S-Core

SPRINT® Core Material

- **Innovative thick section laminating material**
- **Efficient core material for the production boatbuilder**
- **Excellent combination of lightweight, high strength and toughness**

Introduction

The S-Core, or SPRINT® core, is a moulding material that consists of a single layer of a polyester non woven material, that has a pressure stable honeycomb structure, applied to a precast, precatalysed resin film. The moulding material therefore has the appearance of dry reinforcement on one face and resin on the other.

S-Core is intended for use as a core material and must be accompanied by SPRINT® laminate on both faces. It has been designed for simple vacuum bag processing. The product is highly drapeable making it ideal for use in curved or complex areas where foams would be difficult to use. The material has tack on one face allowing it to be easily positioned into the mould. The material cures to a density of just 0.65 and thickness of 4mm making it ideal for bulking out laminates with minimal extra weight and cost. S-Core is ideal for use in a variety of structural items for Automotive, Marine and Industrial applications.

Component Properties

Table 1. Material Properties				
Style	**Description**	**Resin Content By weight**	**Total Fibre Weight (sqm)**	**Total Area Weight (sqm)**
ST94/S-Core 4.0mm/1270	300g Polyester non woven, pressure stable honeycomb construction plied to a ST 94 resin film 1270 mm wide	89%*	300g	2700g

Notes: *Additional resin included for core bonding

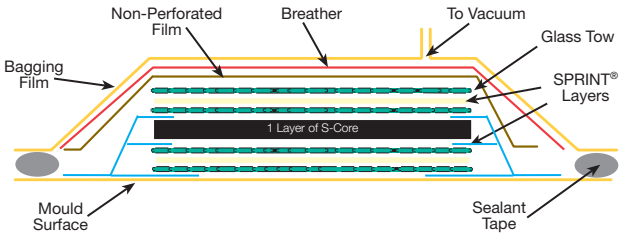
Compatible Products

S-Core has been designed for use with any of the structural SPRINT® product range. A minimum of 1 layer of structural SPRINT® must be placed either side of S-Core to create a sandwich construction. If two layers of S-Core are required then a layer of structural SPRINT® should be placed between them.

Instructions for Use

1. The mould surface must first be treated with a release agent. The required number of plies of structural SPRINT® are placed on the mould surface. A layer of S-Core is then applied on top of the structual SPRINT®. The required number of plies of structural SPRINT® are then placed on top of the S-Core to create a sandwich construction. Dry glass tows should be inserted between the plies of SPRINT® facing each side of the S-Core to provide an air evacuation path out of the laminate. The other end of the tow should be in contact with the breather.

2. If required, a peel ply, pre-impregnated or dry, can be applied over the top of the laminate stack. Note that for good secondary bonding of a peel-plied surface of a laminate, a nylon peel ply such as Gurit/Tygavac Stitch Ply A, is strongly recommended. The peel ply is covered entirely with a non-perforated release film such as Gurit/Tygavac WL3600. The non-perforated release film is then covered with breather material, such as Gurit/Tygavac Econoweave 44W, so that it extends over the release film in all directions and contacts the dry glass strands (see diagram below).



3. Once the lay up is complete, a vacuum bag is installed by standard techniques. At least two vacuum stems should be inserted through the bag, one connecting to the vacuum source and the other, at a point on the part furthest from the source, to a calibrated vacuum gauge. The major benefit of SPRINT® is that it enables all of the air to be removed from the laminate prior to fibre wet out and resin cure. It is recommended that a full vacuum is applied at ambient temperature prior to cure, to fully evacuate the laminate stack. This should be held for between 5 minutes and 1 hour, depending upon the size and thickness of the component. Full vacuum should then be maintained throughout the cure process.

PLEASE NOTE: Further advice can be found in the SPRINT® Processing Notes.

4. Cure the laminate in accordance with the specification given later in this data sheet.

Curing

Cure Envelope

S-Core has a relatively flexible cure envelope. The minimum cure is 10 hours 85°C and a rapid cure is 45 minutes at 120°C. Other cure temperatures and times are given in the Working Properties section.

