°F)*. Toray Cetex® TC1225 doesn't only yield a high-quality product used in ATL/AFP processes, it also speeds up cycle times enabling cost-efficient production in all available formats.

Additionally, Toray Cetex® TC1225 is an ideal composite to be overmolded with neat or short fiber reinforced PEEK resin, creating a very strong bond. Overmolding, integrating continuous fiber reinforced composites in an injection molding process, combines the strength of high-end composites with the design freedom and complexity of injection molding parts.

Toray Cetex® TC1225 is available as a UD tape, a fabric prepreg, and as reinforced thermoplastic laminates (RTLs) of varying thicknesses. RTLs can be equipped with lightning strike protection, and carbon reinforced RTLs can be supplied with a thin glass top layer to protect a partly metallic assembly against galvanic corrosion. Glass scrim is also applicable in structures made from UD tape.

*Standard PEEK processes at temperatures up to 400°C (752°F)

FEATURES

- ▶ Superior processability as a result of low-melt viscosity and relatively low processing temperature
- ▶ Form freedom—suited for overmolding with neat or short fiber reinforced PEEK
- ▶ Relatively low processing temperature enables shorter cycle times and less energy consumption
- ▶ Excellent mechanical performance, also at elevated temperatures
- ▶ Excellent toughness—demonstrated by high compression after impact strengths and fracture toughness values
- ▶ Very low moisture absorption (high hot/wet property retention)
- ▶ Outstanding chemical and solvent resistance
- ▶ Indefinite shelf life at ambient temperature storage
- ▶ Excellent FST performance

PRODUCT TYPE

LMPAEK (Low-Melt PolyArylEtherKetone) Thermoplastic Resin System

TYPICAL APPLICATIONS

- ▶ Primary and secondary aircraft structures
- ▶ High-load aircraft interiors applications
- ▶ Access panels, rib stiffeners, brackets
- ▶ Radome
- ▶ Medical
- ▶ Oil and gas

TYPICAL NEAT RESIN PROPERTIES

Density (specific gravity)	1.30 g/cm ³ (81.2 lb/ft ³)
T _g (glass transition)	147°C (297°F)
T _m (melt)	305°C (581°F)
T _c (crystallinity)	263°C (505°F)
T _p (processing)	340–385°C (644–725°F)

SHELF LIFE

Out Life:	Indefinite at ambient temperature storage
Frozen Storage Life:	Not applicable—product does not require freezing



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PHYSICAL PROPERTIES—CARBON

Property	Standard Modulus Carbon UD Tape	5 Harness Satin (T300JB Carbon Woven Prepreg)
Fiber areal weight (FAW)	145 g/m ² (4.28 oz/yd ²)	281 g/m ² (8.29 oz/yd ²)
Weight per ply (PAW)	221 g/m ² (6.52 oz/yd ²)	489 g/m ² (14.42 oz/yd ²)
Resin content by weight (RC)	34%	43%
Consolidated ply thickness (CPT)	0.14 mm (0.0054 in.)	0.31 mm (0.0122 in.)
Density	1.59 g/cm ³ (99.3 lb/ft ³)	1.53 g/cm ³ (95.51 lb/ft ³)

These reinforcements are available as rolls of semi-preg or as RTLs. Lightning-strike protection layers can be incorporated into RTLs. A glass scrim can also be added to the surface of carbon fiber based laminates. This glass scrim is often used to protect against galvanic corrosion in assemblies where carbon fiber composites are in contact with metal components.

PHYSICAL PROPERTIES—GLASS (STRUCTURAL USE)

Property	US Style 7781 8 Harness Satin (EC6 Glass Woven Prepreg)	US Style 6781 8 Harness Satin (S2 C9 Glass Woven Prepreg)
Fiber areal weight (FAW)	296 g/m ² (8.73 oz/yd ²)	298 g/m ² (8.79 oz/yd ²)
Weight per ply (PAW)	448 g/m ² (13.21 oz/yd ²)	452 g/m ² (13.33 oz/yd ²)
Resin content by weight (RC)	34%	34%
Consolidated ply thickness (CPT)	0.24 mm (0.009 in.)	0.24 mm (0.009 in.)
Density	1.92 g/cm ³ (119.8 lbs/ft ³)	1.87 g/cm ³ (116.7 lbs/ft ³)

The reinforcements above are available as rolls of semi-preg or as RTLs. RTLs can consist of glass plies only or can incorporate UD carbon tapes or woven carbon tapes as required.

PHYSICAL PROPERTIES—GLASS SCRIM

Property	US Style 0120 4 Harness Satin (EC5 Glass Woven Prepreg)	US Style 1080 Plain Weave (EC5 Glass Woven Prepreg)
Fiber areal weight (FAW)	105 g/m ² (3.10 oz/yd ²)	48 g/m ² (1.42 oz/yd ²)
Weight per ply (PAW)	210 g/m ² (6.19 oz/yd ²)	120 g/m ² (3.54 oz/yd ²)
Resin content by weight (RC)	50%	60%
Consolidated ply thickness (CPT)	0.12 mm (0.005 in.)	0.08 mm (0.003 in.)
Density	1.71 g/cm ³ (106.8 lbs/ft ³)	1.61 g/cm ³ (100.5 lbs/ft ³)

The reinforcements above are available as rolls of semi-preg or can be added to the surface of RTLs of carbon UD tape or carbon woven fabric to act as a barrier to prevent galvanic corrosion.

