

## Product Data Sheet

### Ep-preg® S153

185-250°F (85-120°C) Curing Epoxy Prepreg

#### Description

Ep-preg® S153 is an epoxy prepreg suitable for vacuum curing process. It has been designed to be easy to work with in terms of handling and laminating. It is not sticking to hand, but is showing high tack to itself.

Ep-preg® S153 has very long shelf life at room temperature and long out of the bag tack time. Friendly, it can be used for very large composite parts that have to withstand severe weathering and mechanical stresses.

In spite of its high flow matrix, Ep-preg® S153 gives high quality surface when processed and cured properly. Ep-preg® S153 is available in all reinforcements and represents a great choice for many industrial applications.

For large composite parts, S153 is available in three types of E-glass fiber, stitched unidirectional, stitched  $\pm 45^\circ$  (biaxial), and stitched  $\pm 45^\circ/0^\circ$  (triaxial).

#### Prepreg & Matrix Features

- ❖ Long storing life, **15-16 weeks** @ 20-23°C & **24 months** @ -18°C.
- ❖ Suitable for vacuum and autoclave curing.
- ❖ Good flexibility and easy handling.
- ❖ Environmentally friendly and retains its tack for several weeks.
- ❖ Suitable for thick laminates.
- ❖ Versatile curing temperature 185-250°F (85-120°C).

#### Cured Matrix Properties

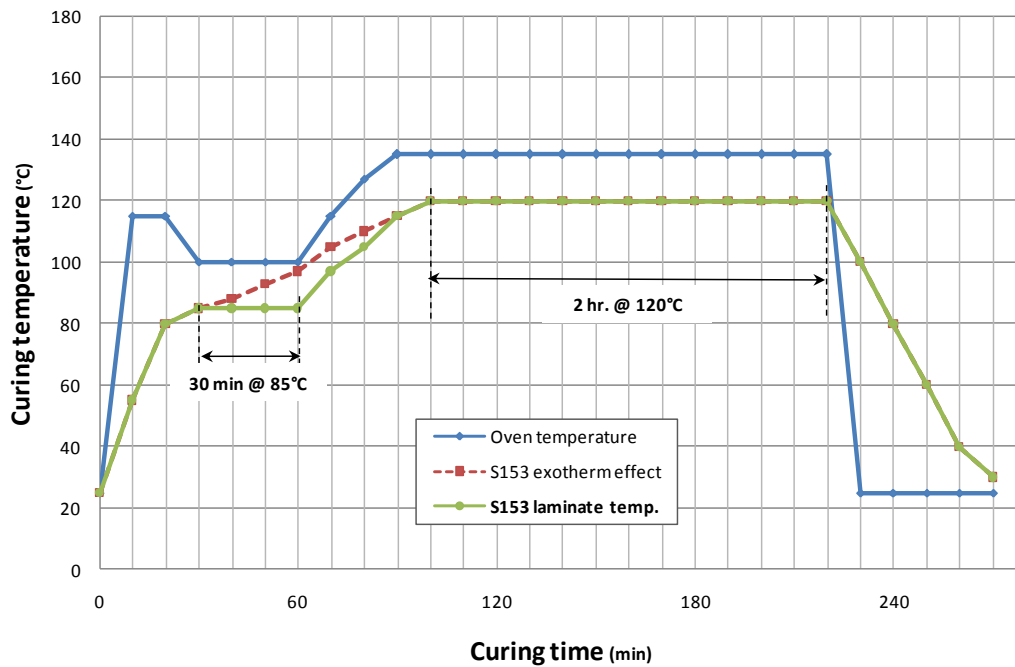
	<b>2 hrs @ 120°C</b>	<b>Method</b>
Tensile Strength (MPa)	77 ± 2	ISO R527
Tensile Modulus (GPa)	3.1 ± 0.1	ISO R527
Strain (%)	3.7 ± 0.1	ISO R527
Flexural Strength (MPa)	132 ± 5	ISO R178
Flexural Modulus (GPa)	3.05 ± 0.1	ISO R178
Strain (%)	8 ± 1	ISO R178
Compression Strength (MPa)	100 ± 2	ASTM D695
Compression Modulus (GPa)	3.2 ± 0.1	ASTM D695
Fracture toughness $K_{Ic}$ (MPa $\sqrt{m}$ )	0.8 ± 0.05	ISO 13586
Fracture energy $G_{Ic}$ (J/m <sup>2</sup> )	230 ± 20	ISO 13586
Density (g/cm <sup>3</sup> )	≈ 1.16	
Glass Transition Temp. (°C)	112 ± 2	DSC - 10°C/min

## Curing Specifications

Minimum		Method
Curing temperature (°C)	85	DSC
Curing time (Hr : min) @ minimum temp.	6:00	DSC
Glass transition temp. T <sub>g</sub> (°C)	97	DSC
Viscosity – 40 to 120°C @ 1°C/min – (Poise)	36.17	Rheometer
Temperature @ minimum viscosity (°C)	108.9	Rheometer

## Typical Vacuum Curing Cycle

Vacuum curing cycle of Ep-preg® S153 prepreg



## Alternative Curing Cycles

Temperature (°C)	Gel time (mins)	Dwell time (Hrs:mins)	DSC T <sub>g</sub> (°C)
85	-	6:00	95-100
90	-	4:00	95-100
100	-	6:00	110-115
110	13-15	-	-
120	7-9	2:00	110-115