Temperature and vacuum control

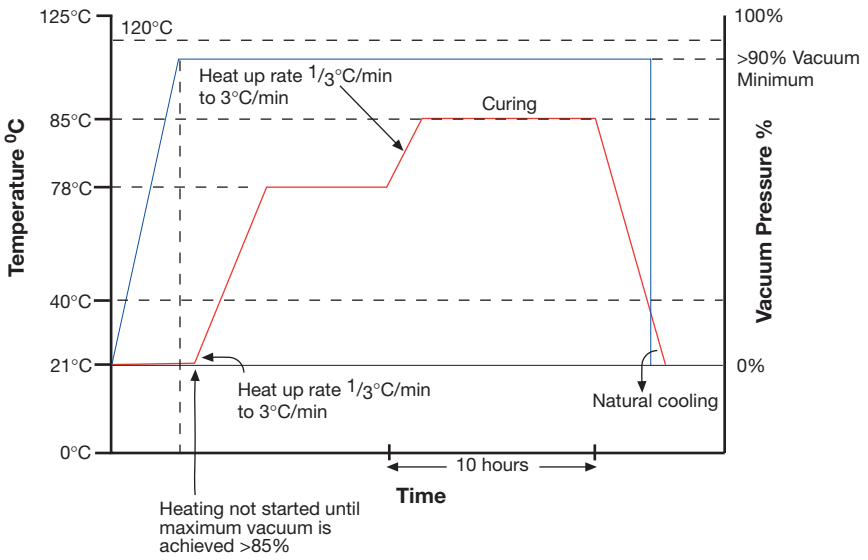
The first step is to applying a vacuum to the laminate stack to remove all air. It is recommended that an ambient temperature vacuum is applied prior to cure, to fully evacuate the laminate stack. While the vacuum is held, the temperature is then increased so that the matrix resin reduces in viscosity and wets the evacuated reinforcement within the laminate by infusion. A dwell can be used at the chosen "infusion" temperature to ensure good laminate quality. The temperature is then further increased to cause the matrix resin to cross-link and is then held at the chosen cure temperature until the cross linking process is complete. Once this is achieved heating is removed so that the temperature reduces by natural cooling. The vacuum must be maintained until 40°C is reached.

Typical Cure Profiles

The successful use of any one of these cure schedules will depend on part size and laminate construction. Heat up rates and dwell periods need to be tailored to take consideration of oven capacity, thermal mass of tool, laminate construction, etc. It is recommended that Gurit is contacted for further advice before utilising any of the suggested cure cycles.

Table 3. Cure Cycles

Minimum Cure Temperature (°C)			85
Minimum Cure Time (@ minimum cure temperature) (hours)			10
	Ultra Slow Cure Schedule	**Standard Cure Schedule**	**Fast Cure Schedule**
	0.3°C/minute ramp to 78°C	1°C/minute ramp to 78°C	2°C/minute ramp to 75°C
	4 hour dwell @ 78°C	78°C dwell for 1 $^{1}/_{2}$ hours	$^{1}/_{2}$ °C/minute ramp to 90°C
	0.3°C/minute ramp to 85°C	1°C/minute ramp to 85°C	2°C/minute ramp to 120°C
	10 hour dwell @ 85°C	10 hour dwell @ 85°C	45 minutes dwell @ 120°C
Total Time	17 hours	12 hours 30 minutes	1 hour 55 minutes



Mechanical Properties

Table 2. Mechanical Properties	
S-Core Type	**ST94/ S-Core/ 4 mm/ 1270mm**
Cure (time/temperature/pressure)	10 hours/ 85°C / 1 Bar
Process	Vacuum bag
Fibre weight (g/sqm)	300
SPRINT® Areal Weight (g/sqm)	2700
SPRINT® resin content (% bw)	89%
Core Shear (n/mm²)	8.57

Notes: This data is based on average values from testing and should not be used as minimums in design data. Panel construction for core shear data was ST95/WRE581T/41%/WRE581T either side of the S-Core.

