

SE 85FR

Epoxy Prepreg System

- **Fire retardant**
- **Rubber toughened system**
- **Good balance of mechanical properties**
- **Good resistance to micro-cracking**
- **Rated to FAR25.853 and FMVSS302**

Introduction

SE 85FR is a fire-retardant, toughened hot-melt, epoxy prepreg system that offers an extremely good balance of mechanical properties. It has been tested to MVSS302 and FAR25.853 (60 secs and 12 secs vertical burn) fire safety standards.

The system is ideal for structural components where improved impact performance and resistance to resin micro-cracking is desired.

SE 85FR can be cured at 85°C, yet retains an outlife of up to 56 days at 23°C. With its 1 hour cure at 125°C, it is also suitable for the quick manufacture of parts, and is also used in the development of trial components.

Instructions for Use

When preparing the lay-up, the prepreg should be removed from the freezer approximately six hours before use (or until it has attained ambient temperature (circa 18-23°C)) before it is removed from its packaging to avoid condensation of water on the surface whilst defrosting.

The mould surface should be release coated and must have been tested for vacuum integrity prior to lay-up.

Place the lay-up on a tool or caul sheet which has been treated with a release agent or film and insert a thermocouple into the lay-up near the centre ply of the thickest edge section.

A layer of peel ply can be applied to the surface of the lay-up to aid good secondary bonding. A nylon peel ply, such as Tygavac Stitch Ply A, is strongly recommended. This is particularly important where the cure temperatures exceed 90°C. The peel ply should then be covered with perforated release film. No edge resin bleeder is usually required. P9 grade release film is recommended. With perforated release film, the amount of resin bled away is controlled by the number of dry plies of resin bleeder cloth placed over the perforated release film. For thin skins, care must be taken not to overbleed the laminate (prepreg peel ply – SC15-1744) will ensure this does not occur).

Install a vacuum bag using standard techniques. At least two vacuum stems should be inserted through the bag, connecting one to the vacuum source, to a calibrated vacuum gauge. Position the component in the oven or autoclave and draw vacuum to check for bag or system leaks. A minimum of 85% is recommended for the entire cure cycle, although higher vacuums will improve laminate quality and surface finish.

Commence the heat-up cycle, typically between 0.3°C/minute and 2°C/minute to the final cure temperature. At 85°C, the temperature should be held for 12 hours and at 1 hour at 120°C. All temperatures should be measured by the previously installed thermocouples.

Once curing is complete, the heat should be turned off and the part allowed to cool until it's temperature has fallen below 60°C. When fully cooled, the part may be debagged, trimmed and machined as necessary.

Gloves should be worn both to avoid skin contact with the prepreg, and to avoid transfer of sweat onto the prepreg, which may cause voiding on cure.

If the lay-up is to take several days, a vacuum debulk is recommended at the halfway stage.

Properties

Uncured Properties	
Out-Life @ 18-22°C	8 wks
Storage Life @ -18°C	2 years
Hazard Designation	Xi, N
Risk Phrases	36/38, 43, 51/53
Safety Phrases	24, 26, 28, 37/39, 57

Cured System Physical Properties		
	Cure	Tg (°C)
Tg DMTA (Peak Tan δ) (°C)	1 hour @ 125°C	153
Tg1 DMTA (°C)	1 hour @ 125°C	128
Tg DMTA (Peak Tan δ) (°C)	2 hrs @ 110°C	150
Tg1 DMTA (°C)	2 hrs @ 110°C	125
Uncured Resin Density (g/cm³)	-	1.31

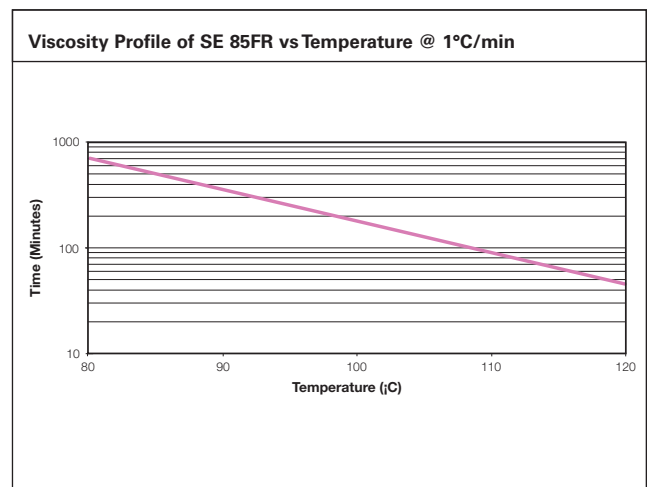
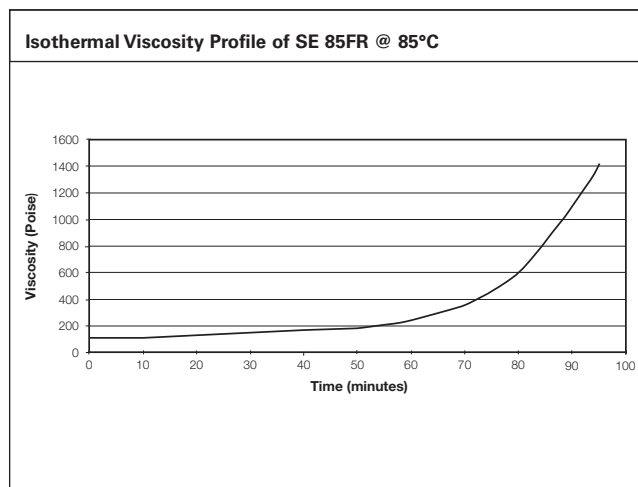
Working Properties	
Minimum Cure Temperature (°C)	85
Minimum Cure Time (@ minimum cure temperature) (hrs)	12
Minimum Viscosity (isothermal @ minimum cure temperature) (P)	120
Minimum Viscosity (1°C/minute ramp) (P)	63
Temperature @ minimum viscosity (1°C/minute ramp) (°C)	100°C
Minimum Cure Time @ 90°C (hrs:mins)	8:00
Minimum Cure Time @ 100°C (hrs:mins)	4:00
Minimum Cure Time @ 110°C (hrs:mins)	2:00
Minimum Cure Time @ 120°C (hrs:mins)	1:00

