ST 70FR

Fire Retardant Glass Structural SPRINT®

- **Award winning SPRINT® matrix**
- **BS476 parts 6 & 7 - best possible "Class 0" Rating**
- **BS6853 Annex B2 - R = 0.90 - 1.20**
- **Low smoke toxicity**
- **Suitable for rail, marine and civil engineering structures**
- **Self extinguishing**
- **Halogen-free**
- **70°C Curable**
- **Suitable for Lloyds and MCA Compliant Structures**
- **Suitable for monolithic and sandwich structures**
- **Excellent laminate quality, from vacuum-only processing**
- **Fire retardant : meets FAR25.853 12 second & 60 second vertical burn**
  : meets MVSS 302

Introduction

ST70FR is part of the range of SPRINT® products. This unique product range provides technically and commercially competitive engineering materials, ideal for use either solely, or in conjunction with other products from SP-High Modulus.

ST70FR is a fire retardant hot melt, Diuron free epoxy SPRINT®. This is ideally suited to the manufacture of thick sections requiring fire protection. It can be cured at temperatures as low as 70°C, but can also be used for the rapid manufacture of components through its 25-minute cure at 120°C. All of this can be achieved together with an out-life of 14 days at 20°C.

ST70FR is designed for vacuum bag processing and offers excellent mechanical performance on glass fibre reinforcements. Currently ST70FR is manufactured into a Single Sided SPRINT® structure primarily with fibreglass reinforcements such as woven WRE581T, WRE850T fabrics and multiaxial XE905 and QE1174 stitched fabrics. Other styles will be available to order.

Instructions for Use

ST70 FR SPRINT® materials can be used with both SPRINT® and prepreg products. It is supplied with a paper backer and should be applied with resin film against the mould. This facilitates placement and improves the fire resistance of the moulded surface.

The moulding surface must first be treated with a release agent. The required number of plies of SPRINT® are then placed on the tool and a thermocouple inserted into the layup outside the net trim line. Dry glass tows are inserted between the plies of SPRINT® to provide air evacuation paths out of the laminate. The ends of the tows should be arranged so as to be in contact with the vacuum breather.

If required, peel ply can be applied over the top of the laminate stack. For a good secondary bond Gurit recommend the use of a non release coated peel ply such as Stitch ply A. The peel ply is then covered with a low bleed release film such as P90 or RP2 . Next, a breather material such as Econoweave 44W is placed over the whole of the stack making sure it connects with the glass strands.

Once the layup is complete a vacuum bag is installed by standard techniques. Two vacuum stems should be inserted through the bag, one to provide a vacuum source and one at the far end of the panel for connection of a vacuum gauge to test the vacuum integrity. The major benefit of SPRINT® is that it enables all of the air in the laminate to be withdrawn prior to fibre wet out and cure. For this it is essential that a perfect vacuum is achieved. (at least 95%). It is recommended that the vacuum is applied at ambient temperature and held for between 10 minutes and an hour prior to cure. Full vacuum should be maintained for the full cure.

In order to maximise the potential of ST70 product range please contact the SP-High Modulus Technical Department. Contact details are on the back of this Product Data Sheet.

General prepreg working practices apply to these products, details of which can be obtained from the SP-High Modulus Guide to Composites or by contacting the above department.

Typical Cure Schedules

The following cure schedules have been shown to produce good results in laminates built. A two hour dwell is useful for allowing fibre impregnation and air evacuation before the resin starts to dwell. However the optimum cure cycle will depend on the part size and construction.

Heat up ramp rates and dwell periods may need to be tailored to take consideration of oven capacity, thermal mass of tool, laminate construction etc.

The temperatures and dwell times shown in the table below indicate laminate temperatures, oven air temperatures may need to be higher.

Other cure cycles can be used and it is recommended that Gurit be contacted for further advice concerning cure cycles.

	Standard Cure Cycle	**Reduced Time Cure Cycle**
	0.5°C/minute ramp to 55°C	0.5°C/minute ramp to 55°C
	2 hours dwell at 55°C	2 hours dwell at 55°C
	0.5°C/minute ramp to 70°C	0.5°C/minute ramp to 85°C
	16hrs Cure at 70°C	6hrs Cure at 85°C
Total Time	**19hrs 40mins**	**9hrs 40mins**

At the end of any cure cycle it is recommended that the part be allowed to cool under vacuum until a sensibly handleable temperature is achieved (<40°C)

It is strongly recommended that laminate temperatures are monitored throughout the cure

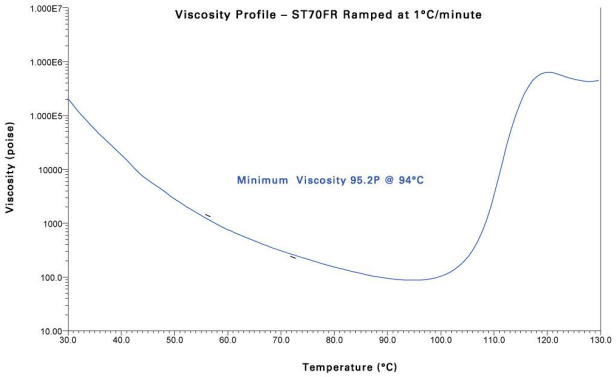
Matrix Properties

Uncured

Thermal properties (cure 20°C-250°C @ 10°C/minute)	
Enthalpy (J/g)	223

Cure Temp (°C)	Cure Time
90°C	4.5hrs
110°C	1hr
Minimum Cure Temperature (°C)	70
Time @ Min. Cure Temp (hours)	16

