

## PRODUCT DATA SHEET

### DESCRIPTION

Toray's NRPE high temperature polyimide prepreg systems utilizes PROOF Research Advanced Composites Division NRPE resin system. NRPE is a high temperature structural polyimide with a low-melt viscosity. NRPE displays exceptional hot/wet mechanical properties suitable for 287°C (550°F) - 315°C (600°F) service temperature applications.

### FEATURES

- ▶ **Exceptional hot/wet mechanical properties at 287°C (550°F) - 315°C (600°F) temperatures vs. other available high temperature polyimide systems**
- ▶ **Lower pressure cure processing (less than 100 psi) vs. other high temperature polyimide systems**
- ▶ **Improved thermal shock and blistering resistance of thick section components vs. other available high temperature polyimide systems**
- ▶ **Very good toughness and microcrack resistance.**
- ▶ **Less than 100 poise melt viscosity**
- ▶ **More robust processing of thick components vs. other high temperature polyimide systems**

### 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  $\leq 21^{\circ}\text{C}$  (70°F) and  $\leq 60\%$  RH before cure.

\*Out life tested by SBS, cured in an autoclave. Users will need to evaluate their own out of life limits based on thickness, size, and complexity of their specific parts and application.

### TYPICAL NEAT RESIN PROPERTIES

Density	1.35 g/cc
Dry $T_g$ (DMA) with 371°C (700°F) cure	374°C (705°F)



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**CARBON FABRIC MECHANICAL PROPERTIES**

T650-35 (3K) 8HS, 370gsm, 39%RC				
Property	Condition	Method	Results	
Tensile Strength 0°	RTA	ASTM D3039	137 ksi	944 MPa
Tensile Modulus 0°	RTA	ASTM D3039	10 Msi	70 GPa
Compressive Strength 0°	RTA	ASTM D6641	107 ksi	738 MPa
Compressive Modulus 0°	RTA	ASTM D6641	10 Msi	69 GPa
Compressive Strength 0°	ETA 287°C (550°F)	ASTM D6641	77 ksi	531 MPa
Short Beam Shear ILSS	RTA	ASTM D2344	11.1 ksi	76 MPa
Short Beam Shear ILSS	ETA 287°C (550°F)	ASTM D2344	6.0 ksi	41 MPa

**Notes**

Tensile and compression properties normalized to 58% fiber volume.

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### CARBON FIBER UNIDIRECTIONAL MECHANICAL PROPERTIES

T1100G, 135gsm, 36%RC				
Property	Condition	Method	Results	
Tensile Strength 0°	RTA	ASTM D3039	368 ksi	2537 MPa
Tensile Modulus 0°	RTA	ASTM D3039	26 Msi	179 GPa
Compressive Strength 0°	RTA	SRM1/D695 Modified	233 ksi	1606 MPa
Compressive Modulus 0°	RTA	SRM1/D695 Modified	24 Msi	166 GPa
Compressive Strength 0°	RTA	ASTM D6641	221 ksi	1523 MPa
Compressive Modulus 0°	RTA	ASTM D6641	25 Msi	172 GPa
Short Beam Shear ILSS	RTA	ASTM D2344	20 ksi	138 MPa
Short Beam Shear ILSS	ETA 121°C (250°F)	ASTM D2344	18.9 ksi	130 MPa
Short Beam Shear ILSS	ETA 232°C (450°F)	ASTM D2344	12.4 ksi	85 MPa
Short Beam Shear ILSS	ETA 287°C (550°F)	ASTM D2344	9.9 ksi	68 MPa
Short Beam Shear ILSS	ETA 315°C (600°F)	ASTM D2344	8.8 ksi	61 MPa
Open Hole Compression	RTA	ASTM D6484	44 ksi	305 MPa
Open Hole Compression	ETA 315°C (600°F)	ASTM D6484	39 ksi	269 MPa
Compression After Impact	RTA	ASTM D7136/D7137	24.6 ksi	170 MPa
Char Yield		TGA	85.8%	

**Notes**  
 Axial tension and compression properties normalized to 60% FV  
 180 psi autoclave stepped cure with a final hold at 371°C (700°F) for 120 minutes  
 Char Yield - TGA N2 gas, 102 min, Final temp: 1000°C (1832°F)  
 Preliminary dataset based on limited lot data

### CURE SCHEDULE

Call for details. This product requires a multi-hour cure at temperatures at or above 343°C (650°F)

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