Notes: For an explanation of test methods used see 'SP-High Modulus Prepregs Technical Characteristics'.
All figures quoted are indicative of the properties of the product concerned. Some batch to batch variation may occur.

Properties (cont'd)

Mechanical Properties				
	300g HSC U/D High Strength Carbon	300g HSC U/D High Strength Carbon	RC200T Woven 2x2 HS Carbon	RE292 Woven 4 Harness Satin Glass
Cure (time/temp/pressure)	12 hrs / 85°C / 1 Bar	1 hr / 125°C / 6 Bar	1 hr / 125°C / 6 Bar	2 hrs / 110°C / 1 Bar
Process	Vacuum Bag	Press	Press	Vacuum Bag
Fibre weight (g/sqm)	300	300	194	292
Prepreg areal weight (g/sqm)	462	462	334	479
Prepreg resin content (% bw)	35	35	42	39
Tensile laminate fibre volume (%)	57.4	57.4	N/A	NA
Cured ply thickness (mm)	0.271	0.263	0.18	0.21
Normalised Tensile Strength @ 60% FVF (MPa)*	2520	2550	N/A	N/A
Normalised Tensile Modulus @ 60% FVF (GPa)*	135	137	N/A	N/A
Flexural modulus (GPa)	104	126	61.1	21.5
Flexural strength (MPa)	1438	1637	886	448
Compressive Strength (Mpa)	N/A	1274	687	529
Compressive laminates fibre volume (%)	57.4	57.4	50	44.5
Normalised compressive strength @ 60% FVF (Mpa)	N/A	1330	824	713
Toughness (GIIc) (kJ/m²)	1.03	1.31	N/A	2.62
ILSS (Mpa)	60.1	78.6	61.9	N/A

* Calculated values from measured resin and fibre properties

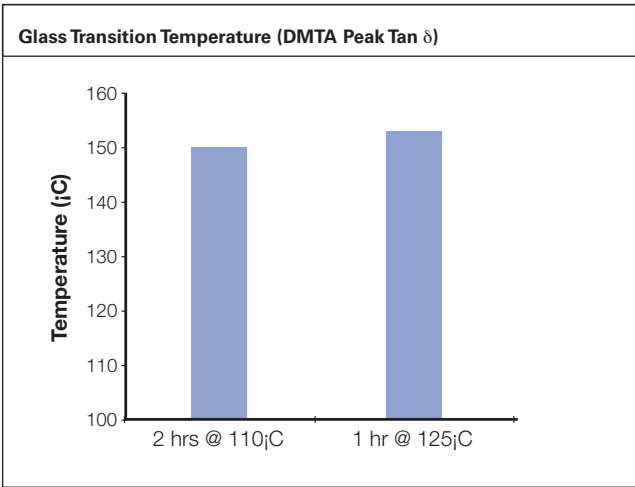


Notes: *C.P.T. is of tensile laminate unless no tensile data is given.

For an explanation of test methods used see 'SP-High Modulus Prepregs Technical Characteristics'.

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Properties (cont'd)



Notes: For an explanation of test methods used see 'SP-High Modulus Prepregs Technical Characteristics'.
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Health and Safety

Although SE 85FR prepregs have greatly improved health and safety characteristics when compared to wet lay-up epoxy systems, the following points must still be considered:-

1. Avoid skin contact - wear disposable rubber gloves and use skin barrier creams.
2. Avoid eye contact. If this occurs, flush with water for 15 minutes and seek medical advice.
3. Ensure good ventilation of vacuum pump exhaust during laminate cure.
4. Avoid inhalation and eye contact with sanding dust. After any sanding operation of reasonable size a shower or bath should be taken and should include hair washing.
5. Wear overalls or other protective clothing. Thoroughly clean or discard soiled garments.
6. Use only resin removing creams/soap and water on exposed skin. Do not use solvents.

Washing should be part of routine practice:

- before eating or drinking
- before smoking
- before using the lavatory
- after finishing work

SP-High Modulus produces a separate full Materials Safety Data Sheet for this product covering usage, transport, storage and emergencies. Please ensure that you have the correct MSDS's to hand for the materials you are using before commencing work.

Applicable Risk & Safety Phrases

R 36/38, 43, 51/53
S 24, 26, 28, 37/39, 57, 60



Transport & Storage

When not in use SE 85FR products should be maintained at -18°C. Shelf life for SE 85FR is two years at -18°C and six weeks at 18-22°C. To avoid condensation on their surfaces, allow rolls to reach room temperature before unwrapping.

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