Colour	
Matrix	Brown
Resin	Reddish brown
Catalyst	White



Cured Properties

Mechanical Properties	
Tensile Strength (MPa)	57
Tensile Modulus (GPa)	3
Tensile Strain (%)	3
Compression Strength (MPa)	125
Compression Modulus (GPa)	4
Matrix density (g/cm³)	1.3
Glass Composite density (g/cm³)	1.8

Thermal Properties (cured between 16 hrs at 70°C)	
DMTA Tg1 (°C)	91
DMTA Peak Tan Delta (°C)	105
DSC Tg2 (°C)	85.0

SPRINT® Properties

Uncured

Material Properties		Notes
Tack	2	Med Tack

Outlife	
At -18°C (months)	18
At 5°C (months)	6
At 21°C (days)	14

Material Safety Information	
Hazard Code	Xi, N
Risk Phrases	36/38, 43, 51/53
Safety Phrases	24, 26, 28, 37/39, 57, 60
Solvent Content	0
Volatiles Content	0

SPRINT® Reinforcement	WRE 581T	QE1174/SS	WRE 850T	XE 905/SS
Resin Content (%)	39	39	39	39
Fibre Weight (g/m2)	581	1200	850	900
Aerial Weight (g/m2)	952	1925	1393	1475
Resin Weights Available	39%	39%	39%	39%
Weave	2 x 2 twill	Quadraxial Glass	2 x 2 twill	Biaxial Glass
Backer Type	Paper	Paper	Paper	Paper
Available Roll Width (mm)	1250	1270	1250	1270
Packaging Type	Packaging type is dependant on the length of roll requested			

Cured

SPRINT® Reinforcement	QE1174/SS	XE 905/SS	WRE581T/SS	WRE850T	Test Method
16hrs 70°C	45%*	45%*	39%*	39%*	
Tg1 (°C) (Laminate)	93.8	93.8	93.8	93.8	DMA
Tg Peak Tan Delta	105.3	105.3	105	105	DMA
0° Tensile Strength (MPa)	330.8	457.7	490.6	465.9	BS EN ISO 527
0° Tensile Modulus (GPa)	18.72	22.86	27.86	28.12	BS EN ISO 527
0° Compressive Strength (MPa)	386.6	521.5	488.5	547.55	ISO 14126
0° Compressive Modulus (GPa)	19.26	23.84	27.76	29.91	ISO 14126
0° ILSS (MPa)	34.2	42	54.11	38.84	BS EN ISO 14130
45° Tensile Strength (MPa)	N/A	106.4	N/A	N/A	BS EN ISO 527
45° Tensile Modulus (GPa)	N/A	12.46	N/A	N/A	BS EN ISO 527

* Resin content includes fire retardant filler loading.

Fire Performance

SPRINT® Reinforcement	WRE 581T (39%) 16hrs 70°C		Test Method
Surface Spread of Flame	< 165mm	Class 1	BS476 part 7
Fire Propagation	I =11.3 $i_1$1.7 i_2 7.3 i_3 2.3	Class 0	BS476 part 6
Area Based Toxicity	R=1.2		BS 6853 Annexe B.2

Health and Safety

The following points must be considered:

1. Skin contact must be avoided by wearing gloves. Gurit recommends the use of disposable nitrile gloves for most applications. The use of barrier creams is not recommended, but to preserve skin condition a moisturising cream should be used after washing.
2. If working in an enclosed area, local extraction and ventilation should be used.
3. Overalls or other protective clothing should be worn when laminating or sanding. Contaminated work clothes should be thoroughly cleaned before re-use.
4. Eye-protection should be worn. If contamination of the eyes occurs then flush the eye with water for 15 minutes, holding the eyelid open, and seek medical attention.
5. If the skin becomes contaminated then the area must be immediately cleansed. The use of resin-removing cleansers is recommended. To finish, wash with soap and warm water. The use of solvents on the skin to remove resins etc. must be avoided.

Washing should be part of routine practice:

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

6. The inhalation of sanding dust should be avoided. If it settles on the skin then it should be washed off. After more sanding operations, a shower/bath and hair wash is advised.

Gurit produces a separate full Material Safety Data Sheet (MSDS) for all hazardous products. Please ensure that you have the correct MSDS to hand for the materials you are using before commencing work. A more detailed guide for the safe use of Gurit resin systems is also available and can be found on our website at www.gurit.com. Note: safety datasheet legislation can vary with country of use. CPDS are also available upon request.

Storage Conditions & Outlife

Storage time and temperature will have an affect on resin reactivity and fibre impregnation. When stored at –18°C SPRINT® can be stored for 2 years without detrimental changes to the product. Storage times at higher temperatures are a function of fabric construction, roll length and resin content. These can be obtained upon request. However, the ST70 matrix resin system has specific properties that enable most combinations of fabric construction, roll length and resin content.

The product can be stored at 20°C for up to 14 days, although for optimum results the material should be used as soon as possible or be re-frozen. Users should ideally try to use the material within two weeks of defrosting, especially with heavyweight reinforcements, as a slight change in flow characteristics can have a consequence in fibre wet-out.

Transport & Storage

All SPRINT® materials should be stored in a freezer when not in use to maximise their useable life, since the low temperature reduces the reaction of resin and catalyst to virtually zero. However, even at -18°C, the temperature of most freezers, some reaction will still occur. In most cases after some years, the material will become unworkable.

Notice

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Gurit are continuously reviewing and updating literature. Please ensure that you have the current version, by contacting Gurit Marketing Communications or your sales contact and quoting the revision number in the bottom right-hand corner of this page.

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