Health and Safety

Although S-Core materials have improved health and safety characteristics when compared to wet lay-up epoxy systems and conventional prepregs, the following points must still be considered:-

1. Avoid skin contact - wear disposable nitrile gloves.

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.

This cleaning should be routine:

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

Gurit 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.

Storage Conditions & Outlife

Storage time and temperature will have an effect on resin reactivity and fibre impregnation. The product can be stored for two years at -18˚C or for 4 weeks at ambient temperature (20˚C) without affecting resin reactivity. However, at ambient temperature the material will begin to self-impregnate much sooner than this, depending on size and tension of the roll, resin content and fabric style. We recommend therefore, that rolls of S-Core are stored frozen at -18˚C and only brought to room temperature when pieces of material are required for use. Having cut the necessary pieces, we recommend that they are stored flat until use. Minimising the out time of the S-Core at room temperature will reduce the resin migration and preserve the handling properties. At all times when not being used S-Core should be stored in the freezers.

The self-impregnation of the S-Core can compromise its ability to generate high quality laminates as the air breathing properties decrease after a certain length of time at ambient temperature. Self-impregnation will increase the tack and reduce the drape of the material. While self-impregnation will vary from product to product, most S-Core materials stored at ambient temperatures will self-impregnate within approximately two weeks. It is recommended that ambient temperature storage is below 21°C as higher storage temperatures will induce premature self impregnation. Contact Gurit Technical Services for further advice.

Rolls of S-Core should be removed from freezer storage in sufficient time to allow them to warm up to ambient temperature before they are used. For most rolls an overnight defrost will suffice, however large rolls may take longer. Rolls of S-Core should always be supported horizontally by their cardboard tube, as laying the rolls on the floor or bench may result in lines of partially wet-out material at the areas of high pressure under the roll's own weight. Material should not be allowed to remain for long periods at ambient temperature before application, as this will compromise the handling properties.

Transport & Storage

When not in use SPRINT® products should be maintained at -18°C. Shelf life for S-Core is two years at -18°C and two weeks at 18-22°C.

Notice

SP-High Modulus is the marine business of Gurit (the company). All advice, instruction or recommendation is given in good faith but the Company only warrants that advice in writing is given with reasonable skill and care. No further duty or responsibility is accepted by the Company. All advice is given subject to the terms and conditions of sale (the Conditions) which are available on request from the Company or may be viewed at the Company's Website: www.gurit.com/termsandconditions_en.html.

The Company strongly recommends that Customers make test panels and conduct appropriate testing of any goods or materials supplied by the Company to ensure that they are suitable for the Customer's planned application. Such testing should include testing under conditions as close as possible to those to which the final component may be subjected. The Company specifically excludes any warranty of fitness for purpose of the goods other than as set out in writing by the Company. The Company reserves the right to change specifications and prices without notice and Customers should satisfy themselves that information relied on by the Customer is that which is currently published by the Company on its website. Any queries may be addressed to the Technical Services Department.

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.

UK
St Cross Business Park
Newport, Isle of Wight
United Kingdom PO30 5WU

T +44 (0) 1983 828 000
F +44 (0) 1983 828 100
E marine@gurit.com
W www.gurit.com

Australia
Unit 1A / 81 Bassett Street,
Mona Vale, 2103 NSW,
Australia

T +61 (0) 2 9979 7248
F +61 (0) 2 9979 6378
E sales-au@gurit.com
W www.gurit.com

New Zealand
32 Canaveral Drive, Albany,
Private Box 302-191,
North Harbour, 0751
Auckland, New Zealand

T +64 (0) 9 415 6262
F +64 (0) 9 415 7262
W www.gurit.com

Canada
175 rue Péladeau,
Magog, (Québec)
J1X 5G9, Canada

T +1 819 847 2182
F +1 819 847 2572
E info-na@gurit.com
W www.gurit.com