## Vacuum Cured Stitched Fiber Laminates

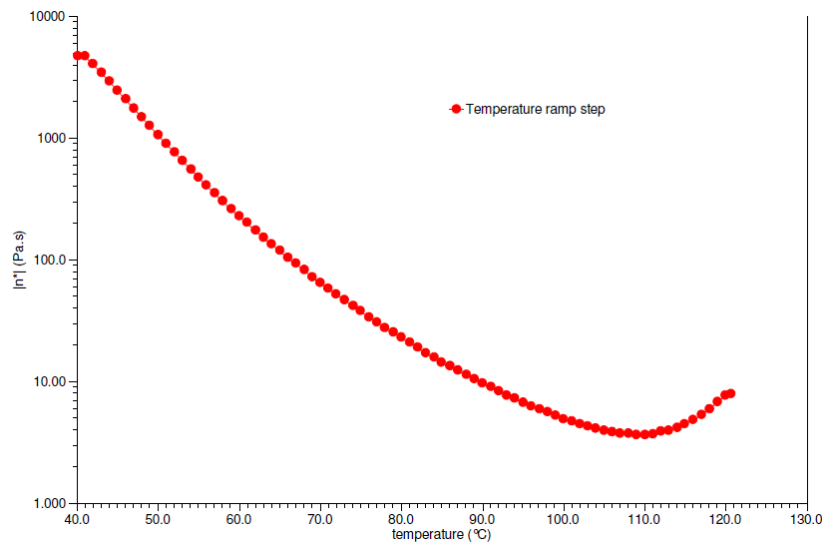
30 min @ 85°C & 2 hrs @ 120°C

Properties	E-Glass						T 700	Test Method
	Stitched UD		Biax ± 45				12K UD	
Fiber weight (gsm)	<b>1152</b>	<b>1594</b>	<b>950</b>		<b>600</b>		<b>309</b>	
Resin Content by weight (%)	32	32	38		50		44	
Number of layers	2	2	3		4		5	
Cured laminate thickness (mm)	1.8	2.2	2.4		2.5		1.9	
Laminate fiber volume (%)	50.3	57.8	45.9	45.9	37.8	37.8	50	
<b>Tensile &amp; Flexural Values in (°)</b>	0	0	45	0	45	0	0	
Tensile strength (MPa)	1023	1217	440	151	348	125	1570	BS EN ISO 527-4
Tensile modulus (GPa)	39.5	45.9	33	12	18.2	7.5	115	BS EN ISO 527-4
Flexural Strength (MPa)	1074	-	620	293	490	231	-	BS EN ISO 14125
Flexural Modulus (GPa)	47	-	19	12.6	16.8	8.1	-	BS EN ISO 14125
<b>Normalized properties @ 53% FVF</b>								
Cured laminate thickness (mm)	1.71	2.37	2.12	2.12	1.78	1.78	1.78	
Tensile strength (MPa)	<b>1077</b>	<b>1080</b>	<b>498</b>	<b>171</b>	<b>488</b>	<b>175</b>	1628	BS EN ISO 527-4
Tensile modulus (GPa)	<b>41.6</b>	<b>42.2</b>	<b>32.1</b>	<b>11.8</b>	<b>25.5</b>	<b>10.6</b>	120	BS EN ISO 527-4
Tensile Stiffness Coef. (GPa*m)	37.6	-	-	-	-	-	-	BS EN ISO 527-4
Flexural Strength (MPa)	1137	-	702	352	688	261	1775	BS EN ISO 14125
Flexural Modulus (GPa)	49.9	-	18.6	12.4	19.6	9.2	120	BS EN ISO 14125
<b>Inter-laminar Values in (°)</b>	0	0	45	0	45	0	0	
Shear Strength (MPa)	75	75	45	28	-	-	90	ASTM D-2344
Shear Strength (MPa)	-	-	-	-	51.5 <sup>■</sup>	-	-	EN-2377

■ 8 layers; L = 26.06 mm; b = 13.45 mm; d = 4.11 mm.

## Rheology Profile

Minimum viscosity: 3.617 Pa.s @ 108.9°C



## Typical Applications

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- Wind blades manufacturing.
- Boats hulls and decks.
- Automobile and Sports Industries.

## Storage and Handling

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All Ep-preg<sup>®</sup> prepregs are wrapped in a barrier film immediately after impregnation. During storing and handling, the following notes must be considered:

- a. Ep-preg<sup>®</sup> prepregs should be stored in their original packaging barrier film, or an equivalent film, at -18°C.
- b. Before use, the prepreg roll has to be out of the freezer and remain tightly sealed for 48 hours, time required to reach ambient room temperature.
- c. It is highly recommended to handle the prepreg at a clean area where relative humidity is  $\leq 50\%$  and ambient temperature is 20-23°C.

## Safety Precautions

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Usual precautions, as following, must be considered:

- a. During lamination, workers must avoid skin contact by wearing appropriate disposable protective gloves.
- b. Clean protective coveralls or equivalent clothes must be worn before laminating and also sanding.
- c. Protective glasses must be worn to avoid eyes contamination. In case of contamination, eyes must be flushed for 15 min and then medical treatment must be applied.
- d. After working, hands and contaminated skin, if any, have to be washed with soap and warm water. This has to be implemented as a routine practice.

## Important Notice

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The data reported in this sheet are based on representative samples. Since the method and circumstances of handling and processing are keys to the material performance, Gulf Composite Materials L.L.C., does not guaranty these data. Users should make their own assessment of the suitability of any product for the performance required.