Toray TC890

Toray Advanced Composites

PRODUCT DATA SHEET

DESCRIPTION

Toray TC890 high temperature polyimide prepreg system utilizes PROOF Research Advanced Composites Division 900HT resin system. TC890 is a high temperature, polyimide-based thermoset prepreg with outstanding dry property retention at 343°C (650°F), wet service property retention at 288°C (550°F), and short-term and intermittent service temperature capability to 427°C (800°F). TC890 has been successfully demonstrated in short term, transient heating applications to temperatures as high as 1300°F. TC890 is an excellent non-MDA replacement for high temperature PMR-15 applications. TC890 prepreg system is easily processable and thermally stable, exhibiting the highest glass transition temperature of commercially available structural matrices. This system displays exceptional toughness, excellent dielectric properties, and low toxicity.

FEATURES

- **Excellent toughness**
- **Excellent dielectric properties**
- **Non-MDA based resin system**
- **High glass transition temperature, substainially higher than PMR-15 and AFRPE-4**

PRODUCT TYPE

High Temperature Polyimide

TYPICAL APPLICATIONS

- Jet engine components
- Heat shields
- High temperature leading edges/radomes
- Missiles
- Launch vehicles

SHELF LIFE

Out Life:	14 days (and up to 30 days) at ambient
Frozen Storage Life:	12 months at -18°C (< 0°F) or below

Out life is the maximum time allowed at ≤ 21°C (70°F) and ≤ 60% RH before cure.

*Out life tested by SBS on a 15 cm x 15 cm (6" x 6") laminate, cured in an autoclave. Users will need to evaluate their own out life limits based on thickness, size, and complexity of their own parts.

TYPICAL NEAT RESIN PROPERTIES

Density	1.33 g/cc
Dry T_g (DMA)	454°C (850°F)

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ELECTRICAL PROPERTIES OF COMPOSITE LAMINATES

TC890/6781HT Fg	10 GHz	30 GHz
Dielectric Constant	3.3	4.2
Loss Tangent	< 0.010[1]	< 0.010[1]
TC890/4581 Quartz	**10 GHz**	**30 GHz**
Dielectric Constant	3.4	3.4
Loss Tangent	0.003[2]	0.004[2]

[1] The loss tangent under focused beam testing is only accurate to 0.010. This material is less than 0.010.

[2] Tested per ASTM D 2520 method A, shorted WR-90 Waveguide.

This material represents one of Toray's best for high temperature, high energy radome applications.

GLASS/QUARTZ FABRIC PROPERTIES

Property	Condition	Method	Results	
			6781HT Fg	4581 Quartz
Tensile Strength	RTD	ASTM D3039	541 MPa (78.5 ksi)	-
Tensile Modulus	RTD	ASTM D3039	34.5 GPa (5.0 Msi)	-
Tensile Strength	ETD	ASTM D3039	534 MPa (77.5 ksi)	-
Compression Strength	RTD	ASTM D6641	501 MPa (72.6 ksi)	477 MPa (69.2 ksi)
Compression Modulus	RTD	ASTM D6641	33.1 GPa (4.8 Msi)	28.3 GPa (4.1 Msi)
Compression Strength	ETD	ASTM D6641	341 MPa (49.5 ksi)	340 MPa (49.4 ksi)
Short Beam Shear Strength	RTD	ASTM D2344	61 MPa (8.8 ksi)	68 MPa (9.9 Msi)
Short Beam Shear Strength	ETD	ASTM D2344	42 MPa (6.1 ksi)	52 MPa (7.5 ksi)
Flex Strength	RTD	ASTM D790	570 MPa (82.6 ksi)	-
Flex Modulus	RTD	ASTM D790	25.5 GPa (3.7 Msi)	-

85 psi autoclave stepped cure with a final hold at 371°C (700°F) for 120 minutes

ETD is 288°C (550°F)