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MECHANICAL PROPERTIES

Standard Modulus Carbon 145gsm UD Tape 34% RC				
Property	Condition	Test Method	Results	
Tensile Strength 0°	RTD	ASTM D 3039	2410 MPa	350 ksi
Tensile Modulus 0°	RTD	ASTM D 3039	135 GPa	19.5 Msi
Tensile Strength 90°	RTD	ASTM D 3039	86 MPa	12.5 ksi
Tensile Modulus 90°	RTD	ASTM D 3039	10 GPa	1.4 Msi
Compression Strength 0°	RTD	ASTM D 6641	1300 MPa	189 ksi
Compression Modulus 0°	RTD	ASTM D 6641	124 GPa	18 Msi
In-Plane Shear Strength	RTD	ASTM D 3518	152 MPa	22 ksi
In-Plane Shear Strength 2% Offset	RTD	ASTM D 3518	42.0 MPa	6.1 ksi
In-Plane Shear Modulus	RTD	ASTM D 3518	4.3 GPa	0.62 Msi
Flexural Strength 90°	RTD	ASTM D 790	152 MPa	22 ksi
Interlaminar Shear Strength (SBS) 0°/90°	RTD	ASTM D 2344	96.5 MPa	14 ksi
Open-Hole Tensile Strength	RTD	ASTM D 5766	448 MPa	65 ksi
Open-Hole Tensile Strength	CTD	ASTM D 5766	448 MPa	65 ksi
Open-Hole Compression Strength	RTD	ASTM D 6484	310 MPa	45 ksi
Open-Hole Compression Strength	ETD	ASTM D 6484	262 MPa	38 ksi
Compression After Impact Strength 30.5 J (270 in/lb) Impact Energy	RTD	ASTM D 7137	310 MPa	45 ksi
Mode I Interlaminar Fracture Toughness (G _{IC} Strain Energy Release Rate)	RTD	ASTM D 5528	2.1 kJ/m ²	12.0 in-lb/in ²
Mode II Interlaminar Fracture Toughness (G _{IIc} Strain Energy Release Rate)	RTD	ASTM D 7905	2.6 kJ/m ²	15.0 in-lb/in ²
Room Temperature Dry (RTD) Cold Temperature Dry (CTD) is -54°C (-65°F) Elevated Temperature Dry (ETD) is 121°C (250°F)				

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Intermediate Modulus Carbon 145gsm FAW UD Tape Laminate 34% RC				
Property	Condition	Test Method	Results	
Tensile Strength 0°	RTD	ASTM D 3039	3100 MPa	450 ksi
Tensile Modulus 0°	RTD	ASTM D 3039	159 GPa	23 Msi
Tensile Strength 90°	RTD	ASTM D3039	86 MPa	12.5 ksi
Tensile Modulus 90°	RTD	ASTM D 3039	10 GPa	1.5 Msi
Compressive Strength 0°	RTD	ASTM D 6641	1300 MPa	189 ksi
Compressive Modulus 0°	RTD	ASTM D 6641	138 GPa	20 ksi
Flexural Strength 90°	RTD	ASTM D 7264	162 MPa	23.5 ksi
Interlaminar Shear Strength (SBS) 0°/ 90°	RTD	ASTM D 2344	96.5 MPa	14 ksi
Open-Hole Tensile Strength	RTD	ASTM D 5766	655 MPa	95 ksi
Open-Hole Compressive Strength	RTD	ASTM D 6484	303 MPa	44 ksi
Compression After Impact Strength 30.5 J (270 in/lb) Impact Energy	RTD	ASTM D 7137	338 MPa	49 ksi
Room Temperature Dry (RTD)				

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High Strength T300JB 3K Carbon 281gsm 5HS Woven Fabric Reinforced Laminate 43% RC				
Property	Condition	Methods	Results	
Tensile Strength 0°	RTD	EN 2597B	805 MPa	117 ksi
Tensile Modulus 0°	RTD	EN 2597B	58.0 GPa	8.4 Msi
Tensile Strength 90°	RTD	EN 2597B	739 MPa	107 ksi
Tensile Modulus 90°	RTD	EN 2597B	59.0 GPa	8.6 Msi
In-Plane Shear Strength	RTD	AITM 1.0002	159 MPa	23 ksi
In-Plane Shear Modulus	RTD	AITM 1.0002	3.90 GPa	0.57 Msi
Compression Strength 0°	RTD	ASTM D6641	628 MPa	91 ksi
Compression Modulus 0°	RTD	ASTM D6641	52.0 GPa	7.5 Msi
Compression Strength 90°	RTD	ASTM D6641	676 MPa	98 ksi
Compression Modulus 90°	RTD	ASTM D6641	53 GPa	7.7 Msi
Flexural Strength 0°	RTD	EN 2562A	1100 MPa	160 ksi
Flexural Modulus 0°	RTD	EN 2562A	61 GPa	9 Msi
Flexural Strength 90°	RTD	EN 2562A	874 MPa	127 ksi
Flexural Modulus 90°	RTD	EN 2562A	48 GPa	7 Msi
Open-Hole Compressive Strength	RTD	AITM 1.0008	291 MPa	42 ksi
Compression After Impact Strength 30 J (266 in/lb) Impact Energy	RTD	ASTM D7137-12	314 MPa	45.6 ksi
Mode I Interlaminar Fracture Toughness (G _{IC} Strain Energy Release Rate)	RTD	ASTM D5528	2249 J/m ²	12.8 in-lb/in ²
Room Temperature Dry (RTD) is 21°C (69.8°F) 50% fiber by volume (V _f) The mechanical data provided are average values from a limited dataset. For additional data please contact Toray Advanced Composites.				

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US Style 7781 EC6 Glass 296gsm 8HS Woven Fabric Reinforced Laminate 34% RC				
Property	Condition	Methods	Results	
Tensile Strength 0°	RTD	ASTM D3039	480 MPa	70 ksi
Tensile Modulus 0°	RTD	ASTM D3039	23.7 GPa	3.4 Msi
Tensile Strength 90°	RTD	ASTM D3039	424 MPa	61 ksi
Tensile Modulus 90°	RTD	ASTM D3039	22 GPa	3.2 Msi
Compression Strength 0°	RTD	ASTM D6641	365 MPa	53 ksi
Compression Modulus 0°	RTD	ASTM D6641	26.7 GPa	3.9 Msi
Compression Strength 90°	RTD	ASTM D6641	332 MPa	48 ksi
Compression Modulus 90°	RTD	ASTM D6641	25.7 GPa	3.7 Msi
In Plane Shear Strength	RTD	ASTM D3518	47 MPa	7 ksi
In Plane Shear Modulus	RTD	ASTM D3518	2.70 GPa	0.39 Msi
Flexural Strength 0°	RTD	ISO 178	544 MPa	79 ksi
Flexural Modulus 0°	RTD	ISO 178	24 GPa	3 Msi
Flexural Strength 90°	RTD	ISO 178	454 MPa	66 ksi
Flexural Modulus 90°	RTD	ISO 178	20 GPa	3 Msi
Tensile Strength 0°	ETW	ASTM D3039	333 MPa	48 ksi
Tensile Modulus 0°	ETW	ASTM D3039	22 GPa	3.2 Msi
Tensile Strength 90°	ETW	ASTM D3039	289 MPa	42 ksi
Tensile Modulus 90°	ETW	ASTM D3039	20.3 GPa	3 Msi
Compression Strength 0°	ETW	ASTM D6641	197 MPa	29 ksi
Compression Modulus 0°	ETW	ASTM D6641	25 GPa	3.6 Msi
Compression Strength 90°	ETW	ASTM D6641	171 MPa	25 ksi
Compression Modulus 90°	ETW	ASTM D6641	23 GPa	3.3 Msi
In Plane Shear Strength	ETW	ASTM D3518	26 MPa	4 ksi
In Plane Shear Modulus	ETW	ASTM D3518	1.43 GPa	0.21Msi

Room Temperature Dry (RTD) is 23°C (73.4°F)
 Elevated Temperature Wet (ETW) is tested at 80°C/dry after 1000 hours of conditioning at 70°C/85% RH
 50% fiber by volume (Vf)
 The mechanical data provided are average values from a limited dataset. For additional data please contact Toray Advanced Composites.

PRODUCT DATA SHEET

EC6 Glass 296gsm FAW 8HS Woven Fabric Reinforced Laminate 34% RC				
Property	Condition	Methods	Results	
Tensile Strength 0°	HD	ASTM D3039	431 MPa	63 ksi
Tensile Modulus 0°	HD	ASTM D3039	23 GPa	3.3 Msi
Tensile Strength 90°	HD	ASTM D3039	338 MPa	49 ksi
Tensile Modulus 90°	HD	ASTM D3039	20 GPa	2.9 Msi
Compression Strength 0°	HD	ASTM D6641	312 MPa	45 ksi
Compression Modulus 0°	HD	ASTM D6641	26 GPa	3.8 Msi
Compression Strength 90°	HD	ASTM D6641	254 MPa	37 ksi
Compression Modulus 90°	HD	ASTM D6641	24 GPa	3.5 Msi
In Plane Shear Strength	HD	ASTM D3518	40 MPa	6 ksi
In Plane Shear Modulus	HD	ASTM D3518	2.3 GPa	0.34 Msi

Hot Dry (HD) is tested at 80°C (194°F)/dry
50% fiber by volume (Vf)
The mechanical data provided are average values from a limited dataset. For additional data please contact Toray Advanced Composites.

HEALTH & 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® PAEK thermoplastic composite materials, contact Toray Advanced Composites.

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