CARBON FABRIC PROPERTIES

Property	Condition	Method	Results	
Tensile Strength	RTD	ASTM D3039	765 MPa	111 ksi
Tensile Modulus	RTD	ASTM D3039	70.3 GPa	10.2 Msi
Tensile Strength	ETD	ASTM D3039	815 MPa	118 ksi
Tensile Modulus	ETD	ASTM D3039	84.1 GPa	12.2 Msi
Compression Strength	RTD	ASTM D6641M	644 MPa	93 ksi
Compression Modulus	RTD	ASTM D6641M	68.3 GPa	9.9 Msi
Compression Strength	ETD	ASTM D6641M	456 MPa	66 ksi
Compression Modulus	ETD	ASTM D6641M	63.1 GPa	9.2 Msi
In-Plane Shear Strength	RTD	ASTM 3518	72.3 MPa	10.5 ksi
In-Plane Shear Strength	ETD*	ASTM 3518	78.1 MPa	11.3 ksi
4-Pt Flexural Strength	RTD	ASTM D7264M	673 MPa	98 ksi
4-Pt Flexural Modulus	RTD	ASTM D7264M	133.1 GPa	19.3 Msi
4-Pt Flexural Strength	ETD	ASTM D7264M	573 MPa	83 ksi
4-Pt Flexural Modulus	ETD	ASTM D7264M	69.8 GPa	10.1 Msi
Bearing Response Strength	ETD	ASTM D5961	501.6 MPa	73 ksi
SBS	RTD	ASTM D2344	56 MPa	8.1 ksi
SBS	ETD	ASTM D2344	48 MPa	6.9 ksi
TOS	N/A	See Note 3	4.95%	

Notes
(1) Laminate data for Toray TC890 prepreg impregnated on T650-35 8HS 370 FAW fabric, 37% RC.
(2) ETD is 288°C (550°F) unless noted. *ETD for In-Plane Shear strength was 316°C (600°F).
(3) 625°F/150 psia/ 125 hours.

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CARBON FIBER UNIDIRECTIONAL PROPERTIES

Property	Condition	Method	Results	
			T800GC-24K-91N	T1100GC-24K-91N
Tensile Strength 0°	RTD	ASTM D3039	2302 MPa (334 ksi)	2723 MPa (395 ksi)
Tensile Modulus 0°	RTD	ASTM D3039	159 GPa (23 Msi)	172 GPa (25 Msi)
Compression Strength 0°	RTD	SRM1/D695 modified	1441 MPa (209 ksi)	-
Compression Modulus 0°	RTD	SRM1/D695 modified	145 MPa (21 Msi)	166 MPa (24 Msi)
Compression Strength 0°	RTD	ASTM D6641	1510 MPa (219 ksi)	1634 MPa (237 ksi)
Compression Modulus 0°	RTD	ASTM D6641	152 MPa (22 MsI)	166 MPa (24 ksi)
Short Beam Shear Strength 0°	RTD	ASTM D2344	119 MPa (17.2 ksi)	141 MPa (20.4 ksi)
Short Beam Shear Strength 0°	ETD 250°F	ASTM D2344	108 MPa (15.6 ksi)	118 MPa (17.1 ksi)
Short Beam Shear Strength 0°	ETD 450°F	ASTM D2344	85 MPa (12.3 ksi)	86 MPa (12.4 ksi)
Short Beam Shear Strength 0°	ETD 600°F	ASTM D2344	70 MPa (10.1 ksi)	69 MPa (10.0 ksi)
Tg by DMA	Dry	ASTM D7028	867	852
Char Performance[1]	-	TGA	88%	86%

Axial tension and compression poperties normalized to 60% FV
85 psi autoclave stepped cure with a final hold at 371°C (700°F) for 120 minutes
T800GC = 145 gsm / 36% RC and T1100GC = 135 gsm / 36% RC
[1] Char Yield - TGA N2 gas, 10°C/min, Final Temp: 1000°C

CURE SCHEDULE

Call for details. This product requires a multi-hour cure at temperatures at or above 371°C (700°F).

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